Chapter 13
Terrestrial Biological Resources

This chapter describes the environmental setting and study area for terrestrial biological resources; analyzes impacts that could result from construction, operation, and maintenance of the Delta Conveyance Project (project); and provides mitigation measures to reduce the effects of potentially significant impacts. This chapter also analyzes the impacts that could result from implementation of compensatory mitigation required for the project and describes any additional mitigation necessary to reduce those impacts, and analyzes the impacts that could result from other mitigation measures associated with other resource chapters in this Draft EIR.

13.0 Summary Comparison of Alternatives

Table 13-0 provides a summary comparison of quantitative impacts on some of the more sensitive terrestrial biological resources in the study area by alternative. These impacts include the permanent, long-term temporary (lasting more than 1 year; see discussion in Section 13.3.1.2, *Evaluation of Construction Activities*), and temporary loss or conversion of natural communities, habitat for special-status plant and wildlife species, and impacts on state- and federally regulated wetlands and other waters (aquatic resources). The table presents the CEQA findings after all mitigation is applied.

Constructing the water conveyance facilities would impact areas of natural communities, occurrences and habitat for special-status plants and wildlife species, and aquatic resources in the study area. The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would generally result in greater impacts on terrestrial biological resources relative to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5), which is largely due to the improvements on Bouldin Island and road improvements throughout the central alignment. Alternative 2a would result in the greatest impacts on terrestrial biological resources, which would be primarily due to the construction activities on Bouldin Island and the Southern Complex under Alternative 2a, and Alternative 5 the fewest. Alternative 4b would also have relatively fewer impacts, and for some resources, would have the fewest quantified impacts of all alternatives (e.g., valley/foothill riparian, greater and lesser sandhill cranes) primarily due to having only one intake, smaller reusable tunnel material (RTM) impacts associated with the Twin Cities Complex, and the smallest RTM footprint on Lower Robert's Island. Alternative 5 would have substantially fewer impacts on state- and federally regulated aquatic resources compared to the other alternatives (Table 13-0).

Implementation of the Compensatory Mitigation Plan (CMP) (Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources*) would compensate for the loss of natural communities, habitats for species, and aquatic resources. The CMP together with other mitigation measures and environmental commitments to avoid and minimize effects on terrestrial biological resources would reduce impacts for all alternatives to less than significant.

This chapter also considers the potential impacts of implementing the CMP, as well as other mitigation measures, on terrestrial biological resources and concludes that impacts under all alternatives would remain less than significant with mitigation.

Table ES-2 in the Executive Summary provides a summary of all impacts disclosed in this chapter.

1 **Table 13-0. Comparison of Impacts on Terrestrial Biological Resources by Alternative (acres/CEQA findings after mitigation)**

	Alternative								
Chapter 13 – Terrestrial Biological Resources	1	2a	2b	2c	3	4a	4b	4c	5
Impact BIO-1: Impacts of the Project on the Tidal Perennial Aquatic Natural Community	54.66/ LTS	67.43/ LTS	50.81/ LTS	53.42/ LTS	43.32/ LTS	56.59/ LTS	39.98/ LTS	42.54/ LTS	11.13/ LTS
Impact BIO-2: Impacts of the Project on Tidal Freshwater Emergent Wetlands	1.05/ LTS	0.87/ LTS	0.87/ LTS	0.87/ LTS	0.40/ LTS	0.40/ LTS	0.40/ LTS	0.40/ LTS	0.57/ LTS
Impact BIO-3: Impacts of the Project on Valley/Foothill Riparian Habitat	72.00/ LTS	75.02/ LTS	68.15/ LTS	71.14/ LTS	27.29/ LTS	30.62/ LTS	23.76/ LTS	26.73/ LTS	29.31/ LTS
Impact BIO-4: Impacts of the Project on the Nontidal Perennial Aquatic Natural Community	1.06/ LTS	1.44/ LTS	0.78/ LTS	0.96/ LTS	0.88/ LTS	1.26 LTS	0.60/ LTS	0.78/ LTS	1.68/ LTS
Impact BIO-5: Impacts of the Project on Nontidal Freshwater Perennial Emergent Wetland	9.62/ LTS	9.57/ LTS	9.05/ LTS	9.57/ LTS	0.85/ LTS	0.85/ LTS	0.33/ LTS	0.85/ LTS	0.75/ LTS
Impact BIO-6: Impacts of the Project on Nontidal Brackish Emergent Wetland	0/ NI	0/ NI	0/ NI	0/ NI	0/ NI	0/ NI	0/ NI	0/ NI	0/ NI
Impact BIO-7: Impacts of the Project on Alkaline Seasonal Wetland Complex	4.76/ LTS	4.76/ LTS	4.76/ LTS	4.76/ LTS	4.76/ LTS	4.76/ LTS	4.76/ LTS	4.76/ LTS	0.76/ LTS
Impact BIO-8: Impacts of the Project on Vernal Pool Complex	19.17/ LTS	19.17/ LTS	18.85/ LTS	19.17/ LTS	19.17/ LTS	19.17/ LTS	18.85/ LTS	19.17/ LTS	26.08/ LTS
Impact BIO-12: Impacts of the Project on Tidal Freshwater Emergent Wetland Plants [a]	6.41/ LTS	7.78/ LTS	5.80/ LTS	6.27/ LTS	4.17/ LTS	5.60/ LTS	3.62/ LTS	4.09/ LTS	1.49/ LTS
Impact BIO-14: Impacts of the Project on Vernal Pool Aquatic Invertebrates [b]	79.46/ LTS	82.81/ LTS	79.46/ LTS	79.46/ LTS	79.46/ LTS	82.81/ LTS	79.46/ LTS	79.46/ LTS	12.73/ LTS
Impact BIO-18: Impacts of the Project on Valley Elderberry Longhorn Beetle [c]	72.02/ LTS	75.02/ LTS	68.14/ LTS	71.14/ LTS	27.29/ LTS	30.61/ LTS	23.74/ LTS	26.72/ LTS	29.31/ LTS
Impact BIO-22: Impacts of the Project on California Tiger Salamander	115.26/ LTS	166.29/ LTS	115.26/ LTS	115.26/ LTS	115.26/ LTS	166.29/ LTS	115.26/ LTS	115.26/ LTS	78.65/ LTS
Impact BIO-33: Impacts of the Project on Greater Sandhill Crane and Lesser Sandhill Crane [d]	1,595.93 / LTS	1,805.05 / LTS	1,304.67 / LTS	1,478.58 / LTS	1,200.73 / LTS	1,403.38 / LTS	907.75 / LTS	1,083.31 / LTS	1,427.66 / LTS
Impact BIO-39: Impacts of the Project on Swainson's Hawk	3,105.23 / LTS	3,432.44 / LTS	2,811.70/ LTS	2,985.46 / LTS	2,812.20 / LTS	3,155.33 / LTS	2,484.99 / LTS	2,679.87/ LTS	1,811.00 / LTS

	Alternative								
Chapter 13 – Terrestrial Biological Resources	1	2a	2b	2c	3	4a	4b	4c	5
Impact BIO-51: Substantial Adverse Effect on State- or Federally Protected Wetlands and Other Waters through Direct Removal, Filling, Hydrological Interruption, or Other Means	226.33/ LTS	241.07/ LTS	217.03/ LTS	223.69/ LTS	168.86/ LTS	185.91/ LTS	159.50/ LTS	166.31/ LTS	60.98/ LTS

CEQA findings after mitigation is applied: NI = no impact; LTS = less than significant.

[a] Impact acres presented are for Mason's lilaeopsis modeled habitat.

[b] Project impact acres include permanent, long-term temporary, temporary, and indirect impacts for vernal pool aquatic invertebrates.

[c] Impact acres presented are for the riparian portion of the species model. The "other potential habitat" portion of the model was used to identify where additional shrubs may occur and not to quantify actual impacts on habitat.

[d] Impact acres presented are for greater sandhill crane modeled habitat.

13.1 Environmental Setting

This section describes the environmental setting for the terrestrial biological resources present in the study area. The section presents the natural communities and other land cover types, the special-status terrestrial wildlife and plants, and the terrestrial invasive plants found in the study area. A brief discussion of the historical modifications of ecosystem processes and functions in the study area is also included because it is crucial to understanding the current status of natural communities and terrestrial plants and wildlife addressed in the study area. Special-status plant and wildlife species considered for inclusion in the chapter, as well as their status, range, and potential to occur in the study area, are presented in Appendix 13A, *Special-Status Species with Potential to Occur in the Study Area*.

13.1.1 Study Area

The study area, defined as the area in which impacts may occur, primarily comprises the statutory Delta, as delineated under the Delta Protection Act (Wat. Code § 12220) as well as a few areas east of this boundary, to capture project infrastructure and areas to the southwest of the legal Delta to include the area around Bethany Reservoir for Alternative 5 (Mapbooks 13-1, 13-2, and 13-3).

Historical modifications of ecosystem processes and functions in the study area have had a great influence on the current conditions of natural communities and special-status species. A brief overview of major historical trends in terrestrial biodiversity is provided below.

Prior to the effects of hydraulic mining, flood control, and agricultural and urban development, the Delta was a large tidal marsh fed by California's two largest rivers, the Sacramento and the San Joaquin (Delta Stewardship Council 2013:2,3). The passage of the federal Swamp Land Act of 1850 and similar California legislation in 1861 led to the conversion of seasonally and tidally flooded lands into croplands protected by levees and the formation of channels to move water out of the Delta (Delta Stewardship Council 2013:8). Further land use changes and urbanization have led to the loss of 95% to 97% of the historical tidal marsh wetlands in the Delta (Whipple et al. 2012:93, Delta Stewardship Council 2013:8).

The abundance of native wildlife and plant species has been reduced over time as a result of the extensive historical modifications to and loss of the habitats in the study area. For example, large mammal species, such as tule elk (*Cervus canadensis nannodes*), have been reduced in numbers across the state and in the region and are limited to a reintroduced population of 300 elk on Grizzly Island, west of the study area (California Department of Fish and Wildlife 2018a:245). Small mammal species, such as riparian brush rabbit (*Sylvilagus bachmani riparius*), now occur only in scattered locations in the study area (California Department of Fish and Wildlife 2020a). Habitat for several rare, threatened, or endangered species, such as the California black rail (*Laterallus jamaicensis coturniculus*) and Mason's lilaeopsis (*Lilaeopsis masonii*), are now limited to remnant marshes in the study area. Habitat modification has also led to conditions that favored invasive species and reduced native species diversity (San Francisco Estuary Institute 2014:22).

Although fragmented, limited riparian habitat remains in the study area. Remnant patches of tall riparian trees, such as Fremont cottonwood (*Populus fremontii*), western sycamore (*Platanus racemosa),* and Goodding's black willow (*Salix gooddingii*), persist, but the recruitment of these species is greatly impaired by lack of active floodplain habitat and hydrologic modifications (e.g., straightened and dredged channels, dams, water diversions, sedimentation from hydraulic mining, levees separating riparian vegetation from channel). The number of species of nesting birds and mammals that depend on riparian habitat and that may be found in the study area has declined during the last 150 years (Bay Institute 1998:3-1). The western yellow-billed cuckoo (*Coccyzus americanus*), the least Bell's vireo (*Vireo bellii*), which are both listed by California Department of Fish and Wildlife (CDFW) as endangered and by U.S. Fish and Wildlife Service (USFWS) as threatened and endangered, respectively, and the yellow warbler (*Setophaga petechia*), a California species of special concern, formerly nested throughout the Central Valley (Grinnell and Miller 1944:186–187; Grinnell and Miller 1944:398–400; 51 *Federal Register* [FR] 16474). Now these species are considered locally extirpated as breeders in the study area (U.S. Fish and Wildlife Service 2006:7; Heath 2008:334; San Francisco Estuary Institute 2014:63), and occurrences within the study area are presumed to be migrating birds. Reports from early explorers describe the Delta and adjacent lands as an area with much greater wildlife species diversity than is currently found (Bay Institute 1998:2-70).

Grasslands with vernal pools, also known as vernal pool complexes, support high levels of endemic biodiversity in the Central Valley (Solomeshch et al. 2007:394–424). This habitat type generally occurs in the northeast, northwest, and southwest areas of the study area. The vernal pool landscape in the northeast and northwest portion of the study area has been affected to some degree by leveling for agricultural land uses (e.g., Stone Lakes National Wildlife Refuge). The grasslands that support vernal pools, including alkali seasonal wetlands, in the southwest study area has been fragmented by agricultural and residential development and by water management projects. Only limited habitat remains for vernal pool species, such as fairy shrimp and native plants. It is estimated that throughout the Central Valley, the acreage of grasslands with vernal pools has declined from 7 million acres during the 1700s to about 895,000 acres in 2005 (Holland 2009:1). Approximately 135,000 acres were estimated to have been lost from 1976 to 2005 (Holland 2009:3).

Most of the land in the study area has been converted to agricultural land uses, which provide limited habitat value to most species. Some species, however, including Swainson's hawk (*Buteo swainsoni)* and greater sandhill crane (*Grus canadensis tabida*), use the alfalfa and field crop areas for foraging. Besides changing land use, agricultural practices can include (1) building levees, which modify hydrology, (2) applying pesticides and fertilizers, which alters surface and groundwater quality (see Chapter 5, *Surface Water,* and Chapter 8, *Groundwater*) and may be toxic to certain species, reducing cover and prey availability (e.g., insects, rodents), and (3) other activities that can be detrimental to native plant and wildlife habitat.

13.1.2 Land Cover Types

In July 2020 land cover mapping data were compiled from multiple sources into a geographic information system (GIS) dataset that was used to (1) depict the land cover that occurs in the study area and (2) develop habitat models for special-status species that are known to or have a potential to occur in the study area. Land cover data consist of three general categories: natural communities, agricultural lands, and developed areas.

Natural communities are distinct and recurring assemblages of plants and animals associated with specific physical environmental conditions and ecological processes. A natural community occurs across a landscape where similar ecological conditions exist. The Wildlife and Natural Areas

Conservation Act defines a natural community as "a distinct, identifiable, and recurring association of plants and animals that are ecologically interrelated" (California Fish and Game Code [Fish & G. Code § 2702(d)).

Agricultural lands mapped in the study area consist primarily of croplands but also include some areas of ruderal or managed vegetation that are not crops.

Areas mapped as developed in the study area consist of areas of rural and urban residential, commercial, and industrial development as well as paved and unpaved roads and highways.

13.1.2.1 Land Cover Mapping Methods

Land cover data sources were selected that could provide the following:

- Natural community data at a fine enough scale for developing species habitat suitability models, especially for species with very specific habitat requirements.
- Agricultural data that identified individual fields by crop type, which would be used for wildlife species modeling.
- Land use data to capture all other developed and managed areas.

Natural Communities

The natural community types described in Section 13.1.2.2, *Natural Community Descriptions*, are based on the general habitat types developed for the CALFED Bay-Delta Program (2000) Ecosystem Restoration Program Volume 1 and the Multi-Species Conservation Strategy. The natural community types employed in this Draft EIR were aggregated from the more specific vegetation types obtained from two data sources: the Delta Vegetation and Land Use Update 2016 (Chico State Research Foundation Geographical Information Center 2019) and Great Valley Ecoregion Vegetation (Chico State Research Foundation Geographical Information Center 2018). The Delta vegetation dataset covers the majority of the study area. The Great Valley dataset covers the few small areas of the project that are east of the statutory Delta. The Delta vegetation is mapped to the alliance level following *A Manual of California Vegetation* (Sawyer et al. 2009) when possible, otherwise it is left at the group level (based on the National Vegetation Classification Standard). The Great Valley dataset also mapped vegetation using the alliances and group levels defined in *A Manual of California Vegetation* (Sawyer et al. 2009). The land cover for the portion of the study area associated with the Bethany Reservoir alternative (Alternative 5) to the west of the statutory Delta was developed from a combination of existing ICF land cover data areas digitized in GIS utilizing the same natural community naming conventions (ICF 2017; ICF 2018) but not to the alliance or group levels in Sawyer et al. 2009.

The vegetation alliances and group levels (vegetation communities) in these datasets that occur within the study area were aggregated by natural community type based on their ecological associations with these natural communities. When a vegetation map polygon could fit into multiple natural community types, it was assigned to the most appropriate category using either geographic boundaries or manually by a botanist and a GIS specialist who reviewed the locations of the vegetation data relative to adjoining communities. For example, the alliance *Lepidium latifolium* can occur in tidal brackish emergent wetland, tidal freshwater emergent wetland, valley/foothill riparian, and nontidal freshwater perennial emergent wetland; however, if review of a *Lepidium* *latifolium* alliance polygon found that it was located adjacent to freshwater marsh on the water side of a levee, it was assigned to tidal freshwater emergent wetland.

The following geographic boundaries were used to further differentiate where vegetation communities would be assigned.

- For tidal vegetation communities that occur in both brackish and freshwater emergent wetlands, a geographic boundary was created that spans Suisun Bay from the area near Collinsville in Solano County to New York Point in Contra Costa County. Vegetation communities west of this break are considered brackish, and all those to the east are considered freshwater.
- For vegetation communities that occur in both tidal and nontidal areas, a GIS layer of Delta levees (California Department of Water Resources 2019) was used to differentiate these communities. Wetlands on the water side of the levee were defined as tidal, whereas wetlands on the landward side of the levee were defined as nontidal.

Vernal Pool Complex

To identify vernal pool complexes in the study area, a GIS layer of mapped vernal pool complexes covering the entire study area was used (Witham et al. 2014). This dataset was developed based on aerial imagery collected in 2012. ICF staff reviewed this data relative to the CDFW vegetation community data from 2016 to ensure that all areas mapped as vernal pool complexes contained vegetation data consistent with being part of a vernal pool complex. This action was conducted in part because the Delta vegetation dataset was more recent (based on aerial imagery from 2016). Also, the Witham et al. (2014) mapping was conducted without minimum mapping units, whereas the polygons for the Delta vegetation dataset had a minimum mapping unit of 0.25 acre (Chico State Research Foundation Geographical Information Center 2019) and the Great Valley dataset had a minimum mapping unit of 1.0 acre (Chico State Research Foundation, Geographical Information Center 2018). When falling within an area mapped as vernal pool complex, the following vegetation polygons were assigned to the vernal pool complex natural community, rather than the grassland natural community.

- California mixed annual/perennial freshwater vernal pool/swale bottomland
- California annual herb/grass group
- Mediterranean California naturalized annual and perennial grassland.

Because the area around Clifton Court Forebay contains a mosaic of vernal pools, alkaline seasonal wetlands, and grasslands that provide habitat for vernal pool species, the following alliance types were also included within the vernal pool complex natural community if they fell within one of the Witham et al. (2014) vernal pool complexes.

- *Allenrolfea occidentalis*
- *Distichlis spicata*
- *Frankenia salina*
- *Suaeda moquinii*
- Western North American disturbed alkaline marsh and meadow

During the review of a draft of this data layer, some areas mapped as California mixed annual/perennial freshwater vernal pool/swale bottomland were found occurring outside of the vernal pool complex polygons mapped by Witham et al. (2014). A review of aerial photographs indicated these areas appeared to support vernal pools and were therefore assigned to the vernal pool complex natural community. These vegetation polygons were incorporated with the Witham et al. (2014) data to produce a new vernal pool complex layer for use in the analysis.

Aquatic Resources Delineation Data

California Department of Water Resources (DWR) conducted an aquatic resources delineation for the project within a portion of the project study area that contained all potential alternative alignments and associated infrastructure (delineation study area) (California Department of Water Resources and GEI Consultants Inc. 2020). DWR submitted the delineation to the U.S. Army Corps of Engineers (USACE) using the Preliminary Jurisdictional Determination process, which is a USACE determination that does not address questions of jurisdiction, thereby treating all aquatic resources within the review area that could be jurisdictional as if they are jurisdictional for purposes of permit processing (33 Code of Federal Regulations [CFR] § 331.2) (California Department of Water Resources and GEI Consultants Inc. 2020:iii). The initial delineation was verified by USACE on June 18, 2020; however, because of expansions of the project to the east and west, additional areas were delineated in late 2020 (California Department of Water Resources 2020a) and in 2021 (California Department of Water Resources 2021). The initial delineation was also submitted to the State Water Resources Control Board (State Water Board) for their review and concurrence. Following their review, the State Water Board concurred that the aquatic resources mapped by DWR would be considered to include all waters of the State. The delineation study area used for CEQA analysis is 143,485 acres and represents approximately 19% of the project study area. For the purposes of the land cover mapping in the study area, the aquatic resources data replaced all other land cover datasets with which it intersected. This resulted in a conflict between some natural communities mapped in the Delta Vegetation and Land Use Update 2016 and wetlands mapped by DWR. The differences are largely due to differences in mapping methods (e.g., underlying aerial datasets used) and minimum mapping units, which result in disagreement on the extent of specific polygons. This resulted in small areas that CDFW originally mapped as a wetland land cover type that DWR considered to be non-wetland and other areas that DWR considered to be a wetland but that CDFW did not map as a wetland type. The majority of these small areas consist of slivers of upland, developed, or agricultural areas. These differences account for a total of 1,592 acres in the delineation study area, or approximately 1.2% of the mapped land cover in the delineation study area. Due to the relatively small amount of area, considering the scale of the analysis, and that acres of natural community and species habitat affected would be verified once access is obtained for all work areas, these slivers in the GIS dataset were not corrected for the analysis and it is assumed that the GIS land cover dataset is sufficient for estimating effects on terrestrial biological resources. Outside of the delineation study area, data from the vegetation datasets described above (Chico State Research Foundation, Geographical Information Center 2018, 2019; ICF 2017, 2018) were used to identify areas of wetlands and waters. More detail on the aquatic resources delineation is presented in Section 13.1.4, *Wetlands and Other Waters of the United States*.

Seasonal Wetlands

DWR's aquatic resources delineation identified 2,319 acres (Table 13-1) of seasonal wetlands in the delineation study area (California Department of Water Resources and GEI Consultants Inc. 2020; California Department of Water Resources 2020a, 2021). These seasonal wetlands were defined as wetlands having seasonal wetland hydrology and dominated by herbaceous wetland plants that are not vernal pool endemics. Aerial imagery of the seasonal wetlands was reviewed to further define the habitat type based on evidence of past and recent disturbance and on the presence or absence of vegetation. Seasonal wetlands that appeared to be in crops or recently fallowed were treated as farmed wetlands and assigned to the Agricultural land cover type. Seasonal wetlands that appeared to be vegetated by natural vegetation that had not been disturbed for several years or longer were assigned to the "Other Seasonal Wetland" natural community type.

Agricultural Areas

The primary source of agricultural data for the study area comes from the 2018 crop mapping conducted by Land IQ (Land IQ and California Department of Water Resources 2021). This data consists of individual fields mapped to crop type using high-resolution (2-meter pixel) satellite imagery. This dataset does not map non-crop agricultural land cover data, such as farm roads, outbuildings (e.g., barns, sheds), feedlots, and dairies, which are captured under the "developed" land cover type. These gaps in agricultural areas were filled in using 2017 land use data produced by Land IQ for DWR (Land IQ 2019), data from DWR's *Draft San Joaquin County Land Use Survey 2017* (California Department of Water Resources 2020b) and the *Sacramento County Land Use Survey 2015* (California Department of Water Resources 2016). In addition, the agricultural data includes areas adjacent to crops that are vegetated by ruderal vegetation or that are heavily managed and do not fall into a natural vegetation community type. Data to fill this gap was produced using a combination of satellite and aerial imagery resources together with information collected on the ground.

Also included under the agricultural land cover type are agricultural ditches, which were mapped in DWR's aquatic resources delineation.

Crop data within the project alternative footprints was reviewed to determine whether there have been any recent conversions of annual crops to more permanent crops (i.e., orchards and vineyards), because permanent crops typically provide minimal habitat value for special-status wildlife species. These areas were reviewed using high-resolution imagery taken in 2018–2019 (Maxar 2020) and reassigned to a more appropriate cover type, when conversions were identified.

Other Land Uses

Developed

The only other land use type included in the final land cover map is "developed." As mentioned above, the developed land cover includes areas mapped as "semi-agricultural/ROW," which includes farm roads, outbuildings (e.g., barns, sheds), feedlots, and dairies. This mapping comes from the 2017 land use data produced by Land IQ for DWR (Land IQ 2019). "Developed" also includes urban land cover that comes from three datasets: Chico State Research Foundation, Geographical Information Center 2019, Chico State Research Foundation Geographical Information Center 2018, and Land IQ 2019. Additional urban areas were identified by reviewing aerial imagery for more recent urbanization using the 2018–2019 high-resolution imagery (Maxar 2020).

13.1.2.2 Natural Community Descriptions

The natural communities are described below, including how each is used by common and special-status plant and wildlife species. The acreages of each natural community within the study area are presented in Table 13-1. The distribution of each natural community in the study area is shown in Mapbooks 13-1, 13-2, and 13-3.

Table 13-1. Area (in acres) of Natural Community Types in the Study Area

Natural Community Type	Study Area Total	Percentage of the Study Area
Tidal perennial aquatic	61,722	8.3%
Tidal brackish emergent wetland	736	0.1%
Tidal freshwater emergent wetland	9,604	1.3%
Valley/foothill riparian	20,458	2.7%
Nontidal perennial aquatic	8,226	1.1%
Nontidal brackish emergent wetland	3,151	0.4%
Nontidal freshwater perennial emergent wetland	27,266	3.7%
Alkaline seasonal wetland complex	468	0.1%
Vernal pool complex	14,439	1.9%
Other seasonal wetland	2,319	0.3%
Grassland	38,295	5.1%
Agricultural	432,119	58.1%
Developed	125,431	16.9%
Total	744,236	100%

Tidal Perennial Aquatic

The tidal perennial aquatic natural community is defined as deep-water aquatic (greater than 10 feet deep from mean lower low tide [i.e., 19-year average of the lowest of the two low tides during the daily tidal cycle]) and shallow aquatic (less than or equal to 10 feet deep from mean lower low tide) zones of estuarine bays, river channels, and sloughs. Under present operations, tidal perennial aquatic in the Delta is mainly freshwater habitat, with brackish and saline conditions occurring in the western Delta at times of high tides and low flows into the western Delta.

Ten vegetation units mapped in the study area occur within the tidal perennial aquatic natural community, none of which have special status. Aquatic vegetation in the study area can be separated into two general categories: floating aquatic vegetation and submerged aquatic vegetation. The geographic extent of this vegetation changes frequently because it depends on highly variable physical factors, such as depth, turbidity, water flow, salinity, substrate, and nutrient availability. It is also subject to management actions, including vegetation clearing using mechanical methods and herbicide treatments.

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

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

Submerged aquatic plants have leaves and stems that are fully submerged for all or nearly all of their life cycle, and they often have root systems reduced to minimal anchorage structures in pond or riverbeds. Many native submerged aquatic species, including pondweeds (e.g., sago pondweed [*Stuckenia pectinata*]) and stoneworts (green algae structurally similar to vascular plants), are highly valuable food plants for waterfowl and nursery habitat for aquatic invertebrates and fish. Submerged aquatic vegetation may form patches or beds of extensive bottom "canopy" habitat. In the Delta, nonnative invasive submerged aquatic species dominate and replace native species in naturally open-water slough beds. Brazilian waterweed (*Egeria densa*) and alligatorweed (*Alternanthera philoxeroides*), are invasive and extremely competitive with native species and are capable of surviving at great water depths. These plants have structural characteristics that create suitable cover and shelter for predatory nonnative fish in tidal slough beds.

Wildlife species associated with tidal aquatic habitats vary with water depth and other habitat features. Deeper open-water areas without vegetation provide foraging habitat for wildlife such as terns, gulls, osprey, diving ducks (e.g., ring-necked duck [*Aythya collaris*] and canvasback [*Aythya valisineria*]), and river otters (*Lontra canadensis*), which feed primarily on fish, crayfish, and other aquatic organisms. Shallower water with submerged or floating aquatic vegetation provides foraging habitat for reptiles, such as western pond turtle (*Actinemys marmota*), and dabbling ducks, such as American widgeon (*Mareca americana*) and northern pintail (*Anas acuta*), which feed on a variety of invertebrates and plant material. Special-status wildlife species occurring in tidal perennial aquatic natural community include giant garter snake (*Thamnophis gigas*) and western pond turtle. No special-status plants are characteristic of this community. The community's distribution in the study area is mapped in Mapbooks 13-1, 13-2, and 13-3.

This community may meet the definition of jurisdictional waters of the United States and be regulated by USACE under Section 404 of the Clean Water Act (CWA). It may also be regulated by the State Water Board as waters of the State under the Porter-Cologne Water Quality Control Act (Porter-Cologne Act).

Tidal Mudflat

Tidal mudflat occurs at the edges between tidal perennial aquatic, tidal freshwater emergent, and tidal brackish emergent wetlands. Because of the land cover datasets used and their underlying resolutions, tidal mudflat was not mapped separately from these natural community types and, therefore, is not addressed separately in detail in this chapter.

Tidal Brackish Emergent Wetland

The tidal brackish emergent wetland natural community is a transitional community between tidal perennial aquatic and terrestrial upland communities. In the study area, tidal brackish emergent wetland exists in the San Francisco Bay saltwater/Delta freshwater mixing zone that extends from near Collinsville westward to the limits of the statutory Delta. Tidal brackish emergent wetland is present on the south side of Suisun Bay. The distribution of tidal brackish emergent wetland in the study area is mapped in Mapbooks 13-1, 13-2, and 13-3.

The tidal brackish emergent wetland community in the study area is found on undiked islands, such as Chipps Island. Tidal brackish emergent wetland in the study area is characterized by tall herbaceous wetland plant species that line the channels down to the depth of mean lower low tide. Dominant plant species include hard-stem bulrush (*Schoenoplectus acutus*), California bulrush (*Schoenoplectus californicus*), common reed (*Phragmites australis*), and cattails (*Typha* sp.) (Whitcraft et al. 2011:14). Dominant species present between the channels and the marsh plain include pickleweed (*Salicornia* sp.), saltgrass (*Distichlis spicata*), saltmarsh dodder (*Cuscuta salina*), fathen (*Atriplex prostrata*), and Baltic rush (*Juncus balticus* subsp. *ater*). The marsh plain is usually free of standing water but may be flooded at very high tides. Wildlife use of channels is similar to that of tidal perennial aquatic natural community, especially in larger channels. On the marsh plain and in channels with vegetative cover, typical wildlife present include ornate shrew (*Sorex ornatus*), song sparrow (*Melospiza melodia*), and red-winged blackbird (*Agelaius phoeniceus*). Several special-status plant and wildlife species are found within the tidal brackish emergent wetland natural community, including salt marsh harvest mouse (*Reithrodontomys raviventris*) and Mason's lilaeopsis. The community's distribution is mapped in Mapbooks 13-1, 13-2, and 13-3.

This community may meet the definition of jurisdictional waters of the United States and be regulated by the USACE under Section 404 of the CWA. It may also be regulated by the State Water Board as waters of the State under the Porter-Cologne Act.

Tidal Freshwater Emergent Wetland

The tidal freshwater emergent wetland natural community is typically a transitional community between tidal perennial aquatic and valley/foothill riparian or terrestrial upland communities across a range of hydrologic and soil conditions. In the study area, the tidal freshwater emergent wetland community often occurs at the shallow, slow-moving or stagnant edges of freshwater waterways or ponds in the intertidal zone and is subject to frequent long-duration flooding. The distribution of tidal freshwater emergent wetland in the study area is mapped in Mapbooks 13-1, 13-2, and 13-3.

Tidal freshwater emergent wetland vegetation naturally occurs along a hydrologic gradient in the transition zone between open water and terrestrial vegetation such as grasslands or woodlands. In the study area, there are abrupt transitions to agricultural cover, managed wetlands, and boundaries formed by levees and other artificial landforms. Twelve vegetation units mapped in the study area fall within the tidal freshwater emergent wetland natural community.

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

Low-elevation tidal freshwater emergent wetland typically is dominated by tules and occasionally includes species of cattails. They are highly productive but support few species other than tules that tolerate deep, prolonged tidal flooding. The middle-elevation tidal freshwater emergent wetland is more diverse in plant species (e.g., bur-reed [*Sparganium* sp.], broadleaf arrowhead [*Sagittaria latifolia],* and water smartweed [*Persicaria amphibia*]), even though this community may also be dominated by tules (*Schoenoplectus* spp.).

Middle-elevation tidal freshwater emergent wetland is less abundant than low-elevation tidal freshwater emergent wetland and often represents a more mature marsh condition with long periods of peat accumulation or sediment deposition. Historically, this plant community was much more widespread, but much of its habitat has been converted to other land uses, such as agriculture. Invasive nonnative plants, such as common reed (*Phragmites australis*) and yellow flag iris (*Iris pseudacorus*), tend to invade this species-rich freshwater zone. The middle-elevation tidal freshwater emergent wetland zone grades into the uppermost end of tidal freshwater marsh (high-elevation intertidal marsh zone).

The high-elevation tidal freshwater emergent wetland zone can be dominated by grass and grasslike species, such as Baltic rush, creeping wildrye (*Elymus triticoides*), and saltgrass. It typically includes large patches of yerba mansa (*Anemopsis californica*) and salt heliotrope (*Heliotropium curassavicum*). Special-status plant species commonly found in this plant community include Suisun marsh aster (*Symphyotrichum lentum*) and woolly rose-mallow (*Hibiscus lasiocarpus* var. *occidentalis*). Large thickets of nonnative Himalayan blackberry (*Rubus armeniacus*) invade high-elevation tidal freshwater emergent wetland, converting the marsh to riparian scrub thickets. High-elevation tidal freshwater emergent wetland may naturally grade into low-elevation grasslands (dense stands of saltgrass and creeping wildrye) or seasonal wetland transition zones, or it may end abruptly at the edges of steep levees or eroded riverbanks. This high-elevation type of tidal freshwater marsh is also rare but is well developed in a few locations in the Delta.

Wildlife species composition in sparsely vegetated areas in low-elevation tidal freshwater emergent wetland is similar to the composition described above under tidal perennial aquatic natural community. Other wildlife that use these productive wetlands as foraging habitat and the dense vegetation as cover, especially in the low and middle elevations, include western pond turtle, wading birds (egrets and herons), waterfowl (ducks, geese, and swans), shorebirds (e.g., rails, plovers, sandpipers), and perching birds. Common nesting birds include red-winged blackbird, marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), and black-crowned night heron (*Nycticorax nycticorax*). American beaver (*Castor canadensis*) and muskrat (*Ondatra zibethicus*) forage on marsh plants and use them for cover and den material. Several special-status plant and wildlife species occur in the tidal freshwater emergent wetland natural community, including side-flowering skullcap (*Scutellaria lateriflora*) and giant garter snake.

This community may meet the definition of jurisdictional waters of the United States and be regulated by the USACE under Section 404 of the CWA. It may also be regulated by the State Water Board as waters of the State under the Porter-Cologne Act.

Valley/Foothill Riparian

Broadly defined, the valley/foothill riparian natural community is often a transition zone between aquatic and upland terrestrial habitat and is found in a wide range of geologic, soil, and other environmental conditions (e.g., variable light and nutrient availability) throughout the study area (Bay Institute 1998:2-27–2-29; Vaghti and Greco 2007:425–455). The current extent of the valley/foothill riparian community represents a small proportion of its historical extent in the study area. Historically, valley/foothill riparian vegetation was distributed along all major and minor waterways and floodplains throughout the study area (Bay Institute 1998:2-12). The loss of riparian vegetation throughout California, estimated to be 85%–95%, was caused by human activities, such as river and stream channelization, levee building, vegetation removal to stabilize levees, and extensive agricultural and urban development (Riparian Habitat Joint Venture 2004:6).

Valley/foothill riparian communities occur in the study area most often as long, linear patches separating other terrestrial biological communities and agricultural or urban land, or in low-lying, flood-prone patches near river bends, canals, or breached levees (Mapbooks 13-1, 13-2, and 13-3). An exception is in conservation areas where large tracts of riparian forest are being restored, such as the Cosumnes River Preserve. Generally, however, this natural community is located along many of the major and minor waterways, oxbows, and levees in the study area, including the Sacramento River, the Sacramento River Deep Water Ship Channel, the Yolo Bypass, and channels of the San Joaquin River and the Delta. Patches of riparian vegetation are also found on the interior of leveed Delta islands, along drainage channels and pond margins, and in abandoned, low-lying fields.

Thirty-six vegetation units mapped in the study area fall within the valley/foothill riparian natural community. These assemblages are discussed below in general terms under the riparian scrub, and riparian forest and woodland subcategories. Several special-status wildlife species occur in valley/foothill riparian natural community, including valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), Swainson's hawk, and white-tailed kite (*Elanus leucurus*). No special-status plants are characteristic of this natural community, although many special-status plants in tidal wetlands occur where tidal wetlands and riparian communities intergrade. In addition, 15 vegetation alliances occurring in the valley/foothill riparian natural community are considered to have special status (Box Elder Alliance, Buttonwillow Alliance, California Rose Alliance, California Sycamore Alliance, Wild Grape Alliance, Fremont Cottonwood Alliance, Goodding Willow Alliance, Gumplant Alliance, Hind's Walnut Alliance, Oregon Ash Alliance, Red Osier Alliance, Red Willow Alliance, Shining Willow Alliance, Valley Elderberry Alliance, Valley Oak Alliance). The community's distribution in the study area is mapped in Mapbooks 13-1, 13-2, and 13-3.

Riparian Scrub

Riparian scrub in the study area consists of woody riparian shrubs forming dense thickets. Species may include willows (*Salix* sp.), blackberries (*Rubus* sp.), buttonwillow (*Cephalanthus occidentalis*), mulefat (*Baccharis salicifolia* subsp. *salicifolia*), and other shrub species. These thickets are usually associated with higher, sloping, better-drained edges of marshes, or topographic high areas, such as levee remnants and elevated flood deposits. Thickets may occur along shorelines of ponds or banks of channels in tidal or nontidal freshwater habitats. Willow thickets and dead branches or trees (snags) in riparian woodland provide important habitat for a wide range of wildlife species. During extreme floods, dense and tall riparian willow thicket canopies may remain partially above water levels, trap debris and sediment, and act as permeable barriers to wave energy traveling across open water. Nonnative Himalayan blackberry thickets are a common element of riparian scrub communities along levees and throughout pastures within the levees. Understory shrubs provide cover for mammals such as desert cottontail (*Sylvilagus audubonii*) and for ground-nesting birds, such as spotted towhee (*Pipilo maculatus*), that forage among the vegetation and leaf litter.

Riparian scrub in areas subject to frequent flooding or ponding also may meet the definition as wetlands subject to USACE jurisdiction under Section 404 of the CWA, and waters of the State under the Porter-Cologne Act.

Riparian Forest and Woodland

The study area supports winter-deciduous, broadleaved trees, up to 60 feet in height in the riparian forest and woodlands, where the canopy cover ranges from relatively open to very dense. At present, riparian forest and woodland communities dominated by tree species are mostly limited to narrow bands along sloughs, channels, rivers, and other freshwater features throughout the study area. Cottonwoods and willow mixed with Oregon ash (*Fraxinus latifolia*), box elder (*Acer negundo*), and California sycamore (*Platanus racemosa*) are the most common riparian trees in central California. Valley oak (*Quercus lobata*) is common in riparian areas in the Central Valley, as are species of walnut. Riparian woodland often has a shrubby understory consisting of the similar species discussed above in riparian scrub. Equivalent communities, as described by Holland (1986:55-57), include great valley cottonwood riparian forest, great valley mixed riparian forest, great valley oak riparian forest, and white alder riparian forest.

Riparian habitat supports a wide variety of wildlife species. It provides structure and function for live-in habitat; provides cover, food, and water resources; and also serves as important dispersal, movement, and connectivity habitat for a wide range of taxonomic groups ranging from invertebrates to birds to large mammals. Riparian trees are used for nesting, foraging, and protective cover by many bird species, including black-headed grosbeak (*Pheucticus melanocephalus*), tree swallow (*Tachycineta bicolor*), Bewick's wren (*Thryomanes bewickii*), and Cooper's hawk (*Accipiter cooperii*). Riparian canopies provide nesting and foraging habitat for common mammals, such as western gray squirrel (*Sciurus griseus*) as well as birds, bats, and terrestrial and semi-aquatic mammals. Understory shrubs provide cover for mammals such as desert cottontail and for ground-nesting birds, such as spotted towhee (*Pipilo maculatus*), that forage among the vegetation and leaf litter. Mammals such as raccoon (*Procyon lotor*) and opossum (*Didelphis virginiana*) and many other species spanning many taxa benefit from the structure and cover as well as the variety of plants, berries, invertebrates, small mammals, and bird eggs that provide food for a wide variety of species.

Riparian forest and woodlands are considered sensitive communities because they have sustained considerable losses throughout the state. Riparian forest and woodland that is subject to frequent flooding or ponding may also qualify as wetlands subject to USACE jurisdiction under Section 404 of the CWA, and waters of the State under the Porter-Cologne Act.

Nontidal Perennial Aquatic

Nontidal perennial aquatic natural communities in the Delta can range in size from small ponds in uplands to large lakes, such as North and South Stone Lakes. The nontidal perennial aquatic natural community can be found in association with any terrestrial habitat and can transition into nontidal freshwater perennial emergent wetland and valley/foothill riparian. This natural community is differentiated from the tidal perennial aquatic natural community described above by a physical separation from the tidally influenced sloughs and channels in the Delta. Ten vegetation mapping units fall within the nontidal perennial aquatic natural community in the study area.

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

Nontidal perennial aquatic natural community provides foraging habitat and winter roosting habitat for wildlife that depends on other habitats for breeding and cover. Typical species include pied-billed grebe (*Podilymbus podiceps*), western grebe (*Aechmophorus occidentalis*), ruddy duck (*Oxyura jamaicensis*), canvasback, bufflehead (*Bucephala albeola*), and river otter. Several special-status plant and wildlife species occur in the nontidal perennial aquatic natural community, including watershield (*Brasenia schreberi*), western pond turtle, giant garter snake, and California red-legged frog (*Rana draytonii*). The community's distribution in the study area is mapped in Mapbooks 13-1, 13-2, and 13-3.

This community may meet the definition of jurisdictional waters of the United States and be regulated by USACE under Section 404 of the CWA. It may also be regulated by a California Regional Water Quality Control Board (RWQCB) as waters of the State under the Porter-Cologne Act.

Nontidal Brackish Emergent Wetland

The nontidal brackish emergent wetland natural community is a transitional community between tidal perennial aquatic and terrestrial upland communities. These emergent wetlands typically occur on the land side of the Delta levees. In the study area, nontidal brackish emergent wetland occurs mostly in the former tidelands near Collinsville but is also scattered along coastal areas of Contra Costa County and in the Yolo Basin. The distribution of nontidal brackish emergent wetland in the study area is mapped in Mapbooks 13-1, 13-2, and 13-3.

Nontidal brackish emergent wetlands in the study area are found in areas that were formerly tidal but have been disconnected from tidal action by dikes or other hydrological changes, similar to the alkaline seasonal wetlands in Contra Costa County (Stanford et al. 2011:61–63). The soils remain highly saline, but the hydrology is currently seasonal and driven by precipitation and other nontidal sources. The characteristic plant species of nontidal brackish emergent wetland include pickleweed, saltgrass, fathen (*Atriplex prostrata*), alkali heath (*Frankenia salina*), and common reed. Common wildlife present include ornate shrew, song sparrow, and red-winged blackbird. Special-status wildlife species occurring in nontidal brackish perennial emergent wetland natural community include California black rail and tricolored blackbird (*Agelaius tricolor*).

This community may meet the definition of jurisdictional waters of the United States and be regulated by the USACE under Section 404 of the CWA. It may also be regulated by a California RWQCB as waters of the State under the Porter-Cologne Act.

Nontidal Freshwater Perennial Emergent Wetland

The nontidal freshwater perennial emergent wetland community is composed of permanently saturated wetlands, including meadows, dominated by emergent plant species that do not tolerate permanent saline or brackish conditions (CALFED Bay-Delta Program 2000:140). Thirteen vegetation mapping units fall within this natural community. Nontidal freshwater perennial emergent wetland communities in the study area occur in small fragments along the edges of the nontidal perennial aquatic and valley/foothill riparian natural communities (Mapbooks 13-1, 13-2, and 13-3). These emergent wetlands typically occur on the land side of the Delta levees. Shallow emergent wetlands (i.e., water less than 3 feet deep) are dominated by thick, tall, highly productive stands of tules and cattails.

Much of the nontidal freshwater perennial emergent wetland that occurs in the study area is disturbed, either through hydrologic disturbance or by physical disturbances. Broad, deeply flooded areas that are covered by open water most of the year and that develop emergent mud beds late in the growing season effectively alternate between seasonal ponds and freshwater marshes. Physical disturbances are direct, such as channel dredging, or indirect as a result of adjacent agricultural, commercial, or residential activities. Disturbed nontidal freshwater perennial emergent wetland that occurs in ditches supports a higher proportion of cattails than undisturbed nontidal freshwater marshes. Characteristic forb and grasslike species associated with nontidal freshwater perennial emergent wetland include a mix of native and nonnative species, such as cocklebur (*Xanthium strumarium*), curly dock (*Rumex crispus*), several knotweed species (*Polygonum* sp.), common spikerush (*Eleocharis macrostachya*), rabbit-foot grass (*Polypogon monspeliensis*), and dallisgrass (*Paspalum dilatatum*). The higher elevation edges of freshwater marsh gradients may be characterized by abrupt transitions to terrestrial vegetation, or they may transition into vegetation of alkaline seasonal wetlands, riparian woodland, or riparian scrub.

Nontidal freshwater perennial emergent wetland provides important foraging, breeding, and winter roosting habitat for a variety of wildlife species; dense emergent vegetation provides concealment from predators. Reptiles and amphibians associated with marsh habitats include common garter snake (*Thamnophis sirtalis*), Sierran treefrog (*Pseudacris sierra*), and bullfrog (*Lithobates catesbeianus*). Locally common to abundant wading birds (egrets and herons), waterfowl (ducks, geese, and swans), shorebirds (e.g., rails, plovers, sandpipers), and perching birds (e.g., red-winged blackbird, marsh wren, common yellowthroat) use nontidal marsh habitat for foraging, cover, and nesting. American beavers and muskrats forage on marsh plants and use them for cover and den material. River otters forage on fish, amphibians, and invertebrates and use the cover provided by thickets and tall wetland plants. Several special-status plant and wildlife species occur in nontidal freshwater perennial emergent wetland natural community, including Sanford's arrowhead (*Sagittaria sanfordii*), woolly rose-mallow (*Hibiscus lasiocarpos* var. *occidentalis*), California red-legged frog, northern harrier (*Circus hudsonius*), and Modesto song sparrow (*Melospiza melodia mailliardi*).

This community may meet the definition of jurisdictional waters of the United States and regulated by the USACE under Section 404 of the CWA. It may also be regulated by the State Water Board as waters of the State under the Porter-Cologne Act.

Alkaline Seasonal Wetland Complex

Alkaline seasonal wetland complex occurs on alkaline or salt-rich soils with ponded or saturated soil conditions for prolonged periods during the growing season. The vegetation of alkaline seasonal wetlands is composed of high pH-tolerant or salt-tolerant plant species that are also adapted to wetland conditions. This natural community "complex" includes both seasonally ponded and saturated wetlands and the surrounding matrix of grassland. It is typically found where salts accumulated through evaporation, or in upland locations, such as basin rims and seasonal drainages, that receive salts in runoff from distant upslope salt-bearing rock. Extensive areas of alkaline seasonal wetlands were historically present near the Clifton Court Forebay, but only about 30% of the historical extent remain (Stanford et al. 2011:60–63, Whipple et al. 2012:193–194) (Mapbooks 13-1, 13-2, and 13-3).

The composition of alkaline seasonal wetland complex can be highly variable from site to site, and these wetlands may include species typically associated with the Holland communities of alkaline grassland, alkaline sink, chenopod scrub, brackish marsh, valley sink scrub, and alkaline vernal pools (Holland 1986:18–19, 35, 38–39). Nine vegetation mapping units are associated with this natural community. Alkaline seasonal wetlands can support a richness of species, and they often provide suitable habitat for several special-status plant species. Dominant grasses in alkaline seasonal wetlands and surrounding grassland include saltgrass and wild barley (*Hordeum* spp.). The associated herb and shrub cover consists of salt-tolerant species, including saltbush (*Atriplex* sp.), alkali heath, alkali weed (*Cressa truxillensis*), alkali mallow (*Malvella leprosa*), and common spikeweed (*Centromadia pungens*). The study area includes small stands of alkaline sink scrub (also known as valley sink scrub), which are characterized by iodine bush (*Allenrolfea occidentalis*). Alkaline seasonal wetland complex is rare in the study area, occurring primarily around Clifton Court Forebay and southern Solano County.

During winter and spring, when alkaline seasonal wetlands are filled with water, plants, and aquatic life, the wetlands act as an important foraging habitat for a variety of common wildlife species, including great blue heron (*Ardea herodias*) and great egret (*Ardea alba*). Alkaline seasonal wetlands support common wildlife species, including dabbling ducks, invertebrates such as various native bee species, and reptiles and amphibians, such as the common garter snake and Sierran treefrog. Several special-status plant and wildlife species occur in alkaline seasonal wetland complex natural community, including San Joaquin spearscale (*Extriplex joaquinana*) and California linderiella (*Linderiella occidentalis*).

This community may meet the definition of jurisdictional waters of the United States and be regulated by the USACE under Section 404 of the CWA. It may also be regulated by a California RWQCB as waters of the State under the Porter-Cologne Act.

Vernal Pool Complex

The vernal pool complex natural community is characterized by interconnected and isolated groups of vernal pool wetlands and seasonal swales in the matrix of the grassland natural community (described below). The vernal pool complex community is rare in the study area and is generally contiguous with vernal pool habitat adjacent to the study area (Mapbooks 13-1, 13-2, and 13-3). Details of the methods used to map the vernal pool complex community are presented above in the introduction to Section 13.1.2.1, *Natural Community Mapping Methods*. In the study area, vernal pool complex occurs in the vicinity of Stone Lakes National Wildlife Refuge, the Yolo Bypass, southeastern Solano County, Jepson Prairie, and Clifton Court Forebay.

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

During winter and spring, when vernal pools or seasonal wetlands are filled with water, plants, and aquatic life, they act as an important foraging habitat for a variety of common wildlife species, including dabbling ducks, shorebirds such as American avocets (*Recurvirostra americana*) and greater yellowlegs (*Tringa melanoleuca*), invertebrates such as various native bee species, and reptiles and amphibians, such as the common garter snake and Sierran treefrog. The uplands that surround vernal pools also provide habitat for pollinators of native vernal pool plants (e.g., solitary bees) as well as refugia for amphibian species that utilize these pools for breeding. Several special-status plant and wildlife species occur in vernal pool complex natural community, including dwarf downingia (*Downingia pusilla*), legenere (*Legenere limosa*), vernal pool fairy shrimp (*Branchinecta* *lynchi*), western spadefoot toad (*Spea hammondii*), and California tiger salamander (*Ambystoma californiense*).

This community may meet the definition of jurisdictional waters of the United States and regulated by the USACE under Section 404 of the CWA. It may also be regulated by a California RWQCB as waters of the State under the Porter-Cologne Act.

Other Seasonal Wetlands

The other seasonal wetlands community encompasses all the remaining seasonal wetland communities other than vernal pools and alkaline seasonal wetlands. These areas mapped by DWR consist of seasonally ponded, flooded, or saturated soils generally dominated by grasses, sedges, or rushes. Most of these wetlands were mapped within croplands. Other seasonal wetlands are freshwater wetlands characterized by ponded or saturated soil conditions during winter and spring and by dry soil conditions throughout summer and fall until the first substantial rainfall. The vegetation of seasonal wetlands is typically composed of wetland generalist species such as hyssop loosestrife (*Lythrum hyssopifolia*), cocklebur, dallisgrass, Bermuda grass (*Cynodon dactylon*), barnyard grass (*Echinochloa crus-galli*), and Italian ryegrass (*Festuca perennis*), which typically occur in frequently disturbed sites. Species dominance varies according to flooding regime.

Special-status species potentially occurring in other seasonal wetlands include vernal pool fairy shrimp. The community's distribution in the study area is mapped in Mapbooks 13-1, 13-2, and 13-3.

This community may meet the definition of jurisdictional waters of the United States and regulated by the USACE under Section 404 of the CWA. It may also be regulated by a California RWQCB as waters of the State under the Porter-Cologne Act.

Grassland

The grassland community is a spectrum ranging from natural to intensively managed vegetation dominated by grasses. At the more natural end of the spectrum, this natural community consists of introduced or native annual and perennial grasses and forbs (non-grass herbaceous species). At the intensively managed end of the spectrum, it includes non-irrigated pasturelands. Grasslands are often found adjacent to wetland and riparian habitats and are the dominant community on levees in the Delta. The distribution of the grassland community in the study area is mapped in Mapbooks 13-1, 13-2, and 13-3.

Grassland communities within the study area are generally dominated by nonnative species, such as wild oats (*Avena fatua*), various bromes (*Bromus* sp.) and barleys (*Hordeum* sp.), Italian ryegrass, filarees (*Erodium* sp.), mustards (*Brassica* sp.), wild radish (*Raphanus sativus*), mallows (*Malva* sp.), vetches (*Vicia* sp.), and star-thistles (*Centaurea* sp.). They may also support infrequent native annual and perennial grasses and forbs. In some areas of the Delta, the grassland community is interspersed with vernal pool complex, alkaline seasonal wetland complex, and other natural seasonal wetland natural community types. *A Manual of California Vegetation* (Sawyer et al. 2009) recognizes the broad spectrum of grassland types and includes vegetation alliances ranging from those that are completely dominated by nonnative annual grasses to grasslands that are dominated by perennial native grasses. Within the study area, the grassland community can include special-status plants, such as Jepson's coyote-thistle (*Eryngium jepsonii*), Heckard's peppergrass (*Lepidium latipes* var. *heckardii*), and saline clover (*Trifolium hydrophilum*).

The grassland community designation has also been applied to areas that have been cleared of their natural vegetation cover, such as levee faces and edges of agricultural fields and roads. Vegetation in these areas is best characterized as ruderal. Ruderal vegetation is dominated by herbaceous, nonnative plant species, some of which are considered invasive (see discussion in Section 13.1.5, *Invasive and Noxious Plant Species*). Representative species that occur in ruderal grassland areas are common mallow (*Malva neglecta*), bull thistle (*Cirsium vulgare*), bindweed (*Convolvulus arvensis*), poison hemlock (*Conium maculatum*), wild lettuce (*Lactuca serriola*), Russian thistle (*Salsola tragus*), yellow star-thistle (*Centaurea solstitialis*), pampas grass (*Cortaderia jubata*), sweet fennel (*Foeniculum vulgare*), and many nonnative grasses, including wild oats, bromes, barleys, and Bermuda grass. Ruderal vegetation on maintained levees throughout the Delta can be a persistent source of seeds of nonnative plants, some of which are considered invasive. Some native annuals, such as common spikeweed and willowherb (*Epilobium* sp.), are also common.

Fallow fields and disturbed fields (ruderal lands) often are dense, low-diversity stands of nonnative invasive ("weedy") plants that provide limited wildlife values. Wildlife habitat values can be affected by nonnative invasive plant species through several means, including physical alteration of habitat structure (e.g., the formation of dense stands that restrict wildlife movement, or a reduction in suitable cover and nest sites), altering foodwebs (e.g., reducing invertebrate prey populations), and disrupting biogeochemical processes (e.g., altering the timing of carbon availability).

Ruderal and grassland communities provide foraging, breeding, and cover habitat value for a variety of wildlife species, including gopher snake (*Pituophis catenifer*), western racer (*Coluber constrictor mormon*), western meadowlark (*Sturnella neglecta*), red-tailed hawk (*Buteo jamaicensis*), western harvest mouse (*Reithrodontomys megalotis*), and California vole (*Microtus californicus*). Wildlife communities in fallow and ruderal fields are often similar to those in cultivated row crop or silage fields. The absence of active cultivation increases the potential for successful bird nesting; however, these habitats provide limited breeding habitat for grassland-associated wildlife, such as western meadowlark, American goldfinch (*Spinus tristis*), and red-winged blackbird. Several special-status plant and wildlife species occur in grasslands, including alkali milk-vetch (*Astragalus tener* var. *tener*), coast horned lizard (*Phrynosoma blainvillii*), San Joaquin coachwhip (*Masticophis flagellum ruddocki*), and western burrowing owl (*Athene cunicularia*).

Agricultural

Agricultural is the predominant land cover type in the study area. These areas are largely croplands but also include unvegetated areas adjacent to fields, fallowed areas, farm roads, and agricultural ditches. Croplands consist of both seasonal and perennial crop types. Perennial crop types include orchards and vineyards. The distribution of seasonal crops varies annually within the study area, depending on crop-rotation patterns and market forces. General cropping practices result in monotypic stands of vegetation for the growing season and bare ground in fall and winter. Several special-status wildlife species are associated with croplands, for example, greater sandhill crane and tricolored blackbird. No special-status plants are associated with agricultural areas. Agricultural land cover is mapped in Mapbooks 13-1, 13-2, and 13-3. Some of the principal crop types and their value to wildlife are discussed below.

Alfalfa

Alfalfa (*Medicago sativa*) is an irrigated, intensively mowed, leguminous crop that constitutes a dynamic habitat. Vegetation structure varies with the growing, harvesting, and fallowing cycles.

Alfalfa is rotated periodically with other crops, such as vegetables and cereal grains. It is a very productive crop that does not require frequent tilling, so it can support large populations of small mammals (e.g., voles) and invertebrate species. As a result, it provides high-value foraging habitat for wildlife, including wading birds, shorebirds, blackbirds, and hawks. Some of these species, such as shorebirds, use the fields when they are periodically flood-irrigated. Alfalfa can be particularly important to Swainson's hawk, white-tailed kite, and other raptor species, which capitalize on high prey densities and cycles of increased prey availability when the fields are being irrigated and mowed.

Irrigated Pasture

Irrigated pastures are managed grasslands that are not typically tilled or disturbed frequently. They are usually managed with a low structure of native herbaceous plants, cultivated species, or a mixture of both. Irrigated pastures provide breeding opportunities for ground-nesting birds and burrowing animals, such as burrowing owl, western meadowlark, California ground squirrel (*Otospermophilus beechyi*), and Botta's pocket gopher (*Thomomys bottae*). The open structure of irrigated pastures provides foraging habitat for grassland-foraging wildlife, such as red-tailed hawk, northern harrier, American kestrel (*Falco sparverius*), and coyote (*Canis latrans*).

Rice

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

Other Cultivated Crops

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

Although generally of lesser value to wildlife than native habitats, row crop and silage fields often support abundant populations of small mammals, such as western harvest mouse and California vole. These species in turn attract predators such as gopher snake, western racer, American kestrel, and red-tailed hawk. Other reptile and bird species prey on the insect populations abundant in row crop and silage fields, including western fence lizard (*Sceloporus occidentalis*), Brewer's blackbird

(*Euphagus cyanocephalus*), American crow (*Corvus brachyrhynchos*), and the nonnative European starling (*Sturnus vulgaris*).

Orchards

Orchards are habitats dominated by a single tree species. Trees are usually kept fairly low and bushy, with a mostly closed canopy and an open understory. Orchards usually are grown on fertile land that formerly supported diverse and productive natural habitats and wildlife. Orchard habitats are used by several common woodland-associated species, such as western gray squirrel, American robin (*Turdus migratorius*), red-tailed hawk, bats, and the nonnative black rat (*Rattus rattus*). The western red bat (*Lasiurus blossevillii*) (a state species of special concern, see Section 13.1.3, *Special-Status Species*) is known to roost in orchards, which may serve as an alternative habitat to the species' more preferred habitat of large cottonwoods, sycamores, and oaks (Pierson et al. 2006:1).

Vineyards

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

Developed Lands

Additional lands in the study area that were not designated with a natural community type are characterized here as developed lands. Developed lands include lands with residential, industrial, and urban land uses, as well as landscaped areas, riprap, road surfaces, and other transportation facilities. Developed lands support some common plant and wildlife species, whose abundance and species richness vary with the intensity of development. Dense urban areas support less wildlife than less dense suburban settings. Suburban areas with mature trees (ornamental or native) can approximate a natural environment and more native species may occur than in other urban settings. Bird species include house sparrow (*Passer domesticus*), house finch (*Haemorhous mexicanus*), western scrub-jay (*Aphelocoma californica*), and European starling in more urban zones; wrentit (*Chamaea fasciata*), bushtit (*Psaltriparus minimus*), white-tailed kite, red-tailed hawk, red-shouldered hawk (*Buteo lineatus*), and California quail (*Callipepla californica*) occur in more suburban environments.

Mammal species in urban residential areas include bats, raccoon, opossum, and striped skunk (*Mephitis mephitis*), with black-tailed deer (*Odocoileus hemionus*) and black-tailed jackrabbit (*Lepus californicus*) in more suburban settings. California slender salamander (*Batrachoseps attenuatus*), gopher snake, and western fence lizard could also be present in these areas.

Riprap on levees provides potential upland habitat for a number of aquatic wildlife species, including the federally and state-listed giant garter snake. Riprap on levees provides a thermal gradient, warm surfaces and cooler underground refuges, similar to burrows adjacent to aquatic habitats in locations where burrows may be limited.

13.1.2.3 Special-Status Communities

Eleven of the natural community types occurring in the study area are, for the purposes of this Draft EIR, identified as special-status natural communities. These communities are considered to have special status because they include specific vegetation alliances that are recognized by CDFW as having limited distribution statewide or within a county or region (California Natural Diversity Database [CNDDB] Rank of S1–S3) or because they contain wetlands and other waters that are protected under federal and state laws. Federal and state laws and regulations applicable to special-status natural communities include:

- California Environmental Quality Act (CEQA)
- Section 1602 of the California Fish and Game Code
- Sections 401 and 404 of the Clean Water Act (CWA)
- California's Porter-Cologne Water Quality Control Act (Porter-Cologne Act)

Special-status natural communities may be of special concern to resource agencies and conservation organizations for a variety of reasons, including their locally or regionally declining status or because they provide important habitat to common and special-status species. Many of these habitats or their constituent plant alliances and associations are monitored and reported in the CNDDB, which is maintained by CDFW. The following natural communities, all of which are found within the study area, are considered to be special-status natural communities or to include special-status species alliances.

- Tidal perennial aquatic
- Tidal brackish emergent wetland
- Tidal freshwater emergent wetland
- Valley/foothill riparian
- Nontidal perennial aquatic
- Nontidal freshwater perennial emergent wetland
- Nontidal brackish emergent wetland
- Alkaline seasonal wetland complex
- Vernal pool complex
- Other natural seasonal wetland
- Grassland

Six of the vegetation alliances mapped in the study area within the tidal brackish emergent wetland natural community are considered to have special status (Alkali Heath Alliance, American Bulrush Alliance, Creeping Wildrye Alliance, Gumplant Alliance, Pickleweed Alliance, Salt Marsh Bulrush Alliance).

Two plant alliances found in the tidal freshwater emergent wetland natural community in the study area are considered to have special status (American Bulrush Alliance, Santa Barbara Sedge Alliance).

Three special-status vegetation alliances are components of nontidal brackish emergent wetland (Alkali Heath Alliance, Pickleweed Alliance, Salt Marsh Bulrush Alliance).

Two special-status vegetation alliances in the study area are components of the nontidal freshwater perennial emergent wetland natural community (American Bulrush Alliance, Wildrye Alliance).

Three special-status plant alliances in the study area are components of alkaline seasonal wetland complex (Alkali Heath Alliance, Bush Seepweed Alliance, Iodine Bush Alliance).

Vernal pools and vernal pool grassland in the study area have not been mapped to the alliance level, but many vernal pool alliances expected to occur in the study area have special status, including alliances characterized by Fremont goldfields (*Lasthenia fremontii*,), smooth goldfields (*Lasthenia glaberrima*), and common spikerush (*Eleocharis macrostachya*).

Grassland alliances in the study area also have not been mapped to the alliance level. However, special-status alliances that may occur within the grassland community in the study area include Gum plant patches, Creeping ryegrass turf, Needlegrass grassland, and Curly bluegrass grassland.

Two land cover types (agricultural and developed) present in the study area are not considered special-status natural communities. Though some cultivated lands and developed lands provide habitat for special-status species, as a natural community and a land cover type these areas are not of limited distribution and do not in themselves require particular regulatory consideration for the vegetation that occurs there (e.g., these areas are not regulated wetlands). Throughout the remainder of the chapter, these two community/land cover types are addressed in the context of the other natural communities.

13.1.3 Special-Status Species

This section addresses plant and wildlife species considered for analysis in the Draft EIR.

For the purposes of this Draft EIR, special-status species are legally protected or otherwise regulated or tracked by federal, state, or local resource agencies. Special-status species are species, subspecies, or varieties that fall into one or more of these categories.

- Listed as threatened or endangered under the federal Endangered Species Act (ESA).
- Proposed or candidates for listing under the ESA.
- Listed as threatened or endangered under the California Endangered Species Act (CESA).
- Plants listed as rare under the Native Plant Protection Act.
- Candidates for listing under the CESA.
- Taxa (i.e., taxonomic categories or groups) that meet the criteria for listing, even if not currently included on any list, as described in Section 15380 of the State CEQA Guidelines (e.g., species that appear on the CDFW special animals list).
- California species of special concern.
- California fully protected species.
- Plants ranked as “rare, threatened, or endangered in California” (California Rare Plant Rank [CRPR] 1B and 2).

- Plants that may warrant consideration on the basis of local significance or recent biological information (CEQA Guidelines § 15380(d)), which may include some CRPR 3 and 4 species (plants about which more information is needed to determine their status and plants of limited distribution, respectively).
- Plant species included on the CNDDB *Special Plants, Bryophytes, and Lichens List* (California Department of Fish and Wildlife 2020b).
- Plants considered to be locally significant species, that is, species that are not rare from a statewide perspective but are rare or unique in a local context, such as within a county or region (CEQA Guidelines § 15125(c)) or are so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G).

13.1.3.1 Critical Habitat

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

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

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

Any federal action (permit, license, or funding) that has a potential to adversely modify critical habitat, requires that the federal agency consult with USFWS.

The federally listed wildlife and plant species that have designated critical habitat within the study area are presented in Table 13-2 below. Critical habitat for each species is presented in the figures in the respective species accounts in Appendix 13B, *Species Accounts*, and is also discussed in Section 13.3.3, *Impacts and Mitigation Approaches*.

Table 13-2. Designated Critical Habitat within the Study Area for Wildlife and Plant Species

Species	Acres of Critical Habitat
Vernal pool fairy shrimp	338
Delta green ground beetle (*Elaphrus viridis*)	319
California tiger salamander, Central California DPS (*Ambystoma californiense*)	1,645
California red-legged frog	1,875
Contra Costa goldfields (*Lasthenia conjugens*)	890

DPS = distinct population segment.

13.1.3.2 Special-Status Plant Species

A list of special-status plant species occurring in the study area was generated from a query of the CNDDB based on the limits of the study area (California Department of Fish and Wildlife 2020a). Additional information about plant species occurring or potentially occurring in the study area was obtained by a search of the California Native Plant Society (CNPS) Electronic Inventory for the U.S. Geological Survey (USGS) map quadrangles that overlap with the limits of the study area (California Native Plant Society 2020a–2020j). Table 13A-1 in Appendix 13A, *Special-Status Species with Potential to Occur in the Study Area*, presents detailed information on the special-status plant species known or with potential to occur in study area and includes their common and scientific names, listing status (federal, state, and CNPS), notes on the species habitat, distribution in California, flowering period, and potential for occurrence in the study area. Species in Appendix 13A, Table 13A-1 that are not known to occur in the study area and that would not be affected by the project alternatives are not addressed further.

More detailed information on the plant species habitat requirements, distribution, and occurrences within the study area is presented in the species accounts in Appendix 13B. The species accounts also contain the habitat suitability models, which are GIS-based models used for establishing the amount of potential habitat for a species within the study area, for estimating effects on the species, and for identifying areas were avoidance and minimization measures would be implemented. Prior to project construction, all work areas would be evaluated for the presence of suitable habitat and/or the occupation by special-status plant species through on-the-ground habitat assessments and/or species surveys (Figure 13-1). The methods used to develop these models are described in Appendix 13B, Section 13B.0.1.5, *Species Habitat Suitability Methods*.

A text description of this figure is provided in Chapter 39, *Text Descriptions of Figures*

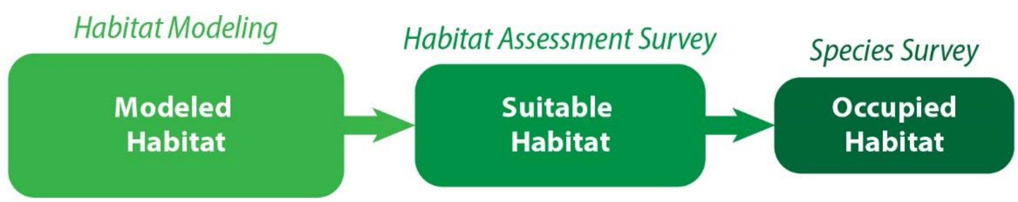

Figure 13-1. Modeled Habitat in Relation to Suitable and Occupied Habitat

13.1.3.3 Special-Status Wildlife Species

Table 13A-2 in Appendix 13A provides information on the special-status wildlife species that were identified for consideration in the Draft EIR, including common and scientific names, listing status (federal, state, global rank, and/or state rank), notes on the species life history, habitat, distribution in California, and potential for occurrence in the study area. The species listed in this table were generated from queries of the CNDDB and the USFWS database based on the limits of the study area, and by taking into consideration the ranges of special-status species that have a potential to occur in the study area despite not having occurrences in the study area. The primary source of range information for considering the inclusion of additional species were the maps and range descriptions within the online version of the California Wildlife Habitat Relationship System (California Department of Fish and Wildlife 2020c). Species in Appendix 13A, Table 13A-2 that are not known to occur in the study area, have ranges outside the study area, lack suitable habitat in the study area, and/or that would not be affected by the project alternatives are not addressed further.

More detailed information on the wildlife species habitat requirements, distribution, and occurrences within the study area is presented in the species accounts in Appendix 13B. The species accounts also contain the descriptions of the habitat suitability models, which are GIS-based models used for establishing the amount of potential habitat for a species within the study area, for estimating effects on the species, and for identifying areas were avoidance and minimization measures would be implemented. Prior to project construction, all work areas would be evaluated for the presence of suitable habitat and/or the occupation by special-status wildlife through on-the-ground habitat assessments and/or species surveys (Figure 13-1). The methods used to develop these models are described in Appendix 13B, Section 13B.0.1.5.

In addition to special-status species, non–special-status migratory birds and raptors that may be present in or adjacent to the project footprint and that are protected by California Fish and Game Code Sections 3503 and 3503.5 and the federal Migratory Bird Treaty Act were collectively included as part of the analysis.

13.1.4 Wetlands and Other Waters of the United States

Waters of the United States are aquatic resources that are subject to federal jurisdiction under the CWA. Waters of the United States are categorized as either wetlands or other waters. Each of these two categories is briefly described below and a more detailed discussion of waters of the United States under the CWA is included in Section 13.2, *Applicable Laws, Regulations, and Programs*.

In general, wetlands are characterized as having a dominance of hydrophytic vegetation, hydric soils, and wetland hydrology (a more detailed definition of wetlands is provided below).

Other waters of the United States are generally linear features (e.g., streams) and open-water habitats that can be tidal or nontidal.

As mentioned in Section 13.1.2.1, *Land Cover Mapping Methods*, DWR conducted an aquatic resources delineation within a subset of the study area, referred to as the *delineation study area*. Wetland features within the delineation study area were identified based on the *Corps of Engineers Wetlands Delineation Manual* (U.S. Army Corps of Engineers 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (U.S. Army Corps of Engineers 2008), technical guidance documents that describe and define the characteristics of wetlands. In these guidance documents, wetlands are defined as areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (U.S. Army Corps of Engineers 2008:2).

The delineation study area encompasses approximately 143,485 acres of the study area, which includes areas where all potential alternative alignments and associated infrastructure would be situated. At the time of the delineation, a lack of access to properties under private ownership resulted in only a limited portion of the study area being accessible to conduct field delineation; therefore, the decision was made to conduct the entire delineation via aerial imagery interpretation in order to maintain consistency across the study area.

The aquatic resources delineation was conducted by DWR, GEI Consultants, Inc., and Stillwater Sciences, working under the direction of DWR's Delta Conveyance Office. The team used aerial imagery interpretation in GIS to identify and delineate aquatic features in the study area by identifying signatures typically associated with, and indicative of wetlands, including areas of inundation or saturation on wet season imagery, hydrophytic vegetation signatures that persisted over multiple years, and soil map unit properties as obtained from the Natural Resources Conservation Service (NRCS) Soil Survey. Other imagery signatures that were evaluated included variation in soil color and areas of active agriculture where cropped lands showed reduced growth and/or vigor. Light detection and ranging (LiDAR) imagery was routinely used to identify minor variations in topography to correlate potential wetland signatures on aerial imagery to topographic depressions and to delineate wetland polygons.

Wetlands and other waters were mapped using the following as data sources.

- 1-foot resolution true-color digital orthorectified aerial imagery flown on December 14–20, 2017 (U.S. Geological Survey 2017)
- 2017 Sacramento–San Joaquin Delta LiDAR, Digital Elevation Model data from flights conducted on December 9, 2017, through January 21, 2018 (U.S. Geological Survey 2017)
- 1-meter pixel resolution true-color digital aerial imagery from the National Agriculture Imagery Program captured in 2018 (National Agriculture Imagery Program 2018)
- Soil data from the NRCS Web Soil Survey database (Natural Resources Conservation Service 2019)

Additional sources of information included historical aerial imagery available on Google Earth, USGS topographic maps, earlier National Agriculture Imagery Program imagery, the U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory (U.S. Fish and Wildlife Service 2020a), and the 2011 Delta Vegetation and Land Use Data (Chico State Research Foundation, Geographical Information Center 2019). Wetland mapping products that were developed by DWR for the Bay Delta Conservation Plan/California WaterFix were also consulted.

Aquatic resources were categorized as perennial or seasonal, based on persistence of hydrology as evidenced by sustained inundation or saturation visible on aerial imagery. Perennial wetlands were further classified into emergent wetlands, scrub-shrub wetlands, or forested wetlands based primarily on vegetative life form (i.e., herbaceous, shrub dominated, or tree dominated). Seasonal wetlands were further classified as alkaline wetland or vernal pool, as these habitats have unique soil and distinctive vegetation assemblages. The seasonal wetland category also includes a third class generalized as "seasonal wetland" to capture the diversity of non-specialized vegetation assemblages that are associated with a range of soil types and are subject to temporary inundation of a duration that supports a hydrophytic vegetation assemblage.

Linear features and open-water habitats that may qualify as other waters of the United States were categorized based on tidal influence as nontidal or tidal. Nontidal waters include natural channels, depressions, and agricultural ditches. Tidal classifications include tidal channel, which includes major waterways, and conveyance channel, which was used for conveyance features associated with the State Water Project (SWP) and Central Valley Project (CVP).

The initial aquatic resources delineation was verified and received a preliminary jurisdictional determination from USACE on June 18, 2020. The initial delineation was submitted to the State Water Board for their review and concurrence. The State Water Board concurred that the aquatic resources mapped by DWR would be considered to include all waters of the State. In late 2020 and in 2021, the study area was expanded to the east and west and additional aquatic resources mapping was completed. The results of this additional mapping have been submitted to USACE and the State Water Board. The results of the delineation are summarized below in Table 13-3 and these aquatic resources within their respective natural communities are presented in Mapbooks 13-1, 13-2, and 13-3.

Table 13-3. Area (in acres) of Jurisdictional Aquatic Features in the Delineation Study Area

Wetlands and Other Waters	Delineation Study Area Total (acres)
Wetlands	
Emergent wetland	1,501
Scrub-shrub wetland	875
Forested wetland	566
Vernal pool	63
Seasonal wetland	2,260
Alkaline wetland	335
Wetlands Subtotal	5,600
Other Waters	
Agricultural ditch	2,382
Natural channel	14
Depression	514
Tidal channel	7,419
Conveyance channel	116
Other Wates Subtotal	10,445
Total	16,045

13.1.4.1 Perennial Wetlands

Perennial wetlands are dominated by persistent hydrophytic vegetation. Three types of perennial wetlands were mapped in the delineation study area based on the growth form of the vegetation.

Emergent Wetland

Emergent wetlands within the delineation study area are dominated by herbaceous emergent plants such as California tule, hard-stem tule, narrow-leaf cattail, broad-leaf cattail, and floating water primrose. The vegetation assemblages typically associated with this wetland type are almost exclusively dominated by species rated as obligate on the National Wetland Plant List (Lichvar et al. 2016:8–17). These areas have a persistent vegetative aerial signature and evidence of inundation or saturation is present on most aerial images evaluated.

This wetland class typically occurs at the edges of ponds or lakes, along the margins of tidal channels, on in-channel islands of major tidal channels within the Delta, and where seepage occurs on the landside of levees.

Scrub-Shrub Wetlands

Scrub-shrub wetlands within the delineation study area are dominated by woody vegetation less than 20 feet tall and include shrubs typically associated with riparian areas such as sandbar willow (*Salix exigua*), Himalayan blackberry, red twig dogwood (*Cornus sericea*), buttonwillow (*Cephalanthus occidentalis*), and California wild rose (*Rosa californica*). Fremont's cottonwood seedlings or saplings may also be present. The vegetation assemblages typically associated with this wetland type include species rated as obligate, facultative wetland, and facultative on the National Wetland Plant List (Lichvar et al. 2016:8–17). Herbaceous species are generally lacking or are a minor component of the vegetation assemblage, as the canopy cover in scrub-shrub wetlands is high and low-growing herbaceous species do not receive sufficient light for survival. Evidence of saturation or inundation is more variable as compared to the emergent wetland class; however, the vegetation community is persistent due to the dominance of perennial shrubs.

The scrub-shrub wetland class typically occurs at the periphery of depressions, ponds, and lakes; along the margins of tidal and nontidal channels; and on in-channel islands in the Delta.

Forested Wetlands

Forested wetlands are defined by woody vegetation that is 20 feet tall or taller with a tree canopy cover equal to or greater than 25%. Riparian trees common in the delineation study area include Goodding's black willow (*Salix gooddingii*), red willow (*Salix laevigata*), box elder, Oregon ash, Fremont's cottonwood, white alder (*Alnus rhombifolia*), black walnut (*Juglans nigra*), and valley oak. Forested wetlands generally have a shrub component, typically in canopy openings and along the forested edge. The presence of an herbaceous layer is variable. The vegetation assemblages typically associated with forested wetlands include species rated as facultative wetland and facultative on the National Wetland Plant List (Lichvar et al. 2016:8–17). Species with obligate or facultative upland ratings are occasional in forested wetlands, and generally not the dominant species represented in the habitat.

Forested wetlands within the delineation study area are located along the edges of tidal and nontidal channels, and on in-channel islands located within tidally influenced waterways. Evidence of saturation or inundation is variable on aerial images as compared to the emergent wetland class; however, the vegetation community is persistent due to the dominance of perennial tree species.

13.1.4.2 Seasonal Wetlands

Three classes of seasonal wetlands were mapped in the delineation study area. Seasonal wetlands experience temporary inundation or saturation, typically in the winter or spring months of water years that receive normal or above normal precipitation. Inundation and saturation are most evident on aerial images captured during wet months. Due to the seasonality of saturated or inundated conditions, hydrophytic vegetation is transitory and these areas are prone to colonization by annual upland grasses and forbs late in the growing season as the soils dry. Aerial image evaluation in addition to the primary image source years of 2017 and 2018 was often necessary to aid in the determination of seasonal wetlands.

Vernal Pool

Vernal pool wetlands are topographic depressions that are usually found within annual grassland habitats. There is a water-restricting soil horizon, often high in clay content and indurated, located near the soil surface that prevents water from infiltrating deep into the soil horizons and away from the root zone. These depressions fill with rainwater and may remain inundated through spring or early summer. Vernal pools often occur in complexes of many small pools that are hydrologically interconnected via overland surface flow through swales when pools are full. Water may also move below the soil surface as water infiltrates and travels above the hardpan or claypan layer into adjacent pools. Vernal pools support distinct herbaceous vegetation assemblages and many of the plant species that occur in this wetland type are endemic to California. Vernal pool wetlands can support a variety of floristic diversity, ranging from common to rare. Commonly encountered species typical of vernal pool habitats within the delineation study area include popcorn flowers (*Plagiobothrys spp.*), Fremont's tidy tips (*Layia fremontii*), goldfields (*Lasthenia spp.*), coyote-thistle (*Eryngium spp.*), calicoflower (*Downingia* spp.), and common spikerush (*Eleocharis macrostachya*). The wet phase of vernal pools is dominated by plants rated as obligate or facultative wetland on the National Wetland Plant List (Lichvar et al. 2016:8–17). As the vernal pools draw down as a result of evaporation and increased evapotranspiration in late spring and early summer, annual upland grasses sometimes colonize and become dominant in these seasonal wetland habitats.

Vernal pool wetlands within the delineation study area are located primarily in areas that are relatively undeveloped without substantial land alteration. This wetland type occurs on lands with hummocky surfaces, primarily at the northernmost portion of the delineation study area south of North Stone Lake, and along the western side of the San Joaquin Valley near Clifton Court Forebay.

Seasonal Wetland

Seasonal wetlands are the most broad and diverse of the wetland classes identified in this report. These wetlands are primarily colonized by herbaceous species that are common throughout the Central Valley and Delta. The vegetation assemblages typically associated with seasonal wetlands primarily include species rated as facultative wetland and facultative on the National Wetland Plant List (Lichvar et al. 2016:8–17), and often include ruderal species such as tall flatsedge (*Cyperus eragrostis*), Santa Barbara sedge (*Carex barbarae*), soft rush (*Juncus effusus*), fiddle dock (*Rumex pulcher*), curly dock, and perennial rye grass (*Festuca perennis*). Species with obligate or facultative upland ratings typically comprise a lesser percentage of the plant community. The vegetation composition is influenced primarily by landscape position, effects of groundwater, soil texture, and runoff and drainage properties, as well as anthropogenic and natural disturbances.

Seasonal wetlands are the most prevalent and widespread of all wetland classes mapped within the delineation study area. Evidence of saturation or inundation is variable on aerial images, especially in areas with a high degree of anthropogenic modification and which may be subject to regular disturbance such as agriculture or winter flooding for migratory bird and waterfowl management. Numerous seasonal wetlands were mapped in active agricultural fields in the Delta. While the size and shape of seasonal wetlands in farmed fields is subject to a degree of annual variation which may result from ongoing farming practices, some evidence of wet season inundation or saturation is visible in a typical year. Although groundwater levels are controlled on Delta islands using a system of pumps and drainage ditches to maintain water levels on the subsided islands, a high water table persists in some areas. Upland crops planted in these areas may be subject to failure or may be impossible to harvest; therefore, aerial signatures indicating reduced growth and/or vigor in crops such as corn or areas within cropped fields that were seldom planted were interpreted as indications of wetland conditions and these areas were categorized as seasonal wetland.

Alkaline Wetland

Alkaline wetland is a type of seasonal wetland influenced by strongly alkaline or saline soils. Alkaline wetlands often support alkaline or saline tolerant shrubs such as iodine bush, alkali heath, bush seepweed (*Suaeda nigra*), and saltbush. The shrub layer may be codominant with salt-tolerant grasses including salt grass and alkali sacaton (*Sporobolus airoides*). This wetland type may have large unvegetated areas as a result of salt accumulations at or near the soil surface. Alkaline wetland habitats are dominated by an assemblage of plants with facultative wetland or facultative ratings on the National Wetland Plant List (Lichvar et al. 2016:8–17).

Evidence of seasonal saturation or inundation may be present on wet season aerial imagery, and salt crust presents bright white signatures during dry season imagery. Alkaline wetlands are primarily located in the southern portion of the delineation study area on lands without substantial land alteration, or in small patches at the periphery of agricultural fields or along canals.

13.1.4.3 Nontidal Waters

Three types of nontidal waters were mapped in the delineation study area. Nontidal features include naturally occurring features and anthropogenic features on the landscape that are the result of ditching or excavation. Nontidal waters are subject to Section 404 of the CWA up to the ordinary high water mark.

Agricultural Ditches

Agricultural land cover is common throughout the delineation study area, most notably on Delta islands. Agricultural ditches are used for irrigation and drainage purposes. Agricultural ditches range in size from 1 to 75 feet in width. These features are generally unvegetated with unconsolidated mud bottoms as a result of regular maintenance activities conducted to maintain capacity for drainage and water delivery. Tule and cattail species may colonize ditch side-slopes if there is a lapse in the vegetation maintenance cycle. Water in agricultural ditches may be pumped off agricultural lands and/or Delta islands and have a connection to Traditional Navigable Waters (TNW) or Relatively Permanent Waters (RPW).

Natural Channels

Nontidal natural channels are present primarily along the northeast and southwest portions of the delineation study area. Natural channels include intermittent streams that qualify as RPW and ephemeral channels that qualify as non-RPW. All features mapped to this class are assumed to have an OHWM as indicated by a change in vegetative character or break in bank slope, as evidenced on aerial imagery or the Digital Elevation Model. The substrate in natural channels may be mud, sand, gravel, and/or cobble depending on geographic location. Natural channels within the delineation study area include waterways such as drainages to Stone Lake and tributaries to the Cosumnes River and Italian Slough.

Depressions

Depressions are open-water ponds that are permanently or seasonally inundated, with little to no rooted vegetation on an unconsolidated or mud bottom. These features may be artificially filled as a result of agricultural or stormwater detention or may result from a high water table. Depressions generally have a water depth of less than 6 feet. These waterbodies are often created by excavation and are diked or otherwise artificially impounded.

Depressions may be colonized by floating plant species such as common duckweed (*Lemna minor*), mosquito fern (*Azolla filiculoides*), or water hyacinth, but generally lack rooted vegetation except on depression margins.

13.1.4.4 Tidal Waters

Tidal waters are the open-water portions of linear aquatic features that are influenced by the rise and fall of the tides. Human-made structures such as gates or culverts may restrict tidal influence to varying degrees. Tidal waters are subject to regulation under Section 404 of the CWA up to the mean higher high water elevation (e.g., high tide line), and are subject to Section 10 of the Rivers and Harbors Act of 1899 up to the mean high water level.

Tidal Channels

Tidal channels are natural perennial riverine waterways, though most within the delineation study area have been modified with leveed banks that are reinforced with rock revetment. In-channel water velocity and depth fluctuate under tidal influence, and the channel bottom is generally composed of mud or unconsolidated sediments with varying amounts of sand, silt, and clay.

Emergent wetlands that occur along the margins of tidal channels and in-channel islands that are also commonly encountered in the delineation study area, notably along Old River and Middle River, were mapped separately from the tidal channel aquatic type.

Conveyance Channels

Conveyance channels include rock or cement-lined linear channels. These are constructed water features that are associated with the SWP or CVP. These features are generally straight as a result of excavation and are diked or have reinforced banks. Vegetation is generally absent because of water depth or a lack of rooting substrate. Control structures are present that periodically affect tidal influence, but conveyance channels experience tidal fluctuation when water is brought into the system, generally on a flood tide.

13.1.4.5 Relationship to Waters of the State

Under the Porter-Cologne Act, waters of the State include “any surface water or groundwater, including saline waters, within the boundaries of the state,” which is a broader definition than that of waters of the United States. Because DWR’s delineation did not exclude any such wetlands and waters, the delineation also potentially represents what would be considered waters of the State within the delineation study area.

13.1.5 Invasive and Noxious Plant Species

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

13.1.5.1 Definitions

The study area contains both aquatic and terrestrial plant species that have been designated as invasive plants and/or noxious weeds. Although these two descriptive terms are sometimes used interchangeably, it is important to note that there are implications associated with the use of each term. The term *noxious weed* is a designation used by government agencies, such as the U.S. Department of Agriculture (USDA) and the California Department of Food and Agriculture (CDFA), for plant species that have been identified as pests by law or regulation. Invasive plants may be considered as such from a scientific perspective because of their ability to spread to areas that are far from their point of introduction (Richardson et al. 2000:93). Plant species can also be identified as invasive through recognition by nongovernmental organizations, such as the California Invasive Plant Council, which maintains a list of invasive plants that threaten California's wildlands. For the purpose of this Draft EIR, *invasive plants* are species that have been identified as noxious weeds by USDA or CDFA, or as invasive plants by the California Invasive Plant Council (Cal-IPC) (California Invasive Plant Council 2006; California Department of Food and Agriculture 2021; U.S. Department of Agriculture 2019). The study area does not contain any known populations of noxious weeds identified by the USDA.

13.1.5.2 General Effects on Native Species and Natural Communities

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

13.1.5.3 Invasive Plant Species in Natural Communities

The six counties that overlap with the study area contain 242 plant species that have been identified as invasive by Cal-IPC (Calflora 2021). Invasive species are present in all of the natural communities in the study area. Activities that promote the spread of invasive plants could have an adverse effect on natural communities in the study area. A discussion of the invasive species that primarily affect each natural community is provided below.

Tidal Perennial Aquatic

Invasive plants have exhibited a pronounced negative effect on the tidal perennial aquatic natural community and the special-status species that inhabit it. Water hyacinth, Brazilian waterweed, South American spongeplant (*Limnobium spongia*), and alligator weed are invasive plant species of concern in this natural community. Additional information about the role of aquatic invasive plants as stressors to native fisheries is provided in Chapter 12, *Fish and Aquatic Resources*.

Tidal Brackish Emergent Wetland

Invasive plants have exerted detrimental effects on the tidal brackish emergent wetland and the special-status species that occur there. Invasive plant species of concern in this natural community are perennial pepperweed (*Lepidium latifolium*), fennel, giant reed (*Arundo donax*), pampas grass, barb goatgrass (*Aegilops triuncialis*) and rabbits-foot grass.

Tidal Freshwater Emergent Wetland

The primary invasive plants that affect the tidal freshwater emergent wetland natural community are perennial pepperweed and giant reed.

Valley/Foothill Riparian

In the study area, the primary invasive species that can negatively affect the valley/foothill riparian natural community are Himalayan blackberry, giant reed, perennial pepperweed, and red sesbania (*Sesbania punicea*). Perennial pepperweed can spread rapidly in riparian floodplain areas (Hogle et al. 2006:8). Other invasive species that occur in this natural community are black locust (*Robinia pseudoacacia*), and tamarisk (*Tamarix* spp.).

Nontidal Perennial Aquatic

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

Nontidal Freshwater Perennial Emergent Wetland

The primary invasive plants that affect the nontidal freshwater perennial emergent wetland natural community are Brazilian waterweed, Eurasian watermilfoil, and water hyacinth.

Nontidal Brackish Emergent Wetlands

Invasive plants that could affect the nontidal brackish emergent wetland community are perennial peppergrass, five-horn Bassia (*Bassia hyssopifolia*), common brassbuttons (*Cotula coronopifolia*), kochia (*Kochia scoparia*), and annual rabbit's-foot grass. Perennial peppergrass could have a severe impact on this community.

Alkaline Seasonal Wetland Complex

The primary invasive plants that affect or could affect the alkaline seasonal wetland complex natural community in the study area are Italian ryegrass, perennial pepperweed, and Russian thistle.

Vernal Pool Complex

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

Waxy mannagrass (*Glyceria declinata*) is a primary invasive plant in pool interiors.

Other invaders in grasslands that can have a substantial known or potential effect on vernal pools are perennial pepperweed, yellow star-thistle, medusahead (*Elymus caput-medusae*), purple starthistle (*Centaurea calcitrapa*), barb goatgrass, Italian ryegrass, and Italian thistle (Swiecki and Bernhardt 2002:34; Witham 2003:18, 2006:41–46; Hopkinson et al. 2008:20–24).

Other Seasonal Wetlands

The invasive species that primarily affect the other seasonal wetland community are waxy mannagrass, Italian ryegrass, and perennial pepperweed.

Grassland

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

Agricultural

Agricultural lands in the study area consist primarily of crops that are intermixed with small areas of natural habitat, such as riparian corridors or wetlands. Past and ongoing ground disturbance (e.g., tillage and irrigation) associated with cultivated lands facilitate the establishment of invasive plants, which colonize the perimeter of active agricultural fields and rapidly germinate in fallow fields. Maintenance activities, such as herbicide application and regular cultivation, are implemented in active fields to reduce the effects of invasive plants. Invasive plants that are commonly found in cultivated lands are wild radish, bindweed, fennel, field mustard (*Brassica rapa*), and Bermuda grass.

13.1.6 Wildlife and Habitat Connectivity

13.1.6.1 Connectivity Setting Overview

The following sections provide an overview of general habitat and context with respect to wildlife connectivity with the study area and at a larger landscape scale surrounding the study area are (i.e., regional study area). The regional study area is defined as 25-mile area surrounding the study area.

13.1.6.2 Existing Corridors and Linkages

This section summarizes studies and data relevant to existing terrestrial wildlife connectivity resources including landscape/habitat blocks, corridors, linkages, and riparian corridors that have been documented in the study area via the project literature review and the CDFW BIOS Habitat Connectivity Viewer (California Department of Fish and Wildlife 2022). See Section 13.3.1.2, *Evaluation of Construction Activities*, under *Methods Used to Assess Impacts on Terrestrial Wildlife Connectivity*, for a description of the methods and data used in the evaluation and impacts analysis, and Appendix 13E, *Terrestrial Wildlife Connectivity*, for figures illustrating these data.

Bay Area and Beyond Critical Linkages

The Critical Linkages: Bay Area and Beyond effort (Penrod et al. 2013) was led by Science and Collaboration for Connected Wildlands, a nonprofit focused on connectivity conservation in a portion of the regional study area. The Critical Linkages: Bay Area and Beyond report identifies landscape-level connections that, combined with the Conservation Lands Network, create a comprehensive plan for regional-scale connectivity. The linkages identified are considered crucial to the region’s ecological health. The study uses least-cost corridor analysis to identify movement routes between large landscape blocks for a number of focal species. The analysis modeled efficient paths based on weighted characteristics for each focal species. In total, 11 focal species were chosen for least-cost corridor linkage modeling. Linkages were designed on the basis of habitat suitability, patch size, and patch configuration analysis, as well as opinion of species experts. These linkage designs were then field checked for barriers and areas of priority. The report offers a method for designing a conservation strategy and identifying opportunities for conserving linkages. No linkages identified by Penrod et al. (2013) overlap with the study area; however, the most eastern edge of the Mt. Diablo large landscape block, overlaps with the western boundary of the study area at Marsh Creek in the City of Brentwood. The Mount Diablo-Diablo Range Corridor, connecting Mount Diablo to the Diablo Range, is located immediately southwest of the study area (Figure 13E-1).

California Essential Habitat Connectivity Project Data

The California Essential Habitat Connectivity (CEHC) Project: A Strategy for Conserving a Connected California was designed to support land use planning and transportation. The report was produced by a multidisciplinary team of representatives of 62 agencies, a smaller technical advisory team, and a steering committee. The report includes a statewide Essential Habitat Connectivity Map, the data collected to delineate the areas shown on the map, recommendations for correcting the fragmentation caused by roads, and guidance for developing and implementing local and regional connectivity plans. Analysis was conducted to determine where mitigation would be most effective and how best to enhance connectivity while lessening vehicle-wildlife collisions (Spencer et al. 2010).

The connectivity map depicts large natural blocks of habitat and areas deemed essential for ecological connectivity for a broad range of species. The Essential Connectivity Areas were found using least-cost path modeling; they are currently large polygons that need to be replaced by more refined linkage designs. The Natural Landscape Blocks and Essential Connectivity Areas can be used to help prioritize conservation, mitigation, and other land-based decisions (Spencer et al. 2010:xiii). The detailed linkage designs use the coarse Essential Connectivity Areas to refine and delineate specific lands needed to maintain or restore functional connections between Natural Landscape Blocks and to develop a course of action necessary for conservation. The detailed plan looks more closely at the areas to be connected and the focal species in those areas. Based on these two aspects, a least-cost path model can be run that takes into account the likelihood of future alterations such as climate change. The design can then be field verified for other opportunities and modified to add habitat where needed to improve corridor quality—for example, increasing width to 2 kilometers to accommodate medium animals and less mobile populations that take longer to disperse.

The study area is within the Great Central Valley Ecoregion, which is comprised of the Sacramento Valley in the north, the San Joaquin Valley in the south, and the Sacramento–San Joaquin Delta in between. The Great Central Valley is largely converted to agricultural and urban land covers, with severely reduced remaining natural communities resulting in the highest level of habitat conversion and fragmentation of any ecoregion (Spencer et al. 2010:52). Nevertheless, the Great Central Valley supports diverse native and endemic species especially in wetland areas and along waterways. As a whole, this ecoregion has 114 Natural Landscape Blocks entirely within the ecoregion that tend to be small and isolated; the largest Natural Landscape Blocks (those >20,000 acres) are largely restricted to the foothill margins of the Valley proper (Figure 13E-2). Ten Natural Landscape Blocks are within the study area; the named landscape blocks include Sacramento Bypass, Yolo Bypass, Little Holland Tract/Yolo Bypass, Stone Lake, Bear Slough, Staten Island, Montezuma Hills, Mandeville Island, Grizzley Island, and Brushy Peak. Three of the Natural Landscape Blocks (Yolo Bypass, Holland Tract/Yolo Bypass, and Mandeville Island) are entirely within the study area (Figure 13E-2). Scattered throughout the study area are numerous unnamed small natural areas (areas smaller than 2,000 acres that otherwise meet Natural Landscape Block criteria). Four essential connectivity areas occur within the study area that connect at least two or more Natural Landscape Blocks: including the Yolo Bypass-Sacramento Bypass, Little Holland Tract/ Yolo Bypass-Yolo Bypass, Stone Lake–Yolo Bypass, Bear Slough–Browns Creek, Mandeville Island–Staten Island, and Mountain House–Brushy Peak (Figure 13E-2).

A major challenge of this ecoregion is to maintain and enhance local and regional connectivity across numerous roads, agricultural areas, and urban land covers. This challenge is being addressed by multiple agencies, researchers, and through local and regional connectivity planning and implementation. Many of these local and regional connectivity planning efforts emphasize restoration of aquatic flows and riparian forest, removing in-stream barriers, and increasing the extent and continuity of riparian vegetation communities along major rivers and tributaries. Additionally, various natural community conservation plans (NCCP) have focused on approaches for sustaining, restoring, and enhancing functional connectivity for diverse species and natural communities.

Potential Riparian Connections—CEHC

The potential riparian connections dataset is a product of CEHC Project; the dataset illustrates the contribution of streams and rivers in providing additional avenues for terrestrial and aquatic connectivity in the network of Natural Landscape Blocks and Essential Connectivity Areas. Streams and rivers that intersect with the study area include Cosumnes River, Mokelumne River, Sacramento River, Putah Creek, San Joaquin River, Calaveras River, and French Camp Slough.

Terrestrial Connectivity Areas of Conservation Emphasis

CDFW's Terrestrial Connectivity dataset within Areas of Conservation Emphasis summarizes information on terrestrial connectivity per hexagon and includes the presence of mapped corridors or linkages; the juxtaposition to large, contiguous, natural areas; and the relative intactness score. This dataset was developed to support conservation planning efforts by allowing users to spatially evaluate the relative contribution of an area to terrestrial connectivity based on the results of statewide, regional, and other connectivity analyses (California Department of Fish and Wildlife 2017, 2019a). Each hexagonal mapping unit has a connectivity rank value from 1 to 5, with 5 indicating areas of irreplaceable and essential connectivity conservation priority. Figure 13E-3 shows the intersection between the Terrestrial Connectivity dataset and the study area. The majority of the study area intersects with hexagonal mapping units with a connectivity ranking of 1, signifying "limited connectivity opportunity," defined as "areas where land use may limit options for providing connectivity (e.g., agriculture, urban) or no connectivity importance has been identified in models (California Department of Fish and Wildlife 2019a). ACE terrestrial connectivity dataset generally identifies the majority of the study area that is not within the vicinity of a waterway as having limited terrestrial connectivity opportunities (Rank 1) (Figure 13E-3). Portions of the study area intersect with hexagonal mapping units with a connectivity ranking of 4 or 5, signifying "conservation planning linkages" and "irreplaceable and essential corridors," which are defined as "habitat connectivity linkages mapped in the CEHC and fine-scale regional connectivity studies" and "… channelized areas, as identified in The Nature Conservancy's Omniscape model, and priority species movement corridors" (California Department of Fish and Wildlife 2019a). Terrestrial connectivity improves around the Sacramento and San Joaquin Rivers and their associated tributaries, and around Liberty Island, Old River, Middle River, Grant Line Canal, and areas near and west of Byron Highway; these areas are identified as conservation planning linkages (Rank 4) or areas with implementation flexibility (Rank 3) because of the presence of nearby large, contiguous natural areas and wildlife movement corridors. Areas identified with a connectivity ranking of 5 include the Cosumnes River Preserve, northern portion of Liberty Island, Stones Lake National Wildlife Refuge, Little Holland Tract, San Joaquin River at Venice Island, Quimby Island, Little Mandeville Island, Kimball Island, and the remaining wetlands in the vicinity of Antioch Point.

Missing Linkages in California's Landscape

In 2000, a statewide interagency workshop was held to discuss and map critical and at-risk linkages throughout California. The effort, which included more than 200 contributing land managers, conservationists, and biologists, culminated in the *Missing Linkages: Restoring Connectivity to the California Landscape* report and linkage dataset (Penrod et al. 2001a, 2001b). The associated GIS data includes the 232 habitat linkages across California identified as a result of the *Missing Linkages: Restoring Connectivity to the California Landscape* report. Figure 13E-4 shows the intersection between the missing linkages dataset and the study area. The following linkages (from north to south) are within or near the study area.

- **Putah Creek**—From Lake Berryessa this riparian stream corridor extends approximately 29 miles east to the Sacramento Deep Water Ship Channel, where it ultimately enters the Sacramento River. This landscape linkage was mapped along the South Fork of Putah Creek and was identified as a riparian stream corridor that provides movement habitat for the following key species groups (i.e., species used as connectivity indicators): fish (Chinook salmon [*Oncorhynchus tshawytscha*]), and birds. The linkage was ranked as having a priority value of 4 (out of 5) for the feasibility of the linkage as a conservation priority. It was ranked as having a threat value of 5 (out of 5), indicating severe threat/loss imminent, for overall degree of threat to connectivity. The linkage was also identified as having local support opportunities for conservation planning and is a part of the UC Davis Putah Creek Riparian Reserve (University of California, Davis 2020), USACE, Teichert Aggregates, Yolo and Solano counties Resource Conservation District, and the Putah Creek council.
- **North South Cross Delta**—Extends from northeast of Dixon south through the Montezuma Hills, across Sherman Island, southeast through Brentwood to Coney Island. The landscape linkage was identified as oak and cottonwood riparian corridor and freshwater marsh habitat that provides movement habitat for migratory birds, bats, and aquatic and semi-aquatic vertebrates. The linkage was ranked as having a priority value of 4 (out of 5) for the feasibility of the linkage as a conservation priority. It was ranked as having a threat value of 3.5 (out of 5), indicating moderate threat, for overall degree of threat to connectivity. The linkage was identified as having many land parcels that are resource agency (i.e., USACE, CDFW, etc.) owned, which may facilitate conservation planning opportunities.
- **Grizzly-Cache Slough**—Extends from west of Lindsey Slough westward through Bradmoor Island to Grizzly Island. The most eastern extent of this landscape linkage is within the western boundary of the study area, near Rio Vista. This linkage was identified as a salt marsh, grassland, and vernal pool habitat and that provides movement habitat for the following key species: tule elk, fairy shrimp, delta smelt (*Hypomesus transpacificus*), black rail, and salt marsh harvest mouse. The linkage was ranked as having a moderate priority value of 3 (out of 5) for the feasibility of the linkage as a conservation priority. It was ranked as having a threat value of 2 (out of 5), indicating low threat for overall degree of threat to connectivity. The linkage was also identified as having local support opportunities for conservation planning from The Nature Conservancy, Solano County Farmland and Open Space Trust, as well as private conservation easements and fee titles.

- **Suisun-San Pablo Bay—**Extend from Sherman Island west to western Suisun Bay, this linkage is identified as a potential connectivity 'choke-point'**.** This linkage was identified as open water, tidal marsh, and brackish wetland movement habitat for the following key species: California Ridgway's rail, salt marsh harvest mouse, and other marsh dependent wildlife species. The linkage was ranked as having a moderate priority value of 3 (out of 5) for the feasibility of the linkage as a conservation priority. It was ranked as having a threat value of 4.5 (out of 5), indicating somewhat severe threat/loss imminent, for overall degree of threat to connectivity. The linkage was also identified as having conservation opportunities through oil refinery rehabilitations or changes.
- **Lower San Joaquin River—**From Tulloch Reservoir, following the Stanislaus River west to the confluence of the Stanislaus and San Joaquin River, this riparian river corridor was identified as a 'missing link' and provides movement habitat for riparian brush rabbit, riparian woodrat (*Neotoma fuscipes riparia*), western yellow-billed cuckoo and other neotropical migratory birds, and ringtail (*Bassariscus astutus*). The linkage was ranked as having a priority value of 5 (out of 5) for the feasibility of the linkage as a conservation priority. It was ranked as having a threat value of 4 (out of 5), indicating somewhat severe threat/loss imminent, for overall degree of threat to connectivity. The linkage was also identified as having conservation opportunities through collaborations between the Tuolumne River Trust, potential agency land acquisition through CALFED and USFWS, and is included in the USFWS Recovery Plan for Upland Species of the San Joaquin Valley (Penrod et al. 2021a:389-390).

UC Davis Core Reserves and Corridors

UC Davis ecologists compared conservation networks at regional and local scales from the same area within the Central Valley of California to analyze the impact of scale effects on conservation planning. An intersection of results from multiple scales could potentially be used to prioritize areas for conservation found to be important at several spatial scales. Using MARXAN and least corridor analysis technologies, potential regional and intraregional conservation networks were compared. The study found large differences, specifically in the disparateness of the identified corridors that connect core reserves, suggesting many regionally important corridors are not identified at the local scale and corridors connecting locally important core areas can be missed if only regional scale is taken into account in the planning process. One-third of the area identified for inclusion within a conservation network at either scale was identified at both the regional and local scale (Huber 2008:79). The results suggest that planning efforts at any one scale neglects to include biodiversity patterns and ecological processes that are important at other scales (Huber et al. 2010:683).

Four core reserves were identified in the study area; two core reserves are located in the northern portion of the study area, one core reserve overlaps with the central portion of the study area (from Frank's Tract northwest to the Sacramento River), and another core reserve overlaps with the most southeastern extent of the study area. Corridors have been identified linking the core reserves (Figure 13E-5).

Wildlife Corridors—San Joaquin Valley

The California Departments of Fish and Wildlife, Parks and Recreation, and Transportation (Caltrans) are collaborating to improve planning information for wildlife connectivity statewide. The results of an inquiry to identify existing information on wildlife corridors in California produced eight datasets covering three parts of California and a single statewide dataset. Not all datasets represent the same data gathering and analysis criteria for designating corridors. The following datasets identified potential corridors connecting conservation opportunity areas in the San Joaquin Valley region: Statewide Corridors dataset by South Coast Wildlands; Central California Coast Corridors dataset by University of California, Davis; San Joaquin Valley Corridors dataset by Endangered Species Recovery Program; San Joaquin Valley Corridors (three datasets) by Information Center for the Environment; Southern California Corridors (two datasets), by South Coast Wildlands; and one dataset by Patrick Huber at the Information Center for the Environment, University of California, Davis.

These potential corridors were identified using a tool called Corridor Creator that is a modified version of the least-cost corridor ArcMap tool. This tool identifies a connectivity surface rather than single line, then the highest rated raster cells were selected from the resulting surfaces and converted them to polygons. For this analysis a more complex model was used to create the cost surface and included current land cover and management, road density, urban area density, natural area density, and waterway density. Cost surfaces for three broad suites of species were created: forest, open/shrub, and aquatic/riparian. These three surfaces were then summed to create one overall, generic cost surface for the region.

Six wildlife corridors intersect with the study area (Figure 13E-6). The Delta Old North corridor is located northwest of Bacon Island. The Delta-Mokelumne corridor is south of Thornton, Delta Old South is on Roberts Island east of Middle River, and three corridors are located south of Union Island. Old Lower San Joaquin corridor is southeast of Union Island and west of Lathrop; Coral Lower San Joaquin corridor is southeast of Tracy, and Old Coral corridor is southwest of Mountain House.

Wildlife Movement Barrier Priorities

The California Wildlife Barriers 2020 dataset and report (California Department of Fish and Wildlife 2020d) represents CDFW's initial effort to identify priority wildlife movement barriers across the state. Increasing attention is being directed toward wildlife habitat connectivity as a mechanism of maintaining biodiversity in the face of population growth and climate change. Listing priority wildlife barrier locations will help focus limited financial resources where the highest need has been identified to improve wildlife movement. CDFW staff across the six administrative CDFW regions used all available empirical information, including existing connectivity and road crossing studies, collared-animal movement data, roadkill observations, and professional expertise, to identify linear segments of infrastructure that present barriers to terrestrial wildlife movement. The wildlife barriers were evaluated based on ten criteria and each CDFW region identified ten high priority locations for remediation. As a result, a total of 61 individual segments were identified as priorities statewide. Of the top priorities, 58 involve the State Highway System (e.g., interstate, highway or state route). One road, one railway, and one canal location were also identified, collectively representing a total of 610 linear miles.

Within the study area, a culvert on State Route (SR) 12 (ID W031) is identified as a wildlife movement barrier for giant garter snake, western pond turtle, mink (*Neovison vison*), river otter, beaver, and all other reptiles and mammals in the area (Figure 13E-7).

Wildlife-Vehicle Collisions

Wildlife-vehicle collision data (i.e., roadkill data) can be an important tool in assessing wildlife movement and potential barriers to movement. Roadkill data can be useful in identifying areas where movement is constrained and where roadkill hotspots may be occurring. Roadkill data are not always indicative of preferred crossing locations because of the wide variety of factors that may contribute to roadkill: landscape factors, traffic volume, physical conditions, and availability and condition of potential crossing structures (e.g., culverts, undercrossing). Nevertheless, roadkill data can provide insight into where movement and mortality are occurring, prompting further investigation into potential causes and deployment of measures to reduce the incidence of roadkill.

The roadkill data utilized in this analysis were collected from the following sources:

- Opportunistically collected roadkill data gathered by volunteers for the University of California, Davis, California Roadkill Observation System (University of California, Davis 2021)
- Roadkill data from law enforcement vehicular accident and roadway hazard reports (Road Ecology Center 2021)

Roadkill data are predominantly gathered along I-5 in the Central Valley region, coinciding with highly developed areas, areas of high road density, and roads with high traffic volumes. Wildlife-vehicle collision data are also clustered along SR 4, 12, 160, and various local roads in the study area.

There were a total of 483 individual roadkill observations within the study area comprising approximately 71 species represented in these data. Species in the data include various bird species, amphibians, reptiles, small mammals such as ground squirrels and rabbits, medium-sized mammals such as raccoon, coyote, Northern river otter, and beaver, and large mammals including black-tailed deer. Within the study area three special-status species were observed in the roadkill data including American badger (*Taxidea taxus*), burrowing owl, and western pond turtle.

Figure 13E-8 in Appendix 13E illustrates the roadkill data for focal species within the study area and Table 13E-1 in Appendix 13E details the species represented in the roadkill data within the study area.

13.1.6.3 Existing Infrastructure

Existing Infrastructure Conditions

Throughout the study area, various types of infrastructure present substantial constraints and barriers to wildlife movement. This section discusses roads and highways, rail lines, aqueducts and canals, and urban/developed lands.

Roads and Highways

Local roads and highways are abundant throughout the study area. Multilane interstates and highways in the study area include I-80, I-5, I-205, SR 50, SR 160, SR 12, and SR 4. The highest road densities are in the West Sacramento, Stockton, Lathrop, Tracy, Brentwood, Oakley, Antioch, and Pittsburg areas. Many of these roads and highways, particularly those with high traffic volumes and in areas with high road density, present barriers to movement for a variety of species.

Rail

Several existing rail lines cross the study area; these include railroads owned and operated by various entities such as Amtrak, Union Pacific Railroad, BNSF Railway, California Northern Railroad, Sierra Northern Railway, and Sacramento–Yolo Port District. Major rail alignments pass through the West Sacramento, Antioch, Tracy, and Stockton portions of the study area. Many of these rail lines are not fenced and present a barrier and mortality risk to various species; some species likely avoid the rail lines, while others are at risk of train strike or entrapment in the rail track ballast.

Aqueduct and Canals

An extensive network of canals and aqueducts are located in the study area including the Sacramento Deep Water Ship Channel, Yolo Bypass, West Canal, Victoria Canal, Grant Line Canal, Delta-Mendota Canal, and the California Aqueduct. Many of these features are highly developed and channelized, presenting substantial barriers to wildlife movement. Animals can also become trapped in the canals and drown.

Developed

Developed and urbanized lands are distributed throughout the study area with highest densities in the West Sacramento, Stockton, Tracy, Brentwood, Oakley, Antioch, and Pittsburg portions. Because many species of wildlife (e.g., mountain lion [*Puma concolor*], mule deer [*Odocoileus hemionus*], badger) avoid developed and urbanized areas, these areas may act as barriers to wildlife movement and as important agents of habitat fragmentation.

13.1.7 Habitat Conservation Plans

13.1.7.1 Habitat Conservation Plans Setting Overview

The following section provides an overview of the three approved habitat conservation plans (HCPs) and one conservation strategy that overlap with the study area. See Section 13.3.1.2, *Evaluation of Construction Activities*, under *Methods Used to Assess Impacts on Conservation Plans*, for a description of the methods and data used in the evaluation and impacts analysis of the project on approved conservation plans.

South Sacramento Habitat Conservation Plan

The South Sacramento Habitat Conservation Plan (SSHCP) was permitted in 2019 and addresses issues related to species conservation, agricultural protection, and urban development in south Sacramento County. The plan is administered by Sacramento County; the cities of Sacramento, Elk Grove, Galt, and Rancho Cordova; Sacramento Regional County Sanitation District; and the Capital Southeast Connector Joint Powers Authority. The SSHCP covers 28 species of plants and wildlife, including 11 that are state- or federally listed as threatened or endangered.

The western extent of the SSHCP plan area overlaps the study area in Preserve Planning Unit (PPU) 6. Included in the overlap is a portion of the SSHCP's Urban Development Area. PPU 6 encompasses 95,196 acres, including 58,458 acres of agriculture, and 17,633 acres of grassland (County of Sacramento et al. 2018:7-90). The SSHCP intends to conserve at least 41,923 acres, most of which would be agricultural and grassland land cover types with limited overlap with the study area; within PPU 6, the SSHCP aims to conserve 9,750 acres, composed primarily of 8,465 acres of cropland and irrigated pasture, 623 acres of valley grassland, and 447 acres of riparian. The remaining 215 acres to be preserved within PPU 6 include wetland and open-water habitats (County of Sacramento et al. 2018:7-87–7-88, Table 7-6). Approximately 28,000 acres of existing cropland preserves are found within PPU 6 (County of Sacramento et al. 2018:3-167, Figure 3-38).

San Joaquin County Multi-Species Habitat Conservation and Open Space Plan

The San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJC MSHCP) was permitted in 2000 and is administered by the San Joaquin Council of Governments. This 50-year plan addresses 97 special-status plant, fish, and wildlife species (47 of which are on the federal permit) throughout most of San Joaquin County (more than 900,000 acres), including a substantial portion of the eastern Delta. The plan participants include the County of San Joaquin and the Cities of Stockton, Lodi, Manteca, Tracy, Ripon, Escalon, and Lathrop. Activities covered under the plan include urban development, mining, expansion of existing urban boundaries, nonagricultural activities occurring outside of urban boundaries, levee maintenance undertaken by the San Joaquin Area Flood Control Agency, transportation projects, school expansions, nonfederal flood control projects, new parks and trails, maintenance of existing facilities for nonfederal irrigation district projects, utility installation, maintenance activities, managing preserves, and similar public agency projects.

The project study area overlaps a substantial portion of the SJC MSHCP; construction of all project alternatives would take place within the Primary Zone of the Delta (Delta Zone), which consists of primarily agricultural habitat types. Currently, approximately 210,488 acres of agriculture, 13,745 acres of grassland, 7,775 acres of riparian, 5,054 acres of nontidal wetland, 2,101 acres of seasonal wetland, 117 acres of vernal pool, and 1,640 acres of tidal wetland are present within the SJC MSHCP plan area (Appendix 13D, *Overlapping Habitat Conservation Plan Permanent Surface Impacts*). Within the overlapping area, the SJC MSHCP targets for acquisition include flooded fields, grasslands, riparian woodland, row and field crops, and wetlands. However, because the acquisition and restoration requirements of the SJC MSHCP are based upon mitigation ratios applicable to the natural community types where impacts occur, and the plan operates on a "pay-as-you-go" basis, the acquisition targets depend on the amount and location of impacts occurring within the county. Most of the impacts covered under the plan to date and, consequently, the preservation and creation efforts, have occurred on cultivated land. The Delta Zone contains approximately 5,100 acres of existing preserves, all of which are in agricultural habitat types (San Joaquin Council of Governments 2020:21, Table 6).

East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan

The East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECCC HCP/NCCP) was adopted in 2006 by Contra Costa County and the Cities of Brentwood, Clayton, Pittsburg, and Oakley. Permits were issued in 2007 by USFWS and CDFW for a 30-year term. A joint powers authority of the agencies receiving the permits and the East Bay Regional Park District formed the East Contra Costa County Habitat Conservancy to implement the plan.

The HCP/NCCP provides regional conservation while improving and streamlining the permit process for endangered species. In 2012, USACE issued a Regional General Permit to the East Contra Costa County Habitat Conservancy to provide additional streamlining for wetland regulations. The HCP/NCCP requires creation of a preserve system of 23,800 to 30,300 acres that will be managed for the benefit of 28 covered species and their associated natural communities; as of 2019, 14,221 acres have been preserved (East Contra Costa County Habitat Conservancy 2020:ES-2). The range of impacts and conservation requirements varies depending on whether the current urban limit lines of the participating cities are expanded.

The central western portion of the study area overlaps with the ECCC HCP/NCCP (Table 13-102). The overlap area is largely cultivated land outside of the urban limit lines of the county and participating cities. The proposed preserve system for the ECCC HCP/NCCP occurs almost entirely outside of the study area boundary. Project construction would have impacts in the ECCC HCP/NCCP plan area in Subzones 6d and 6e (i.e., Southern Complex and Bethany Complex). The land acquisition requirement for Zone 6 is 250 acres of cropland or pasture outside of Subzones 6d and 6e; within Subzones 6d and 6e, at least 20 acres of alkali wetland are targeted for acquisition (East Contra Costa County Habitat Conservation Plan Association 2006:5-41–5-43).

East Alameda County Conservation Strategy

The East Alameda County Conservation Strategy (EACCS) provides a mechanism for endangered species permitting under the CESA and ESA within eastern Alameda County. The conservation strategy does not directly result in permits for any participating local agency but provides a framework for endangered species permitting of projects in the study area. The strategy was completed in 2011 and is currently being utilized by local jurisdictions. The plan was prepared by Alameda County; the Cities of Dublin, Livermore, and Pleasanton; Alameda County Waste Management Authority; Alameda County Congestion Management Agency; East Bay Regional Parks District; Alameda County Resource Conservation Service; and Natural Resource Conservation Service in consultation with the USFWS, CDFW, and the San Francisco RWQCB. The conservation strategy addresses the conservation needs of 19 species. In June 2012, USFWS issued a programmatic Section 7 BiOp with USACE that can be used for CWA Section 404 compliance using the framework of the conservation strategy for federally listed species. The EACCS does not contain preserves; rather, it identifies conservation priorities within its 18 Conservation Zones and provides a conservation easement toolkit to facilitate land conservation. The southwestern portion of the study area overlaps with a small portion of the EACCS in Conservation Zones 6 and 7. Conservation priorities within these zones include protecting habitat for San Joaquin kit fox and California red-legged frog.

Each of these plans includes a conservation strategy that implements land restoration, enhancement and/or acquisition within or near their respective boundaries. The following discussion addresses whether the Delta Conveyance Project has the potential to conflict with these plans and their conservation strategies.

13.2 Applicable Laws, Regulations, and Programs

The applicable laws, regulations, and programs considered in the assessment of project impacts on terrestrial biological resources are indicated in Section 13.3.1, *Methods for Analysis*, or the impact analysis, as appropriate. Applicable laws, regulations and programs associated with state and federal agencies that have a review or potential approval responsibility have also been considered in the development of CEQA impact thresholds or are otherwise considered in the assessment of environmental impacts. A listing of some of the agencies and their respective potential review and approval responsibilities, in addition to those under CEQA, is provided in Chapter 1, *Introduction*, Table 1-1. A listing of some of the federal agencies and their respective potential review, approval, and other responsibilities, in addition to those under NEPA, is provided in Chapter 1, Table 1-2. Laws and regulations specifically used in the impact analyses are summarized below.

- **Endangered Species Act (16 United States Code [USC] § 1531 *et seq.*):** The federal ESA and subsequent amendments provide guidance for conserving federally listed species and the ecosystems upon which they depend. Section 7 of the act requires federal agencies to consult with USFWS or National Marine Fisheries Service, as appropriate, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered fish, wildlife, or plant species, or result in the destruction or adverse modification of designated critical habitat for any such species. Section 9 of the act and its implementing regulations prohibit the take of any fish or wildlife species listed under the ESA as endangered or threatened, unless otherwise authorized by federal regulations. Species listed under the federal ESA are treated as special-status species under CEQA and are included for analysis in this chapter accordingly. In addition, potential effects on designated critical habitat within the study area are considered.
- **The Bald and Golden Eagle Protection Act (81 FR 91494–91554)**: The Bald and Golden Eagle Protection Act authorizes "incidental take" of bald and golden eagles if all "practicable" measures to reduce impacts on eagles are implemented. The USFWS is responsible for issuing permits and guidance to avoid and minimize effects on the species. USFWS guidance documents around the Bald and Golden Eagle Protection Act are used in the analysis presented in this chapter.
- **Migratory Bird Treaty Act (16 USC § 703 *et seq*., 50 CFR Part 21):** This act protects migratory birds by prohibiting intentional taking, selling, or conducting other activities that would harm migratory birds, their eggs, or nests, unless authorized under a permit, by prohibiting intentional taking, selling, or conducting other activities that would harm migratory birds, their eggs, or nests, unless authorized under a special permit. USFWS guidance on the Migratory Bird Treaty Act was used in the analyses of impacts on special-status birds and in the development of mitigation measures for these species, as well as other birds protected under the Migratory Bird Treaty Act.
- **Federal Noxious Weed Act (7 USC §§ 2801–2813; 7 CFR Part 360):** This act is primarily concerned with the introduction of federally designated noxious weed plants or seeds across the international borders of the United States. The Federal Noxious Weed Act also regulates the interstate movement of designated noxious weeds under USDA's permit system. This act would be a factor in any decisions to import construction materials and equipment, including aggregate, from out-of-state or out-of-country. Noxious weeds degrade wildlife habitat and are difficult to eradicate once established. Resources available in part due to this act were used for the analysis of effects from invasive and noxious plants.
- **Clean Water Act of 1972 (33 USC §§ 1341 and 1344):** CWA Section 401 specifies that states must certify that any activity subject to a permit issued by a federal agency (e.g., USACE) meets all state water quality standards. In California, the State Water Board and the RWQCBs are responsible for certifying activities subject to any permit issued by the USACE pursuant to CWA Section 404 or pursuant to Section 10 of the Rivers and Harbors Act of 1899. CWA 404 authorizes USACE and EPA to issue permits to regulate the discharge of "dredged or fill materials into waters of the United States." Should activities such as dredging or filling of wetlands or surface waters be required for project implementation, then permits obtained in compliance with CWA Section 404 would be required for the project applicant(s). CWA guidance from USACE is used in the analyses of impacts on aquatic resources in this chapter.

- **California Endangered Species Act (Fish & G. Code §§ 2050–2116)**: CESA prohibits the take of any fish, wildlife, or plant species that has been listed as endangered or threatened or designated as a candidate for listing. CESA contains a procedure for CDFW to issue an incidental take permit, authorizing take of listed and candidate species that is incidental to an otherwise lawful activity, subject to specified conditions, including impacts of take that are fully mitigated. Under CESA, if a project would result in take, including take from obstructions to wildlife movement or migration, mitigation would be required to avoid impacts on listed wildlife species. Species listed under CESA are treated as special-status species under CEQA and are included for analysis in this chapter accordingly.
- California Fish and Game Code pertaining to Migratory Birds and Raptors (Fish & G. Code §§ 3503 and 3503.5) protects non-special-status migratory birds and raptors. California Fish and Game Code Sections 3503 and 3503.5 were used in the analyses of impacts on special-status birds and in the development of mitigation measures for these species, as well as other birds protected under the California Fish and Game Code.
- **Fully Protected Species (Fish & G. Code §§ 3511, 4700, and 5050)**: California Fish and Game Code prohibits take or possession of fully protected species at any time. CDFW is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by these species, except pursuant to an approved NCCP. California Fish and Game Code Sections 3511, 4700, and 5050 were used in the analyses of impacts on fully protected species and in the development of mitigation measures for these species.
- **California Native Plant Protection Act of 1977 (Fish & G. Code §§ 1900–1913):** The California Native Plant Protection Act (NPPA) is intended to preserve, protect, and enhance endangered or rare native plants in the state. The NPPA gave the California Fish and Game Commission the power to designate native plants as endangered or rare, and protect endangered and rare plants from take. Designations by CDFW stemming from the NPPA were used in this chapter for determining plant species that qualify as special-status under CEQA.
- **Lake and Streambed Alteration Agreement (Fish & G. Code §§ 1600–1607):** California Fish and Game Code Sections 1600–1607 require notifying CDFW prior to any project activity that might (1) substantially divert or obstruct the natural flow of any river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement that may pass into any river, stream, or lake. If, after notification, CDFW determines that the activity may substantially adversely affect fish and wildlife resources, a Lake or Streambed Alteration Agreement under Section 1602 will need to be obtained. The Streambed Alteration Program (§ 1600 *et seq.*) requires an entity to notify CDFW prior to commencing any activity that may result in the modification of a river, stream, or lake that could adversely affect existing fish or wildlife resources. Information from the Streambed Alteration Program (§ 1600 *et seq.*) was used for analyzing effects on associated resources in this chapter.
- **Porter-Cologne Water Quality Control Act of 1969 (Water Code § 7):** Under the Porter-Cologne Act definition, *waters of the State* are “any surface water or groundwater, including saline waters, within the boundaries of the state.” Although all waters of the United States that are within the borders of California are also waters of the State, the reverse is not true. Therefore, California retains authority to regulate discharges of waste into any waters of the State, regardless of whether USACE has concurrent jurisdiction under CWA Section 404, and defines *discharges to receiving waters* more broadly than the CWA does. Guidance from the

California State Water Resources Control Board is used in the analyses of impacts on aquatic resources in this chapter.

- **Local Policies and Ordinances**: Several general plans and local codes for the cities and counties that overlap with the project footprint contain policies and ordinances for the protection of biological resources. These local agencies include the city and county of Sacramento, the City of Lodi, the City of Stockton, San Joaquin County, Alameda County, and Contra Costa County. Policies, codes, and ordinances from these local agencies were reviewed for potential conflicts with the implementation of the project alternatives.
- **Habitat Conservation Plans, Natural Community Conservation Plans, and Other Regional Conservation Plans**: The study area for this chapter overlaps with several conservation plans. To comply with CEQA, potential conflicts with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state HCP were analyzed in this chapter.

13.3 Environmental Impacts

This section describes the direct and cumulative environmental impacts associated with terrestrial biological resources that would result from project construction, operation, and maintenance. It describes the methods used to determine the impacts of the project and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts are provided.

13.3.1 Methods for Analysis

This section describes the quantitative and qualitative methods used to assess the impacts of implementing the project alternatives on terrestrial biological resources. These impacts would be associated with construction, operations, and maintenance of the project, implementation of the CMP described in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources* and implementation of other mitigation measures. The methods used for the different phases of the project are broken out into subheadings below. The methods for construction are further defined by the resource type.

Generally, for all phases of the project and resources, the analysis contains an assessment of both the direct and reasonably foreseeable indirect impacts of the project alternatives.

All quantified acreage impacts are reported out to the hundredths place, which aligns with the level of rounding used in DWR's aquatic resources delineation.

13.3.1.1 Impact Mechanisms

Impact mechanisms that are common to construction, operations, maintenance, and CMP-related restoration include the following.

- Ground disturbance—Most common examples include grading, excavation, trenching, drilling, and placement of fill, and vibrations associated with those ground-disturbing activities.
- Vegetation removal—Examples include grubbing, trimming, and mowing.
- Hazardous materials—Examples include spills of fuels, oils, cement, and herbicide application.

- Vehicle movement—Examples include construction personnel vehicles, haul trucks, and grading equipment movement on local roads, construction access roads, and off-road vehicle movement in portions of work areas.
- Noise—Examples include equipment operation, pile driving, and helicopters.
- Visual disturbance—Includes permanent lighting at project facilities, temporary lighting used for construction, and disturbances caused by the presence of construction vehicles and personnel.
- Water quality—Includes the creation and mobilization of methylmercury, selenium, pesticides, and microcystins.
- Dewatering—Includes pumping and draining of waterbodies, including cofferdam installation where necessary.
- Dust—Results from ground disturbance and vegetation removal.

13.3.1.2 Evaluation of Construction Activities

The general construction activities common to all project alternatives have a potential to result in permanent and temporary impacts on terrestrial biological resources and include the following activities. The assumptions used for assessing these impacts are also included.

- North Delta Intakes—The intakes would include permanent facilities and temporary work areas. Intake construction would involve, in part, in-water work along the Sacramento River. Construction would occur over a 12- to 14-year period, depending on the alternative.
- Tunnels—The construction of the tunnels, using tunnel boring machines, do not have the potential to cause impacts on terrestrial biological resources, except for the construction of the shafts and the storage of the RTM, which are listed separately below.
- Tunnel Shafts—Tunnel shafts would include permanent facilities and temporary work areas. Tunnel shaft pads would be constructed above the 100-year water surface elevation plus sea level rise and 2 feet of freeboard. The shaft would be raised above the shaft pad to protect against the 200-year flood event plus sea level rise at the year 2100. The construction period would vary by shaft and alternative but would be between 2 and 11 years.
- Reusable Tunnel Material—RTM areas would be both temporary and permanent depending on location, but because of the uncertainty of being able to restore these areas as habitat for terrestrial species they are all considered to be permanent impacts.
- Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c)—Southern Complex construction includes both permanent facilities and temporary work areas. Construction would occur over a 10- to 11-year period, depending on the alternative.
- Bethany Complex (Alternative 5)—Bethany Complex construction includes both permanent facilities and temporary work areas. Construction would occur over a 10-year period.
- Bouldin Island Levee Modifications (Alternatives 1, 2a, 2b, and 2c)—Construction of levee improvements would take approximately 1 month. The total size of the construction site and post-construction site for the Bouldin Island levee modifications would be approximately 251 acres, with an additional 90 acres for temporary levee modification access roads and impacts on terrestrial resources are based on these acreages. However, to account for ongoing work by levee maintenance agencies, the extent of levee repairs would be reevaluated during the design

phase and coordinated with the local levee maintenance agency and could result in additional permanent and temporary impacts.

- Access Roads—Access roads would result in permanent and temporary impacts. The access road activities would include widened and improved roads, new roads, and new and widened bridges. Construction access roads would remain post-construction for maintenance access to the facilities. Improvements to existing State and local roadways would also remain after construction. Construction of most access roads would vary from 1 to 8 months, depending on the location. Bridge widening efforts could take longer.
- Rail-Served Materials Depot—On-site rails would be used to connect to existing Union Pacific Railroad and BNSF Railway. The railways would be used to haul construction materials and RTM. The on-site rails would be temporary and used over the 12- to 14-year period of construction.
- Electric Power—Transmission and distribution line construction for project alternatives would consist of underground construction, overhead construction, and overhead construction on existing lines. For the analysis of construction impacts on terrestrial biological resources, the following assumptions were applied.
    - All permanent new aboveground distribution lines would be constructed within access roads and it is assumed that there would be no ground-disturbing impacts outside of the access road footprints.
    - All permanent underground transmission lines were treated as a permanent impact within the 25-foot-wide easement that would be established above the line. No agriculture requiring cultivation would be allowed in this easement and no woody vegetation (e.g., riparian) would be allowed to reestablish. Underground transmission lines for facilities used during construction only, such as park-and-ride lots, would have long-term temporary impacts; lines would be de-energized and abandoned in-place after construction and restrictions within the easement would not be required thereafter. Lines would be installed using open-cut trenches and directional drilling to go underneath existing infrastructure (e.g., highways) and waterways.
    - Some new overhead transmission line construction would take place over more than 1 year (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c). The current level of design for new transmission lines is conceptual and final design criteria would be developed by the infrastructure owner. The conceptual design currently consists of a 150-foot-wide corridor where most construction-related disturbance is anticipated to take place. In order to estimate what permanent and temporary impacts on terrestrial biological resources would be, assumptions were developed for the amount of ground disturbance based on information obtained from other transmission line construction projects of a similar size. These assumptions include the following.
        - Towers—Towers were assumed to be lattice towers with four footings requiring 7.5 square feet of permanent impact per footing for a total permanent impact of 30 square feet. For towers in agricultural areas, no agricultural production would be possible beneath or immediately adjacent to the towers. For agricultural areas, it was assumed that 900 square feet of agricultural land would be permanently affected per tower. Towers were assumed to be spaced 1,250 feet apart. Temporary work areas around each tower were assumed to be 40,000 square feet and in use for more than 1 year.

        - Pull sites—Sites used for stringing transmission lines on towers (pull sites) were assumed to require 30,000 square feet of temporary work area per pull site. Pull sites were assumed to be spaced every mile and at every point where a line made a turn. Pull sites were assumed to be in use for more than 1 year.
        - Laydowns and Landing Zones (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c)—Areas used for staging equipment and landing helicopters (laydown and landing zones) were estimated to be needed for every 5 miles of transmission line and each laydown and landing zone was estimated to require 2 acres. Laydown and landing zones were assumed to be needed for more than 1 year; however actual helicopter use would be limited to a total of 21 days.
        - Temporary access roads—It was assumed a 24-foot-wide temporary access road would be needed within the 150-foot-wide corridor for the duration of transmission line construction, which would be more than 1 year.
    - Overhead construction on an existing transmission line would be required to power the intakes and Twin Cities Complex under all project alternatives. The project would attach an additional power line to an existing Sacramento Municipal Utility District (SMUD) line that follows Franklin Boulevard from around Hood-Franklin Road south to Lambert Road. This new line would be a short segment (approximately 4 miles) constructed in parallel (i.e., at the same elevation) to the existing power line on these poles. All construction activity is assumed to be done from the existing roadway and would not result in any permanent or temporary ground disturbance.
- SCADA Facilities—Fiber optic cables that are part of the supervisory control and data acquisition system (SCADA) would be installed throughout the project for all of the alternatives. SCADA lines would be both underground and overhead. Construction for both types would take less than 1 year in a given location.
    - Underground SCADA lines are assumed to require a 25-foot-wide temporary construction area along the length of the line and there would be no permanent restrictions on activities above these lines (i.e., prohibitions on cultivation or vegetation management). In most areas SCADA lines are situated within existing or planned roads but there are some instances where they are outside of roadways. Construction would involve open-cut trenches and directional drilling to go beneath existing infrastructure (e.g., highways) and waterways. Overhead SCADA lines would be attached to existing lines but may require permanent impacts associated with pole upgrades. Where upgrades are required, each existing pole was assumed to require 50 square feet of permanent impact. SCADA lines were assumed to be hung below existing power lines and in parallel with existing communications lines.
- Park-and-Ride Lots—Park-and-ride lot construction would result in permanent impacts when considering the duration of the construction but would ultimately be removed.
- Fencing and Lighting—Security fencing would be installed around all permanent project facilities. Lighting may be necessary for some construction sites if work occurs at night and for construction trailers. Permanent facilities would have exterior lighting with motion detectors that would only be used when maintenance personnel are present.
- Field Investigations—As discussed in Chapter 3, *Description of the Proposed Project and Alternatives*, Section 3.15, *Field Investigations*, field investigations would be conducted after adoption of the EIR prior to and during construction to more specifically identify appropriate

construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b). The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments): test trenches, cone penetration tests (CPTs), soil borings, electrical resistivity tomography (ERT), groundwater testing and monitoring, monument installation, pile installation test methods at the North Delta intakes, pilot studies for settlement, agronomic testing, and utility potholing. Temporary disturbances from these activities are described qualitatively but are not characterized as an additional loss of habitat and are not included in impact acreages. The Bethany Fault Study geotechnical investigations (conducted under Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inches in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022b). Because of its small footprint and the short (1-day) duration of the disturbance from the Bethany Fault Study, minor disturbances are described qualitatively but impacts are not quantified and are considered negligible. For those geotechnical investigations which include test trenches, CPTs, soil borings, and geophysical arrays that would take place over the tunnel alignments but outside of other surface footprints and for the evaluation of the West Tracy Fault, temporary impact acreages for these areas were estimated using the following assumptions:

- The West Tracy Fault geotechnical investigations would take place at fixed locations and would involve test trenches, CPTs, and borings. To estimate the temporary impacts from these activities it was assumed that up to five test trenches (up to approximately 1,000 feet long, 3 feet wide, and 20 feet deep) would be excavated along a line running from the southeast of Byron to the southeast of the Clifton Court Forebay. The temporary work area for the trenches would be approximately 200 feet wide (100 feet on each side of the centerline of the trench). The trenches would remain open for up to 6 weeks, depending on the findings, and would be backfilled completely upon the completion of observations of soil conditions within the trench. In addition to the test trenches, two arrays of surface geophysical surveys (1,000 feet long and 3 feet wide). The temporary work area for the geophysical surveys would be approximately 50 feet wide. Additionally, up to 15 CPTs and 6 soil borings would be completed to a depth of 150 feet.
- To estimate temporary impacts from geotechnical investigations over tunnel alignments, the following assumptions were used:
    - Wetlands and waters would be avoided, except necessary overwater borings in channels large enough to accommodate a barge. A single overwater boring would be completed at each river, canal, or slough crossing (Delta Conveyance Design and Construction Authority 2022a, 2022b).
    - Soil boring and CPT sites would each result in approximately 0.84 acre of disturbance per site, which includes a 0.23-acre (10,000-square-foot) area of temporary disturbance for drilling and staging plus an additional 0.61 acre of temporary disturbance associated with accessing the sites.

- Soil borings and CPTs would be spaced approximately every 1,000 feet between tunnel shafts, and the spacing between soil borings and CPTs would be approximately 500 feet (Delta Conveyance Design and Construction Authority 2022a, 2022b).
- The total amount of temporary disturbance for each tunnel alignment segment was estimated by multiplying the number of sites (soil borings and CPTs combined) by the 0.84-acre area of disturbance per site. The total acreage was then proportionally spread across the land cover types occurring within a given tunnel alignment (e.g., if 50% of the alignment is agricultural then 50% of impacts would be assigned to agricultural).

The impact mechanisms from construction activities would include all of those listed in Section 13.3.1.1, *Impact Mechanisms*.

Some impacts described in this chapter have been categorized based on their duration. Project construction impacts on terrestrial biological resources could be permanent, long-term temporary, or temporary.

Impacts have been categorized as permanent where a biological resource would be removed or lost and would not be replaced at its original site. Permanent impacts would occur primarily at construction sites. Construction of aboveground project facilities would permanently remove or alter habitats and could result in the loss of individual special-status plants or animals. Development and use of RTM storage sites have been characterized as permanent losses of biological resources because of the uncertainty of replacing the resource and the length of time between the loss of the resource and the first opportunity to restore or replace the resource after drying and testing of the RTM. Activities associated with tunneling and RTM placement are likely to occur across multiple years at RTM storage areas. All ground-disturbing activities affecting special-status plants are considered to be permanent.

Impacts on wildlife habitat have been categorized as long-term temporary where construction at a given location would take place over multiple years and the area would not be restored to its pre-disturbance condition until the completion of construction. Areas considered to have long-term temporary impacts include the work areas for the Bethany Reservoir Aqueduct, concrete batch plants, construction water pumping plant, Southern Forebay, substations, intakes, overhead transmission lines, the outlet and control structures, ring levees, Bethany Reservoir Pumping Plant and Surge Basin, and shafts. Even though many of these temporary work areas would eventually be restored, they would be unavailable to multiple generations of wildlife during construction, and therefore for compensatory mitigation purposes are treated the same as permanent impacts and are presented as permanent impacts for wildlife in the impact tables.

Impacts on habitat have been categorized as temporary where construction-related habitat losses would occur over less than 1 year and would be restored to the affected area's pre-disturbance condition within 1 year of the initial habitat loss. The areas that would be expected to be restored within 1 year of disturbance include the work areas associated with levee access roads, SCADA work areas, road work areas, railroad work areas, underground transmission line work areas, and metering areas. Temporary impacts on special-status plants are limited to minor effects that do not disturb the soil, such as driving a vehicle across a stand of annual plants that have dispersed their seeds and completed their life cycle.

Methods Used to Assess Impacts on Sensitive Natural Communities

The natural community impact analysis includes a discussion of the direct effects of project construction of facilities. In addition, effects on habitat value have been considered and addressed where relevant.

The GIS layers depicting all project alternative features that could affect the natural communities (e.g., grading, excavation) were intersected with the natural communities GIS layer and the results were reported in acres.

As mentioned in Section 13.1.2.1, *Natural Community Mapping Methods*, under *Aquatic Resources Delineation Data*, there are differences in the amount of DWR-mapped aquatic resources and those similar types in the underlying CDFW vegetation data used. Though the GIS analysis intersected both data sets, the tables in Section 13.3.3.2, only report impacts on the aquatic resources mapped by DWR that by definition are wetlands or other waters, which includes nontidal freshwater perennial emergent wetland, nontidal perennial aquatic, other seasonal wetlands, tidal freshwater emergent wetland, and tidal perennial aquatic. For those communities that can contain both a wetland and upland component, which are alkaline seasonal wetland complex, vernal pool complex, and valley/foothill riparian, the reported impacts for those communities include both the DWR wetlands (wetland component) and those communities mapped by CDFW (upland component). The portion of CDFW “wetland” and “water” types not reported accounts for 0.07% of the total impacts (0.3 to 2 acres, depending on alternative), which are either adjacent agricultural, developed, or upland areas.

Methods Used to Assess Impacts on Special-Status Species

The analysis of effects on special-status plant and wildlife species in this chapter considers the direct effects of project construction for each of the alternatives. Direct effects were assessed both quantitatively and qualitatively. Permanent and temporary impacts from project construction were quantified in GIS by overlaying the project alternative facility footprints on modeled habitat for the species and species occurrences.

Habitat models were developed because project design and the impact analysis were being done simultaneously, and the surveys of the project footprint have not been completed recently or have not been done for some areas. Habitat models serve different purposes for the analyses of impacts on land cover, special-status wildlife, and special-status plants. Because the land cover mapping was based on recent aerial photography, the habitat models have a high likelihood of accurately depicting current conditions and identifying the locations of sensitive natural communities.

Habitat models for special-status wildlife identify areas where suitable habitat is present, and because wildlife is mobile, the models show where the wildlife species are most likely to occur. By its nature, this type of model tends to overestimate suitable habitat by being as inclusive as possible in the absence of site-specific data on vegetation structure, species composition, hydrology, occurrence of or proximity to other habitat elements, and other variables that would provide more certainty with respect to habitat quality and the potential for occurrence. For example, areas of suitable habitat for a species may not be identified if they are smaller than the minimum mapping unit size for a specific landcover layer (e.g., individual trees used for nesting by Swainson’s hawk or other raptors). Still, the more likely scenario is that an overestimate occurs as small acreages of unsuitable habitat are absorbed into larger suitable habitat polygons. Therefore, although the models portray a reasonable distribution of habitat for the species addressed in the Draft EIR, they do not necessarily indicate with certainty that species are restricted to those areas. Instead, the models indicate that nonhabitat areas have a much lower probability of species occurrence compared with areas identified as habitat. In some cases, the models were developed using site-specific species occurrence information from the CNDDB (2020) and information from extensive field surveys conducted in and around water conveyance facility footprints by DWR (*2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*) (California Department of Water Resources 2011). The DWR survey results were used together with occurrence data in the CNDDB to determine whether construction footprints would affect known species occurrences. The DWR surveys did not occur on all lands within the conveyance alignment footprints and the CNDDB data is limited by where previous surveys have occurred; therefore, the actual effects on individuals or populations may be greater than is presented in the species effects discussions. Though the analysis discusses how CNDDB occurrences would be affected, it is not the basis for determining potential effects on individuals or populations. The analysis assumes that areas of modeled habitat contain individuals and populations. Figure 13-1 presents the stepwise process to identify modeled habitat, suitable habitat, and occupied habitat for special-status species.

Models for special-status plants can identify where potential habitat is present, but because plants are not mobile, the likelihood that plants are present or would be affected can only be determined by surveys. The models for special-status plants were developed from published information about species' habitat characteristics, from site-specific species occurrence information obtained from the CNDDB (2020), and in some cases, from soil survey maps (Soil Survey Staff, Natural Resources Conservation Service 2019). The purpose of modeling habitat for special-status plants was to identify locations where there is a higher likelihood that the plants could be affected and to characterize the type and magnitude of the impacts that could affect them. Figure 13-1 presents the stepwise process to identify modeled habitat, suitable habitat, and occupied habitat for special-status species.

Project construction impacts were also assessed qualitatively by considering effects of habitat fragmentation, connectivity, patch size and degradation of habitat functions. Impacts of constructing the project alternatives consist of habitat removal, construction-related disturbances (e.g., disruption of breeding and foraging behaviors from noise, light, pedestrian movement), injury and mortality of wildlife individuals, immediate displacement of wildlife, and immediate degradation of habitats. Impacts on plants include those effects where living plants may be damaged or crushed (seedlings) by the movement or parking of vehicles, the placement of equipment and supplies, site grading, and side casting of drill spoils and excavated materials. Ground disturbance can kill or damage mature plants or eliminate their habitat. Excavation alters soil properties and may create conditions unsuitable for the growth of some species or favor their replacement by other species. The roots of shrubs and other perennial species are susceptible to damage from soil compaction by equipment or construction materials.

Possible indirect impacts on special-status plants and special-status wildlife habitat could occur from construction activities that result in changes to hydrology and erosion that alters or degrades habitat, or ground disturbance that facilitates the establishment of invasive plant species that compete with native vegetation and alter the vegetation community in a way that can make it unsuitable for wildlife species. Potential indirect impacts on special-status vernal pool aquatic invertebrates could occur from changes to the hydrology that supports habitat for these vernal pool species. To quantify indirect impacts on special-status vernal pool aquatic invertebrates, project activities that could result in permanent changes to topography, subsurface hydrology, or the amount of impervious surface within 250 feet of this habitat were considered to have the potential to result in changes to the hydroperiod of this habitat and thus its ability to support special-status vernal pool aquatic invertebrates.

The analysis of construction impacts establishes the maximum potential for impacts and may not reflect the final impact that requires mitigation. The actual impacts on special-status plants and the need for mitigation cannot be determined until the special-status plant surveys have been completed. Once project work areas become accessible, they would be assessed and mapped for natural communities, suitable species habitat, and, where applicable, surveyed for the presence of species. Details on the process to verify habitat suitability and defining the ultimate mitigation commitment are provide for special-status plants in Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants*, for special-status wildlife in various measures throughout the chapter, and in Appendix 3F, Sections 3F.2.3, *Impacts on Special-Status Species,* and 3F.4.2.1, *Mitigation Credits from Approved Banks*).

For quantifying the impacts of construction on valley elderberry longhorn beetle, only the riparian portion of the species model described in Appendix 13B, Section 13B.39, *Valley Elderberry Longhorn Beetle*, was used to estimate permanent and temporary impacts on the species. The “other potential habitat” portion of the model was used to identify where additional shrubs may occur and not to quantify actual impacts on habitat because although these areas may contain elderberry shrubs, they are typically less frequent and at lower densities than in riparian habitat, and these areas generally do not provide the same connectivity and opportunities for future establishment as riparian habitat does. The other potential habitat portion of the model would be used to help focus future survey efforts in work areas once they become accessible prior to construction.

The analysis for potential impacts on Sacramento and Antioch Dunes anthicid beetles (*Anthicus sacramento* and *A. antiochensis*, respectively) did not rely on the use of modeled habitat, as discussed in Appendix 13B, Sections 13B.37, *Antioch Dunes Anthicid Beetle*, and 13B.38, *Sacramento Anthicid Beetle*, respectively, because the specific habitat requirements of the species—sand dunes, sand bars, and dredge spoil piles—occur at a finer scale than the land cover data used. The potential for impacts was assessed qualitatively by reviewing aerial imagery for the presence of suitable habitat within and adjacent to project facilities and assessing whether construction activities at those locations would result in the alteration of suitable habitat or affect the species in other ways.

The impact analysis of construction on bank swallow relies on the information in the species account rather than a habitat suitability model, as described in Appendix 13B, Section 13B.79, *Bank Swallow*.

Methods Used to Assess Effects of Construction Noise on Sandhill Cranes

Sandhill cranes are present in the study area September 15 through March 15 and have many known habitat areas for roosting, foraging, and loafing behavior. These habitat areas occur in suitable croplands and wetlands, many of which are in close proximity to and directly within the proposed construction areas. Cranes spend the nighttime hours (dusk to dawn) at roost sites; the morning and evening hours in foraging habitat (generally, sunrise to 10:30 a.m. and 2:30 p.m. to sunset); and the midday (generally 10:30 a.m. to 2:30 p.m.) loafing in these areas and other areas without optimal foraging, but away from active human disturbances.

The evaluation of noise impacts on birds and their behavior is difficult. A summary of the effects of highway noise on birds in a California Department of Transportation (Caltrans) report (Dooling and Popper 2007:36) provides a useful list of variables that could affect how noise is perceived by birds, resulting in the outcome of any noise-related indirect effects. As described in the Caltrans report, there are many complications in assessing the effects of noise independent of several confounding variables, many of which are relevant to this analysis.

> Without taking each of these potential variables (and others) into consideration, appropriate correlations between road noise and bird behavior cannot be made. These variables include, but are not limited to:
>
> 1) Bird species and their style of acoustic communication.
> 2) Bird species and their behavior in the presence of adverse stimuli.
> 3) Age and experience of the birds.
> 4) Hearing capabilities of a species in quiet.
> 5) Hearing capabilities of a species in noise.
> 6) Other kinds of stimuli associated with highways that might include (among others).
>   a. Visual signals (vehicle movement).
>   b. Vehicle-produced air pollution.
>   c. Substrate vibrations resulting from the vehicles moving on the highway.
>   d. The ecosystem near the roadway including substrate, vegetation, etc.
>   e. Food supply near the highway.

Primary noise sources in the study area are traffic traveling on surrounding freeways, highways, and rural roadways; agricultural operations; overhead commercial aircraft; and recreation related noise (e.g., fishing boats and waterski boats). Land uses near sandhill crane habitat are primarily rural and consist of agricultural use and low-density residential development. As such, existing noise levels are in the range of 40 to 50 dBA (A-weighted decibels). Typical ambient sound levels as a function of human population density are presented in Table 13-4, below.

Table 13-4. Human Population Density and Associated Ambient Noise Levels

Human Population Density Type	dBA, L_{dn}
Rural	40–50
Small town or quiet suburban residential	50
Normal suburban residential	55
Urban residential	60
Noisy urban residential	65
Very noisy urban residential	70
Downtown, major metropolis	75–80
Area adjoining freeway or near major airport	80–90

Source: Hoover and Keith 2000:2-12.
dBA = A-weighted decibels; L_{dn} = Day-night sound level.

Sensitivity to Noise and Thresholds for Mitigation

The general human response to changes in sound levels having similar frequency content (for example, comparing increases in continuous traffic sound levels) is summarized as follows.

- A 3 decibel (dB) change in sound level is considered a barely noticeable difference.
- A 5 dB change in sound level will typically be noticeable.
- A 10 dB change in sound level is considered to be a doubling in loudness.

This may not be an appropriate metric for sandhill cranes. Because of the scarcity of data on unweighted intensities of source noise, for this analysis we assume that sandhill cranes, like most vertebrate animals, have a hearing sensitivity greater than that of humans, therefore, small changes in ambient noise (e.g., 3 dB) are assumed to be noticeable. Any errors this may introduce are compensated by use of a very conservative metric.

A wide variety of construction equipment would be used at each facility construction site and would vary throughout the construction period. Each of the major equipment types associated with construction are analyzed using the methods discussed in Chapter 24, *Noise*, Section 24.3.1.2, *Evaluation of Construction Activities*, including noise levels from pile driving (Table 24-5), heavy construction equipment (Table 24-6), and traffic noise.

Effects of construction noise were estimated by calculating the distances from construction sites subject to noise above 60 dBA and 50 dBA. To assess the potential effect of noise on greater and lesser sandhill cranes, an overlay of the resulting sound level contours (Appendix 24A, *Sound Level Contours*), on the modeled greater sandhill crane and lesser sandhill crane foraging habitat and known temporary and permanent roost sites was used to conduct a conservative analysis of the areas affected by expected noise levels above 60 dBA and 50 dBA. In most of the study area, the noise analysis was conducted based on the assumption that there was direct line of sight from sandhill crane habitat areas to the construction site, and therefore is a conservative estimate of effects. However, in many areas, existing levees and other topographic variation would partially or completely block the line of sight and function as effective noise barriers substantially reducing noise transmission. The elevation of the S. P. Cut levee was incorporated into the sound level contours to develop a more accurate estimate of noise in the vicinity of the Stone Lakes National Wildlife Refuge. Although USFWS uses 60 dBA as a significance threshold for other special-status bird species such as least Bell's vireo and California gnatcatcher (County of San Diego 2021:2.4-3; Ldn Consulting Inc. 2014:13; California Department of Fish and Wildlife 2013:2), in the absence of data indicating the species-specific effect that noise levels above baseline would have on sandhill cranes, a conservative approach of also assessing noise levels above 50 dBA was used.

Methods Used to Assess Impacts on State- and Federally Protected Aquatic Resources

The impacts on state- and federally protected aquatic resources were analyzed both quantitatively and qualitatively. The quantitative analysis involved intersecting the GIS layer of aquatic resources mapped by DWR with the GIS layers depicting all project alternative features that could result in the potential for permanent, long-term temporary, and temporary discharge of dredged or fill material in these aquatic resources.

The project alternatives were also assessed for their potential to result in temporary and permanent changes to the hydrology of aquatic resources. This analysis was done qualitatively by reviewing the project description for construction activities that could alter surface topography or subsurface conditions such that nearby aquatic resources are impacted.

The analysis is presented in Impact BIO-51: *Substantial Adverse Effect on State- or Federally Protected Wetlands and Other Waters Through Direct Removal, Filling, Hydrological Interruption, or Other Means* in Section 13.3.3.5, *Impacts of the Project Alternatives on General Terrestrial Biological Resources*. Because DWR mapped all aquatic features within the delineation study area, the delineation also reflects all features that would be considered waters of the State. Therefore, the analyses and conclusions for effects in Section 13.3.3.4 under Impact BIO-51 would also apply to waters of the State.

Methods Used to Assess Impacts on Terrestrial Wildlife Habitat Connectivity

Study Area

Wildlife connectivity was evaluated qualitatively within the study area and at a larger landscape scale surrounding the study area to provide regional context for the connectivity setting within the study area and surrounding region. The landscape scale was qualitative in nature and encompassed a 25-mile area surrounding the study area.

Methods

To determine the existing conditions of wildlife connectivity and potential project-related impacts on wildlife and habitat connectivity in the study area, a literature review and assessment of wildlife connectivity resources and constraints was conducted. This wildlife connectivity assessment assembled current data and information related to wildlife movement including connectivity and barriers to wildlife movement within the study area to assess when and where the project could interfere with the movement of any native resident or migratory wildlife species, with established native resident or migratory wildlife corridor.

Literature Review

The literature, data, and aerial imagery review was conducted using the sources outlined below.

- Google Earth
- USGS 7.5-minute quadrangle maps
- National Hydrography Dataset
- CDFW’s Biogeographic Information and Observation System (BIOS) Habitat Connectivity Viewer
- CNDDB for element occurrences
- USFWS Information for Planning and Consultation (IPaC) tool
- Wildlife-vehicle collision data
- Priority wildlife movement barriers
- Wildlife observations and movement data
- Screening of the project’s aquatic resources delineation dataset
- Data regarding existing (as-built) drainage features and structures
- Proposed project infrastructure improvements (e.g., new bridges, widen roads)
- Traffic volumes and noise data

Qualitative Connectivity Assessment

The evaluation of wildlife connectivity was qualitative in nature and encompassed the areas that existing terrestrial wildlife connectivity resources (i.e., wildlife corridors, linkages, riparian corridors, habitat blocks) occur and provides regional context for the connectivity setting within the study area. A qualitative landscape-scale approach was used to assess regional landscape features and existing terrestrial wildlife connectivity resources and their potential to facilitate wildlife movement for a variety of wildlife species inhabiting the project region.

To facilitate assessment of connectivity resources and their function and value as well as impacts on species a wildlife guild approach was used to evaluate species as a function of guilds containing species grouped based on similar behavioral, ecological, movement, and wildlife crossing/infrastructure use characteristics. The Wildlife Crossing Guild approach (Kintsch and Cramer 2011:13–14; Kintsch et al. 2015:3–12) was adapted for use in this analysis. This Wildlife Crossing Guild approach facilitates the evaluation of movement and connectivity for a wide variety of species within each guild and also facilitates the evaluation of impacts and design of structures (such as culverts and bridges) based on ecological and behavioral attributes and requirements of each particular Wildlife Crossing Guild (WCG).

Table 13-5 provides a summary of the WCGs used in the analysis and examples of locally occurring species within each guild.

Table 13-5. Summary of Terrestrial Wildlife Crossing Guilds and Example Species Used in the Analysis

Wildlife Crossing Guild	General Attributes	Example Species Occurring in Study Area
Low-mobility small fauna	Small slow-moving species that require specific environmental conditions for dispersal and survival; may be corridor dwellers or passage species; may require some cover for dispersal and movement (i.e., vegetative cover and habitat contiguity)	Invertebrates, frogs, toads, salamanders
Semi-aquatic obligate	Generally, require aquatic and riparian habitat throughout life history, though may utilize terrestrial pathways for movements and dispersal; require some cover for dispersal and movement (i.e., vegetative cover and habitat contiguity)	River otter, mink, beaver, turtles
Moderate-mobility small fauna	Small species that are adaptable to various types of structures; require some cover for dispersal and movement (i.e., vegetative cover and habitat contiguity)	Squirrels (*Otospermophilus sp. and Sciurus sp.*), raccoon (*Procyon lotor*), badger (*Taxidea taxus*), weasels (*Neovison* sp., *Mustela* sp., and *Martes* sp.), and fox (*Vulpes* sp. and *Urocyon* sp.); may include some birds
Adaptive high-mobility fauna	Adaptable and highly mobile species that use a variety of structure types, which are proportional to body type; require some cover (i.e., vegetative cover and habitat contiguity)	Bobcat (*Lynx rufus*), coyote (*Canis latrans*)
High-openness, high-mobility carnivores	Highly mobile species that tend to prefer good visibility; require some cover (i.e., vegetative cover and habitat contiguity)	Mountain lion

Wildlife Crossing Guild	General Attributes	Example Species Occurring in Study Area
Adaptive ungulates	Species that require good visibility on a horizontal plane (wide field of view) and moderate cover (i.e., vegetative cover and habitat contiguity); require taller and wider openings than the high-openness, high-mobility carnivores guild	Mule deer
Very high–openness fauna	Species requiring very wide fields of vision and line of sight; may require cover for dispersal and movement (i.e., vegetative cover and habitat contiguity)	San Joaquin kit fox
Aerial fauna	Species that fly and often require habitat contiguity and/or continuous canopy cover	Birds, bats, flying insects

This assessment also included consideration of topography (i.e., mountains, valleys, canyons, ridgelines), geography, land use (i.e., current and future), habitats, vegetation/land cover, water courses (i.e., perennial and intermittent), existing habitat linkages and wildlife crossings, and contiguity and connectivity between areas of open space (i.e., protected areas, undeveloped mountainous areas, greenbelts) within the study area and surrounding region (i.e., 25-mile landscape-scale study area).

In addition, species' ecological needs (e.g., access to food, water, shelter, cover) and behavior (e.g., preferred habitat conditions and anti-risk behavior) were considered when assessing the landscape and potential connectivity structure and function. This qualitative landscape-scale assessment was used to inform baseline knowledge of existing wildlife movement conditions, including potential connectivity areas, crossing structures, pinch points, barriers, source-sink dynamics and potential project-related impacts.

The assessment reviewed and assessed the following conditions.

- Identified wildlife corridors and linkages
- Habitat and landscape features that connect natural habitat areas
- Habitat and landscape features that facilitate connectivity structure or function
- Existing crossings (e.g., wildlife crossings, culverts, bridges)

Wildlife Connectivity Assessment

Following desktop assessments, review and analysis of existing conditions and project alternatives details was evaluated to identify potential effects on existing connectivity, crossing function, and wildlife movement in the study area. Site-specific impacts on connectivity function and value were assessed and specific recommendations made to avoid, minimize, and mitigate for potential impacts (e.g., fragmentation, physical barriers, disturbance, light, and noise). These recommendations would be coordinated with DWR and resource agencies (as applicable) to ensure feasibility and congruence with other project elements. The analysis also includes discussions on existing regulatory context, descriptions of all available data on existing wildlife crossings, movement, corridors, and wildlife-vehicle collisions in the study area, and other connectivity resources in the study area.

Methods Used to Assess Impacts on Conservation Plans

The analysis of impacts on conservation plans (i.e., adopted HCPs, NCCPs, or other approved local, regional, or state HCPs) was limited to the conservation plans that overlapped with the study area and where permanent surface impacts of the project alternatives or creation and enhancement of wetlands under the CMP would occur. These plans include the SSHCP, SJC MSHCP, ECCC HCP/NCCP, and EACCS (Section 13.1.7, *Habitat Conservation Plans*). The Solano County Habitat Conservation Plan and Yolo Habitat Conservation Plan/Natural Community Conservation Plan overlapped with the study area, but no permanent surface impacts occurred within these conservation plan areas, so impacts on these plans were not analyzed further.

The analysis in this chapter considers the direct effects of project construction for each of the alternatives within the area that the study area overlaps the conservation plans. Permanent surface impacts from construction of the project alternatives within each conservation plan area were assessed quantitatively in GIS by overlaying the project alternative facility footprints on the conservation plan areas. Because the conservation plans have land preservation goals for different land cover types, impacts for each conservation plan were quantified for each natural community type covered by the plans. Classification of natural communities differed among plans, so natural community types were grouped within the land cover types used for project GIS analyses. A conflict would be considered significant if the permanent surface impacts of the project alternatives or creation and enhancement of wetlands under the CMP would prevent the conservation plans from meeting their habitat preservation goals.

The analysis also considered whether construction, operations, and maintenance of project alternatives and CMP would conflict with species and natural community conservation goals of the overlapping conservation plans. A conflict would be considered significant if the project alternatives would have significant impacts on species and natural communities covered by the conservation plans, after mitigation measures were applied.

Methods Used to Assess Conflicts with Local Policies and Ordinances Protecting Biological Resources

The analysis of conflicts with local policies and ordinances was limited to those counties and cities where project facilities would be constructed, which includes Sacramento, San Joaquin, Contra Costa, and Alameda Counties, and the cities of Sacramento, Lodi, and Stockton. The analysis included a review of policies found in the respective general plans and ordinances in each jurisdiction that have goals and policies to protect biological resources and whether the construction of the alternatives would result in a potential conflict these goals and policies. A conflict would be considered significant if a project alternative would substantially inhibit any one of these jurisdictions from meeting the goals expressed in these policies and ordinances. Sources used for the analysis include the following plans and ordinances.

- Sacramento County General Plan of 2005–2030 (2011)
- *San Joaquin County General Plan* (2016)
- *Alameda County General Plan*, Conservation Element (1976)
- *Contra Costa County General Plan*, 2005–2020 (2005)
- *City of Sacramento General Plan 2035* (2015)

- *City of Lodi General Plan* (2010)
- *Envision Stockton 2040 General Plan* (2018)
- Sacramento County Code, Title 19 *Trees*
- City of Sacramento City Code, 12.56 *Tree Planting, Maintenance, and Conservation*
- San Joaquin County Code, Chapter 9-1505 *Trees*; Chapter 9-1510 *Riparian Habitat*
- City of Stockton, Ordinance 117
- Alameda County Code, Chapter 12.11 *Regulation of Trees in County Right-of-Way*
- Contra Costa County Code, Chapter 816-6 *Tree Protection and Preservation*

Methods Used to Assess Substantial Adverse Effects on Fish and Wildlife Resources Regulated under California Fish and Game Code Section 1600 *et seq*.

To identify areas potentially regulated under California Fish and Game Code Section 1600 *et seq*., project surface footprints and subsurface features for each alternative were assessed for overlaps with rivers, streams, and lakes. The rivers, streams, and lakes within the study area that could fall within a bed, bank, or channel of these features, include the following:

- Tidal perennial aquatic (meet definition of rivers and streams)
- Nontidal perennial aquatic (meet definition of streams and lakes)
- Tidal brackish emergent wetland (usually located within bed and bank of rivers)
- Tidal freshwater emergent wetland (usually located within bed and bank of rivers)
- Nontidal freshwater emergent wetland

Because the scope of California Fish and Game Code Section 1600 *et seq*. may include certain areas containing other communities associated with rivers, streams and lakes, the analysis also considered all landcover that occurs in or adjacent to these areas (referred to as associated communities). To capture valley/foothill riparian associated with Delta channels (rivers), a levee centerline GIS data set (California Department of Water Resources 2019) was used to establish the potential limit of regulated area (i.e., the top of bank). Aerial photographs (National Agriculture Imagery Program 2018) were used to assess for situations where valley/foothill riparian, extended beyond the levee centerline. Where these observations were made, the area potentially regulated was extended beyond the levee centerline to where a clear transition to another community type was discernable. All landcover to the presumed top of bank was included for the analysis. Where lakes and streams did not have associated levees, aerial imagery was relied upon (National Agriculture Imagery Program 2018) to estimate the top of bank, which for this assessment was determined to be the level at which a stream would begin to overflow into adjacent areas. Where the top of bank was not discernable in aerial photographs, aquatic types adjacent to the stream, river, or lake were included (e.g., nontidal freshwater emergent wetland) and valley/foothill riparian was included where contiguous with the river, stream, or lake.

The resulting layer of potentially regulated areas was then used to identify fish, wildlife, and plant resources that may be adversely affected by the proposed activities under each alternative. Special-status plants are not covered under California Fish and Game Code Section 1600 *t seq*.; however, they were also included in the analysis to support CDFW's review. Because the methods used may have resulted in mapped areas that extend beyond CDFW jurisdiction under California Fish and Game Code Section 1600 *et seq* (e.g., including areas above tunnel segments that would be more than 100 feet below ground), the impacts presented in Impact BIO-56 are likely an overestimation of the effects on rivers, streams, and lakes associated communities, and species in occurring in these areas.

The following assumptions were used in the analysis.

- The potentially regulated areas considered were cut off downstream from the fish screens on the California Aqueduct and Delta-Mendota Canal.
- For the Bouldin Island and Roberts Island levee improvements, no tidal waters would be directly impacted.
- The location of the levee centerline for Bethany Reservoir was estimated because no GIS data sources were available.

13.3.1.3 Evaluation of Operations

The direct impacts from operations were largely addressed qualitatively, though they do rely on some numerical estimates, such as noise levels, and estimates of changes to concentrations of water quality constituents. Direct impacts from operations that were considered for analysis include the diversion of water from the Sacramento River and the use of facilities that support water diversion, including above ground SCADA and transmission lines. Diversions were evaluated for the potential to change water quality throughout the study area, which could affect wildlife species that utilized the study area’s tidal channels and wetlands for habitat. The operation of project facilities could result in periodic disturbance to wildlife from human presence, noise, and lighting. Vehicles used by project personnel during operation could result in the disturbance of and injury or mortality of wildlife on project roads.

Changes in river flows, methylmercury, microcystins associated with cyanobacteria harmful algal blooms (CHABs), pesticides, and selenium, and their potential effects on species were assessed both qualitatively and quantitatively based on extrapolation from hydrologic and water quality modeling results (Chapter 5, *Surface Water,* and Chapter 9, *Water Quality*). These potential effects are based on surface water modeling results that were used to assess whether changes in flows could result in impacts on riparian species that depend on hydrogeomorphic processes to create and maintain suitable habitat; modeling results for selenium (water, fish tissue, and bird egg), methylmercury (water and fish tissue), and pesticides were used, along with a literature review of individual species or taxonomic groups’ sensitivity to these bioaccumulative contaminants. The microcystins assessment utilized modeled temperature, velocity, and residence time, qualitative changes in nutrients and water clarity, as well as a literature review of microcystin impacts on terrestrial species, to determine whether the project alternatives could increase the potential frequency and magnitude of CHABs in the Delta, which could adversely affect terrestrial species (Chapter 9). Background information and specific analysis methods for each of the water quality constituents is detailed below.

Hydrology

Potential operational effects on natural communities and special-status species within the study area are considered in the analysis and rely on the hydrologic modeling data presented in Chapter 5, *Surface Water.*

As discussed in Chapter 3, *Description of the Proposed Project and Alternatives*, the project would not change operational criteria associated with upstream reservoirs. The SWP Oroville Reservoir and other upstream CVP reservoirs would continue to be operated to protect regulatory, environmental, and contractual obligations consistent with existing operations. However, the project may indirectly affect how others operate water storage and manage flows upstream of the study area.

The reservoir operations modeling presented in Chapter 5 was used to evaluate whether operating the project alternatives would indirectly affect habitats associated with reservoirs.

The upstream flow modeling on the Sacramento, Feather, and American Rivers presented in Chapter 5 was used to evaluate whether operating the project alternatives would indirectly affect habitats associated with these upstream rivers.

Methylmercury

Mercury is a contaminant of concern that is transformed into the more bioavailable form of methylmercury under anoxic conditions in aquatic systems and is generally elevated throughout the Delta. The factors that determine if and how much mercury becomes mobilized into the foodweb are complex and dependent upon site-specific conditions. In general, the highest mercury methylation rates are associated with high tidal marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008:15). Increases in waterborne methylmercury that could occur in some areas would bioaccumulate in aquatic organisms that could, in turn, biomagnify in higher trophic levels and pose increased health risks to fish, wildlife, or humans. Chapter 9 contains a detailed discussion of mercury in the study area. Methylmercury can also be transported to adjacent terrestrial foodwebs through consumption of aquatic invertebrates, and high concentrations of methylmercury have been reported in some bird species (Cristol et al. 2008:335; Ackerman et al. 2016:37).

The operational impacts of new flows with all project alternatives were analyzed to assess potential effects on mercury and methylmercury concentration and bioavailability, detailed in Chapter 9 and Appendix 9H, *Mercury*. Appendix 9H also contains applicable objectives for mercury and methylmercury in fish tissue. Largemouth bass was used as a surrogate species for analysis of impacts from changes in operations from the construction of the water conveyance facilities because they are good indicators of mercury contamination throughout the aquatic foodweb (Wood et al. 2010:67). Largemouth bass have a relatively high level of mercury compared to other species, are piscivorous, are abundantly distributed throughout the Delta, and have high site fidelity. Therefore, they are representative of spatial patterns of tissue methylmercury concentrations throughout the aquatic foodweb and would reflect changes in methylmercury bioavailability resulting from the project. The magnitude of methylmercury bioaccumulation and its toxic effects on individuals differs among species and habitats due to differences in ecological factors, such as habitat type and foodweb structure, and biological factors, such as species sensitivity and exposure to other environmental stressors (Eagles-Smith et al. 2016:1216). Use of a single fish species has been documented to be a poor indicator of methylmercury concentrations in waterbirds that have broad foraging home ranges (Ackerman et al. 2014:63), so largemouth bass is not an accurate surrogate for actual methylmercury concentrations in terrestrial vertebrates. However, because methylmercury can be transported from aquatic to terrestrial foodwebs through consumption of aquatic prey (Cristol et al. 2008:335), modeled changes in aquatic foodweb methylmercury concentrations resulting from operation of all project alternatives, as modeled in largemouth bass, are assumed to result in similar changes in adjacent terrestrial foodwebs. Accordingly, modeled largemouth bass methylmercury concentrations are used as a general indicator of expected changes to methylmercury bioavailability in Delta aquatic and adjacent terrestrial wetland habitats, which could affect special-status terrestrial species using these habitats.

Microcystins

Microcystis is a toxic blue-green alga shown to have negative effects on the aquatic foodweb of the Delta (Brooks et al. 2012:612), with blooms generally occurring when water temperature is 19° Celsius or more and when conditions feature low channel velocities, long residence time, water clarity, and nutrient availability. These blooms typically form in the Delta from July through November (Lehman et al. 2020:4). Chapter 9 and Appendix 9E, *Cyanobacteria Harmful Algal Blooms*, include a detailed description of microcystins and the assessment methodology used in the Delta. *Microcystis* produces microcystins, which are a class of toxins that affect the livers of animals and humans; microcystins do not biomagnify, but can be transported through foodwebs through consumption (Moy et al. 2016:A). Poisoning of aquatic vertebrates such as fish, turtles, ducks, and waterbirds have been documented around the world, and high levels of microcystins have been identified in the tissues of mallards and double-crested cormorants, including gonads and eggs, indicating that microcystins may also affect bird reproduction (Chen et al. 2009:3317, 3320). Microcystins have also been found in terrestrial foodwebs, such as spiders and songbirds in riparian habitats, likely through consumption of emergent aquatic insects (Moy et al. 2016:A, E).

Pesticides

Current use pesticides, including pyrethroids, organophosphates, carbamate insecticides, herbicides, and fungicides are used extensively throughout the Central Valley; legacy pesticides (i.e., organochlorines and Group A pesticides) persist in the environment despite being banned from use in the United States in the 1970s through 1990s due to adverse health and environmental effects. Pesticides that target insect pests also have the potential to harm other organisms and can have toxic effects on the nervous systems of terrestrial species. Pesticides of concern in the study area are discussed in detail in Chapter 9.

Pesticides can impact special-status species through bioaccumulation in ingested prey items or indirectly through reduced availability of invertebrates that make up insectivorous species' diets. Project operation under all alternatives has the potential to affect pesticide concentrations within the Delta, which could in turn affect special-status species in these areas. Herbicides would be applied at CMP wetland creation and enhancement sites to remove nonnative vegetation for site preparation and to support establishment of new plantings. The analysis of pesticides and herbicides in Chapter 9 was used to evaluate impacts on terrestrial wildlife species.

Selenium

Selenium is a constituent of concern in the lower San Joaquin River, the Delta, and San Francisco Bay with potential effects on aquatic and terrestrial biological resources, and indirectly, human health. Selenium is an essential nutrient for avian species and has a beneficial effect in low doses, such as binding to and reducing the toxicity of methylmercury (Scheuhammer 1987:277–278). However, selenium is bioaccumulative and higher concentrations can be toxic (Ackerman and Eagles-Smith 2009:2134; Ohlendorf and Heinz 2011:670) and can lead to impaired reproduction, specifically, deformities in developing embryos, chicks, and adults, and can also result in embryo mortality (Ackerman and Eagles-Smith 2009:2134, 2139; Ohlendorf and Heinz 2011:690, 694). The effect of selenium toxicity differs widely between species and also between age and sex classes within a species. In addition, the effect of selenium on a species can be confounded by interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009:2140). Chapter 9 contains a detailed discussion of selenium in the study area.

Selenium toxicity in wildlife species can result from the mobilization of naturally high concentrations of selenium in soils (Ohlendorf and Heinz 2011:670). The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and Eagles-Smith 2009:2134; Ohlendorf and Heinz 2011:669) and selenium concentration in species differs by the trophic level at which they feed, increasing with trophic level, therefore, birds that consume prey with high levels of selenium have a higher risk of selenium toxicity (Ackerman and Eagles-Smith 2009:2139). The San Joaquin River watershed is the major source of selenium to the Delta, and the Sacramento River watershed has generally low selenium concentrations (Central Valley Regional Water Quality Control Board 1988:14). The U.S. Environmental Protection Agency developed recommended chronic aquatic life criteria for selenium in the Delta; relevant water quality criteria are discussed further in Appendix 9J, *Selenium*. Changes in selenium concentrations in water, fish tissue, and bird eggs were analyzed in Chapter 9. Generic bird egg selenium concentrations were modeled for insect-eating birds (e.g., mallards, shorebirds), and fish-eating birds (e.g., herons, terns) to represent different trophic levels (Appendix 9J). Modeled bird egg selenium concentrations were compared to Level of Concern (6 milligrams per kilogram dry weight [mg/kg dw]) and Toxicity Level (10 mg/kg dw) values from Beckon (2017:133).

13.3.1.4 Evaluation of Maintenance Activities

Maintenance activities could result in periodic disturbances to natural communities and habitats and potential injury or mortality of special-status plants and wildlife.

- Maintenance activities across all facilities would include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle.
- Maintenance at the intakes (all project alternatives) would require scheduled routine or periodic adjustment and tuning to remain consistent with design intentions. Intake screens would be periodically cleaned. No dredging at intakes would be required.
- Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would also include annual embankment repair, quarterly animal burrow filling, and quarterly weed management (e.g., mechanical removal and herbicide application).
- Maintenance activities at the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and Bethany Reservoir Surge Basin (Alternative 5) would also include annual cleaning (pressure washing).

A full description of maintenance activities including equipment used, duration, and frequency of activity is in Appendix 23B, *Air Quality and GHG Analysis Activity Data*.

13.3.1.5 Evaluation of Compensatory Mitigation

CEQA requires an evaluation of potential impacts caused by the implementation of mitigation measures. Following the CEQA conclusion for each impact analyzed in Section 13.3.3, *Impacts and*

Mitigation Approaches, the potential impacts associated with implementing the CMP required to address potential impacts caused by the project are discussed.

The implementation of the project's CMP by DWR, which is mitigation for the project impacts that result in the loss of natural communities and species habitat, would result in the creation and enhancement of wetlands and other waters as well as habitat for special-status species on Bouldin Island and the I-5 ponds. Habitat restoration, enhancement, and protection actions (Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources*) would be implemented prior to or concurrent with the construction of the water conveyance facilities. Implementation of the CMP would result in physical changes to existing terrestrial biological resources.

For the analysis of the CMP impacts, natural communities and special-status species habitats that might be modified for restoration activities on Bouldin Island and the I-5 ponds were quantified using a GIS layer that included footprints for some types of restoration (Appendix 3F). The acreages of natural community and special-status species habitat types that would be removed by restoration were calculated, as were the acreages of natural community and special-status species types that would develop after restoration based on site attributes, such as vegetation types, soil types, and topography. Potential effects of periodic disturbance to wildlife from human presence, noise, and lighting were also included in the analysis of the CMP.

The CMP also includes a framework for channel margin enhancement and tidal wetland habitat creation (Appendix 3F, Section 3F.4.3, *Tidal Habitat Mitigation Framework*). Several priority locations for these activities are identified in the CMP, which were used to assess the potential for effects on terrestrial biological resources known to or having the potential to occur in these areas. The activities required for channel margin enhancements would generally include the removal of existing riprap, modification of the existing channel margin with heavy equipment, and placement of large woody debris on the channel margin. For tidal restoration, activities would include grading, creation of setback levees, planting, and breaching of existing levees. Impacts from these mitigation actions are described qualitatively in this Draft EIR.

In addition to the direct loss of natural communities and special-status species habitats associated with the restoration activities, changes in methylmercury, microcystins associated with cyanobacteria harmful algal blooms (CHABs), pesticides, and selenium, and their potential effects on species were assessed qualitatively based on extrapolation from water quality impact analysis (Chapter 9, *Water Quality*) and literature review of species' ecology and sensitivity to contaminants. Methods for these analyses are described in detail in Section 13.3.1.3, *Evaluation of Operations*. CEQA considerations may be necessary in the future when specific tidal restoration projects are proposed.

13.3.1.6 Evaluation of Other Mitigation Measures

CEQA requires an evaluation of potential impacts caused by the implementation of mitigation measures. Following the CEQA conclusion for each impact analyzed in Section 13.3.3, the potential impacts associated with implementing other mitigation measures required to address potential impacts caused by the project are analyzed. Table 4-1, in Chapter 4, *Framework for the Environmental Analysis*, lists the mitigation measures with potential to cause environmental impacts under CEQA. The potential impacts of implementing mitigation measures were evaluated for each natural community and special-status species by first identifying locations where other mitigation measures could be implemented relative to each terrestrial biological resource. Where these locations overlap with modeled species habitat, potential impacts such as habitat loss, ground disturbance, noise, and visual disturbance were evaluated. If a potentially significant impact was identified, appropriate mitigation measures to reduce the impact to a less-than-significant level were identified. Mitigation impacts are considered in combination with project impacts in determining the overall impact conclusions for the project alternatives. Additional information regarding the analysis of mitigation measure impacts is provided in Chapter 4.

13.3.2 Thresholds of Significance

The project alternatives would be considered to have a significant impact under CEQA if it would result in any of the conditions listed below.

- Have a significant impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or USFWS.
- Have a significant impact on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or USFWS.
- Have a significant impact on state or federally protected wetlands or waters (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- Conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state HCP.

13.3.3 Impacts and Mitigation Approaches

13.3.3.1 No Project Alternative

As described in Chapter 3, *Description of the Proposed Project and Alternatives,* CEQA Guidelines Section 15126.6 directs that an EIR evaluate a specific alternative of "no project" along with its impact. The No Project Alternative in this Draft EIR represents the circumstances under which the project (or project alternative) does not proceed and considers predictable actions, such as projects, plans, and programs, that would be predicted to occur in the foreseeable future if the Delta Conveyance Project is not constructed and operated. This description of the environmental conditions under the No Project Alternative first considers how terrestrial biological resources could change over time and then discusses how other predictable actions could affect terrestrial biological resources.

Future Terrestrial Biological Resources Conditions

For terrestrial biological resources, future conditions in 2040 are not anticipated to substantially change compared to existing conditions because land policies and resulting land uses that could change the extent of natural communities and habitat for terrestrial species are not expected to change if the project (or project alternative) does not proceed. However, indirect impacts on terrestrial biological resources within the Delta may occur under the No Project Alternative as the result of changes in upstream hydrologic conditions, sea level rise, and continuing seismic risk to Delta levees (Delta Stewardship Council 2021a:2-9, 5-48–5-63). Also, changes in the quality of Delta water may occur as a result of sea level rise and upstream hydrologic conditions (Delta Stewardship Council 2021b:2-8, 4-56). Changes in water quality may affect crop production on agricultural lands used by some special-status wildlife for foraging and nesting (e.g., tricolored blackbird, greater sandhill crane) by reducing the quantity and quality of water suitable for irrigation (Delta Stewardship Council 2021a:5-34, 5-35). In addition, immediate, and potentially long-term changes in natural communities and species habitats could occur under the No Project Alternative because of seismic events, levee failure, and the inundation of Delta lands (Delta Stewardship Council 2021a:5-55). An analysis of the No Project Alternative effects on terrestrial biological resources at 2040 is presented in Appendix 13F, *Terrestrial Biological Resources 2040 Analysis.*

Impacts on terrestrial biological resources related to changes in land use by 2040 in the service area would be expected to continue at the current rate. While the extent of these impacts that might occur in any given region is uncertain, there is a broad range of impacts that could potentially occur as a result of the availability and cost of water. The availability of water as a result of changes in hydrology caused by climate change, either alone or in combination with other factors, could influence land uses in the SWP service area. As an example, reductions in the availability or increases in the cost of water supplies could result in temporary or permanent fallowing of cultivated agricultural land, including crops that some wildlife have become dependent on, such as alfalfa for Swainson's hawk and corn for sandhill cranes (Delta Stewardship Council 2021a:5-35). Similarly, a change in the availability of water supplies in combination with other factors (cost of living, environmental conditions such as air quality, capacity of transportation infrastructure to meet demand, etc.) could result in a change in the demand for previously planned commercial and residential developments. Current modeling suggests such changes could also result in growth within the regions redirecting toward infill or other actions to address the demand for housing and supporting commercial development (Delta Stewardship Council 2021c:2-13–2-16), which could benefit terrestrial biological resources by slowing the loss of natural communities and habitats to development.

Predictable Actions by Others

A list and description of actions included as part of the No Project Alternative are provided in Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions*. As described in Chapter 4, *Framework for the Environmental Analysis,* the No Project Alternative analyses focus on identifying the additional water supply–related actions public water agencies may opt to follow if the Delta Conveyance Project does not occur.

Public water agencies participating in the Delta Conveyance Project have been grouped into four geographic regions. The water agencies within each geographic region would likely pursue a similar suite of water supply projects under the No Project Alternative (Appendix 3C). Construction of water supply reliability projects would result in ground-disturbing activities that could impact terrestrial biological resources. Table 13-6 provides a summary of the potential impacts from the likely projects under the No Project Alternative.

Table 13-6. Effects on Terrestrial Biological Resources from the Plans, Policies, and Programs for the No Project Alternative

Project Type	Regions	Potential Construction Effects on Terrestrial Biological Resources	Potential Operational Effects on Terrestrial Biological Resources
Increased/ accelerated desalination	Northern coastal, southern coastal	Impacts on special-status species, which includes habitat loss and fragmentation, injury, mortality, and disruption of normal behaviors; impacts on jurisdictional aquatic resources.	No impacts anticipated.
Water recycling	Northern coastal, northern inland, southern coastal, southern inland	Impacts on special-status species, which includes habitat loss and fragmentation, injury, mortality, and disruption of normal behaviors; impacts on jurisdictional aquatic resources.	No impacts anticipated.
Groundwater management	Northern coastal, southern coastal	Impacts on special-status species, which includes habitat loss and fragmentation, injury, mortality, and disruption of normal behaviors; impacts on jurisdictional aquatic resources.	No impacts anticipated.
Groundwater recovery (brackish water desalination)	Northern inland, southern coastal, southern inland	Impacts on special-status species, which includes habitat loss and fragmentation, injury, mortality, and disruption of normal behaviors; impacts on jurisdictional aquatic resources.	Pumping activities could result in impacts on aquatic habitats for special-status species and jurisdictional aquatic resources by reducing the amount of groundwater supporting these habitats.
Water use efficiency measures	Northern coastal, northern inland, southern coastal, southern inland	No impacts anticipated.	No impacts anticipated.

Desalination projects would most likely be pursued in the northern and southern coastal regions. The southern coastal regions would likely require larger and more desalination projects than the northern coastal region to replace the water yield that otherwise would have been received through the Delta Conveyance Project as well other contributing factors, such as differences in local hydrology and climate. These projects would be sited near the coast and could involve disturbance of natural communities and agricultural lands that provide habitat for special-status species. Groundwater recovery (i.e., brackish water desalination) would involve similar types of ground disturbance but could occur across the northern inland, southern coastal, southern inland regions and in both coastal and inland areas, such as the San Joaquin Valley. Grading and excavation at the desalination and groundwater recovery plant sites would be necessary for construction of foundations, and trenching would occur for installation of water delivery pipelines and utilities, which could impact natural communities and agricultural lands that provide habitat for special-status species and result in direct impacts on species through removal of special-status plant populations and injury, mortality, and disruption of normal behaviors of special-status wildlife.

The northern and southern coastal regions are also most likely to explore constructing groundwater management projects. The southern coastal region would likely require more projects than the northern coastal region under the No Project Alternative. Groundwater management projects would occur in association with an underlying aquifer but could occur in a variety of locations. Construction activities for each project could require excavation for the construction of the recharge basins, conveyance canals, and pipelines and drilling for the construction of recovery wells (with completion intervals between approximately 200 and 900 feet below ground surface). Construction activities would include site clearing; excavation and backfill; and construction of basins, conveyance canals, pipelines, pump stations, and the turnout. Grading activities associated with the construction of recharge basins would involve earthmoving, excavation, and grading. Canals and pipelines would likely be constructed using typical open trench construction methods. In some cases where siphons would be installed, jack and bore methods could be used to tunnel under and avoid disruption of surface features. These activities would potentially result in the disturbance of natural communities and agricultural areas that potentially support special-status species.

Water recycling projects could be pursued in all four regions. The northern inland region would require the fewest number of wastewater treatment/water reclamation plants, followed by the northern coastal region, and then by the southern coastal region. The southern inland region would require the greatest number of water recycling projects to replace the anticipated water yield that it otherwise would have received through the Delta Conveyance Project. These projects would be located near water treatment facilities. Construction techniques for water recycling projects would vary depending on the type of project (e.g., for landscape irrigation, groundwater recharge, dust control, industrial processes) but could require earthmoving activities, grading, excavation, and trenching. Because construction would involve ground-disturbing activities, such actions could result in the disturbance of natural communities and agricultural areas that potentially support special-status species. In the southern inland region where a greater number of projects would be needed as a substitute for Delta Conveyance, the potential for impact would also be greatly increased relative to these projects in the presence of Delta Conveyance.

Water efficiency projects could be pursued in all four regions and involve a wide variety of project types, such as flow measurement or automation in a local water delivery system, lining of canals, use of buried perforated pipes to water fields, and additional detection and repair of commercial and residential leaking pipes. These projects could occur anywhere in the regions and most would involve little ground disturbance or would occur in previously disturbed areas.

As detailed above, all project types across all regions would involve relatively typical construction techniques (i.e., no large-scale tunnels or deep soil mixing) and would be required to conform with the requirements of CEQA and/or state and local regulations protecting terrestrial biological resources, and mitigation measures would be developed to protect these resources, such as requiring biological monitoring, implementing avoidance and minimization measures for sensitive biological resources, and compensating for the loss of special-status species habitats and jurisdictional aquatic resources.

13.3.3.2 Impacts of the Project Alternatives on Sensitive Natural Communities

Eight of the eleven natural community types occurring in the study area are identified as special-status natural communities. These communities are considered special status because they include specific vegetation alliances that are recognized by CDFW as being of limited distribution statewide or within a county or region (CNDDB Rank of S1–S3) or because they require focused analysis under federal and state laws and regulations (Section 13.2, *Applicable Laws, Regulations, and Programs*). Impacts would be considered significant if they have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by CDFW or USFWS. In this analysis, a *substantial adverse effect* on a sensitive natural community is defined as a net loss of habitat function, including a net loss of acreage.

The three remaining natural community types are not discussed under this section. Tidal brackish emergent wetlands would not be affected because the project alternatives would be implemented within freshwater portions of the tidal Delta. The grassland community mapped in the study area generally would not be considered a special-status natural community because, as described in Section 13.1.2.2, *Natural Community Descriptions*, it is generally dominated by nonnative species and includes areas of fallow and disturbed fields. It may contain vegetation alliances that are recognized by CDFW as sensitive, but the vegetation mapping available for this analysis does not have the resolution required to identify those alliances, which typically require on-the-ground surveys to identify. Other seasonal wetlands do not contain specific vegetation alliances that are recognized by CDFW as being of limited distribution statewide or within a county or region and so are addressed in other sections of this document where they are components of sensitive wildlife habitat or are regulated wetlands.

Methods for determining impacts on sensitive natural communities are presented in Section 13.3.1, *Methods for Analysis*.

Impact BIO-1: Impacts of the Project on the Tidal Perennial Aquatic Natural Community

All Project Alternatives

<u>Construction</u>

Constructing the water conveyance facilities would permanently and temporarily eliminate areas of the tidal perennial aquatic natural community. Permanently affected lands would no longer be available as plant and wildlife habitat. Impacts would result primarily from constructing the intake structures and constructing the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c). Alternative 5 would have fewer impacts than the other alternatives, with most permanent impacts associated with the intake structures and most temporary impacts associated with geotechnical investigations. Affected acreages of tidal perennial aquatic habitat that would be permanently or temporarily lost by implementing the project alternatives are summarized in Table 13-7 and are shown in Mapbooks 13-1–13-3. In general, Alternatives 2a and 4a would have the largest effect on tidal perennial aquatic natural habitat. These two alternatives have greater impacts associated with the outlet and control structures, and the use of Intake A. Alternative 5 has the fewest impacts because it does not include the Southern Complex. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14:

Construction Best Management Practices for Biological Resources (Appendix 3B, *Environmental Commitments and Best Management Practices*) would reduce these potential impacts by training construction staff on the needs of protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; by implementing spill prevention and containment plans that would avoid material spills that could affect aquatic habitat; and by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

Table 13-7. Impacts [a] on the Tidal Perennial Aquatic Natural Community by Alternative

Alternative	Permanent Impacts (acres)	Long-Term Temporary Impacts (acres)	Temporary Impacts (acres)	Total Impacts (acres affected)
1	36.76	4.73	13.17	54.66
2a	45.84	8.42	13.17	67.43
2b	33.61	4.28	12.92	50.81
2c	35.57	4.68	13.17	53.42
3	33.15	4.73	5.44	43.32
4a	42.73	8.42	5.44	56.59
4b	30.50	4.28	5.20	39.98
4c	32.46	4.65	5.43	42.54
5	5.87	1.10	4.16	11.13

[a] See Section 13.3.1.2, *Evaluation of Construction Activities,* for definition of impact types.

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and some of which would involve in-water boring in tidal perennial aquatic habitat (Section 3.15). Geotechnical investigations associated with the tunnels for all project alternatives, which include CPTs and soil borings, would result in temporary impacts on tidal perennial aquatic habitat (Appendix 13C, *Impact Tables*). The West Tracy Fault Study and the Bethany Fault Study investigations, pilot studies for settlement, agronomic testing, and utility potholing would not occur in tidal perennial aquatic habitat. Pile installation test methods at the north Delta intakes would temporarily affect tidal perennial aquatic habitat; however, this temporary impact is not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprint. Environmental Commitments EC-1: *Conduct Worker Awareness Training*, EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on the needs of protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; by implementing spill prevention and containment plans that would avoid material spills that could affect the viability of aquatic habitat; and by having a biological monitor present to ensure that all other protective measures are being implemented where applicable.

Operations

As discussed in Chapter 5, *Surface Water*, project operations would not substantially alter river flows on the Sacramento and San Joaquin Rivers. Therefore, project operations would not substantially affect the tidal perennial aquatic natural community.

Maintenance

Though maintenance activities would take place in existing/developed facilities and would not affect the tidal perennial aquatic natural community, some activities may occur adjacent to the tidal perennial aquatic community and could result in inadvertent impacts related to repaving of access roads every 15 years and semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application). These activities also create the potential for runoff of paving material or materials from parked vehicles or staging areas.

CEQA Conclusion—All Project Alternatives

The project alternatives would cause the removal, conversion, and temporary disturbance of tidal perennial aquatic natural community due to project construction and maintenance.

The temporary disturbances of tidal perennial aquatic habitat would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these environmental commitments, however, the loss of tidal perennial aquatic community from construction and potential impacts from maintenance activities would be significant. Mitigation Measure CMP: *Compensatory Mitigation Plan* would offset permanent and temporary loss of tidal perennial aquatic habitat. Therefore, the impacts on the tidal perennial aquatic community from the project alternatives would be less than significant with mitigation.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP identifies compensatory mitigation options to address impacts on sensitive natural communities, habitat for special-status species, and wetlands and other waters ("aquatic resources") from the construction and operation of the project. The final compensatory habitat mitigation needs for the project will be determined once all regulatory permits and approvals are secured. The CMP outlines three primary approaches in providing compensatory mitigation to mitigate impacts associated with the construction and operation of the project alternatives, which include the following.

1. Develop and implement several initial mitigation actions on Bouldin Island and at the I-5 ponds that would provide compensatory mitigation for many of the affected natural communities, special-status species, and aquatic resources.
    a. The proposed compensatory mitigation actions to be undertaken on Bouldin Island would retain agricultural land uses in most locations, preserve existing habitat, and create or enhance new habitat in areas where it could be sustained with little maintenance. The Bouldin Island mitigation sites would support multiple habitat types, including freshwater marsh, seasonal wetland, riparian, grasslands, ponds (depressions), and grasslands.

b. The proposed compensatory mitigation actions to be undertaken at the I-5 ponds include reconfiguring the three ponds to create a mosaic of high-quality, low-maintenance freshwater emergent wetland, open-water, and associated natural habitats. In addition, existing riparian habitat would be preserved to the extent feasible.

2. Use existing or proposed mitigation banks to secure credits for certain types of habitats and natural communities and to use site protection instruments, such as conservation easements, to protect and manage agricultural lands for wildlife foraging or roosting habitat.

3. Propose a mitigation framework under which future tidal wetland restoration and channel margin enhancement would be done. Mitigation sites would provide suitable habitat for affected fisheries, including salmonids, delta smelt, longfin smelt, and green sturgeon.

c. The restoration of tidal wetlands is intended to contribute to at-risk fish species recovery, providing improved foraging opportunities and refuge from predators. Tidal wetland habitat mitigation would generally be achieved at suitable locations by reconnecting former wetland areas to adjacent tidal sloughs and rivers. Restoration would primarily occur through breaching or setback of levees, thereby restoring tidal fluctuation to land parcels currently isolated behind those levees. Where practicable and appropriate, portions of restoration sites will be raised to elevations that will support tidal marsh vegetation following levee breaching. Potential areas for restoration would be within the lower Yolo Bypass and Cache Slough Complex.

d. Channel margin enhancements would seek to improve rearing and outmigration habitat for juvenile salmonids along migration corridors that have been degraded by construction of flood protection levees. Channel margin restoration would be accomplished by improving channel geometry and restoring riparian, marsh, and mudflat habitats on the water side of levees along channels. Enhancement sites would be targeted within the same general geography of the project, including the north Delta along the Sacramento River mainstem, north Delta along Sacramento River tributaries (e.g., Steamboat, Sutter, and Elk Sloughs), lower Yolo Bypass, and Cache Slough Complex.

Compensatory mitigation for aquatic resources would be provided in accordance with the procedures set forth in 33 CFR Section 332.3(b) and would be provided for through either mitigation bank credits or permittee-responsible mitigation under a watershed approach. Compensatory mitigation for impacts on nontidal freshwater perennial emergent wetlands, valley/foothill riparian wetlands, nontidal perennial aquatic, and other seasonal wetlands would be located on Bouldin Island. Compensatory mitigation for vernal pools and alkaline wetlands would be provided through purchasing wetland creation credits at an approved mitigation bank and in the instance that bank credits are not available, a non-bank site approved by the relevant regulatory agencies supporting the necessary habitat would be used as mitigation. Compensatory mitigation for tidal freshwater emergent wetlands and tidal perennial aquatic communities would be provided by the proposed Tidal Habitat Mitigation Framework (Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources*, Section 3F.4.3, *Tidal Habitat Mitigation Framework*). A secondary option that may be used is the purchase of wetland creation credits at an approved mitigation bank.

As mentioned above, under the CMP tidal perennial aquatic habitat would be created or acquired and permanently protected to compensate for project impacts and ensure no significant loss of tidal perennial aquatic habitat functions and values (Appendix 3F, Section

3F.3.2.5, *Tidal Wetlands and Waters*, and Attachment 3F.1, *Compensatory Mitigation Design Parameters*, Table 3F.1-2, CMP-1: *Tidal Perennial Aquatic Habitat*).

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures*.

Compensatory Mitigation

Implementing the CMP on Bouldin Island and at the I-5 ponds would not result in the permanent loss of tidal perennial aquatic habitat (Appendix 13C, Table 13C-20). The creation and enhancement of wetlands and other waters as well as habitat for special-status species under the project's CMP would result in temporary impacts on the tidal perennial aquatic community from channel margin enhancement and tidal restoration.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4, *Vernal Pools and Alkaline Wetlands*), these activities would not result in effects on tidal perennial aquatic because they would not likely occur within or adjacent to this community. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, *Site Protection Instruments*, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These activities would not result in effects on tidal perennial aquatic relative to baseline conditions because agricultural practices on these properties would continue as they currently do and the protection of natural communities would not likely result in any impacts on the tidal perennial aquatic community in the study area. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure that there is no significant loss of habitat or habitat value by adjusting the overall mitigation commitment (Appendix 3F, Section 3F.1, *Introduction*, Section 3F.2.4, *Mitigation Design Parameters*, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore would reduce any habitat losses associated with the CMP to less than significant. The activities to enhance channel margins would generally include the removal of existing riprap, modification of the existing channel margin with heavy equipment, and placement of large woody debris on the channel margin. Tidal restoration activities would include grading, creation of setback levees, planting, and breaching of existing levees. Environmental Commitments EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for discharge of construction materials in aquatic resources.

The impacts on tidal perennial aquatic habitat from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance and the use of heavy equipment that would have the potential to result in loss of areas of tidal perennial aquatic natural community from ground disturbance, movement of construction vehicles, or inadvertent discharge of construction-related fluids such as fuels, oils, and cement. Impacts on the tidal perennial aquatic natural community resulting from implementation of mitigation measures would be much less substantial, but similar to construction effects of the project alternatives in certain construction areas and would contribute to tidal perennial aquatic natural community impacts.

The impacts of habitat loss, ground disturbance, and exposure to hazardous materials on the tidal perennial aquatic natural community would be reduced through the CMP and Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-4a: *Develop and Implement Erosion and Sediment Control Plans*; EC-4b: *Develop and Implement Stormwater Pollution Prevention Plans;* and EC-14: *Construction Best Management Practices for Biological Resources*. Additionally, Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would reduce impacts on the tidal perennial aquatic natural community. Therefore, impacts on the tidal perennial aquatic natural community from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on the tidal perennial aquatic natural community from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would still be less than significant with mitigation.

Impact BIO-2: Impacts of the Project on Tidal Freshwater Emergent Wetlands

All Project Alternatives

Construction

Project construction would permanently and temporarily eliminate areas of tidal freshwater emergent wetlands and associated vegetation types. Permanently affected lands would no longer be available as plant and wildlife habitat. Affected acreages of tidal freshwater emergent wetlands that would be permanently or temporarily lost by implementing the project alternatives are summarized in Table 13-8 and are shown in Mapbooks 13-1–13-3. In general, the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would have a greater effect on tidal freshwater emergent wetlands than the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5). The difference between the acreages affected by the three alignments is because these impacts would occur at different locations. Most of the impacts would result from geotechnical investigations and constructing roads and power transmission lines. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on the needs of protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; by implementing spill prevention and containment plans that would avoid material spills that could affect wetland habitat; and by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

Table 13-8. Impacts [a] on the Tidal Freshwater Emergent Wetland Natural Community by Alternative

Alternative	Permanent Impacts (acres)	Long-Term Temporary Impacts (acres)	Temporary Impacts (acres)	Total Impacts (acres)
1	0.23	0.00	0.82	1.05
2a, 2b, 2c	0.05	0.00	0.82	0.87
3, 4a, 4b, 4c	0.03	0.00	0.37	0.40
5	0.18	0.00	0.39	0.57

[a] See Section 13.3.1.2, *Evaluation of Construction Activities,* for definition of impact types.

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and would involve some in-water boring that could affect tidal freshwater emergent wetlands (Section 3.15). Geotechnical investigations associated with the tunnels for all project alternatives, which include CPTs and soil borings, would result in temporary impacts on tidal freshwater emergent wetlands (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations, pilot studies for settlement, agronomic testing, and utility potholing would not occur in tidal freshwater emergent wetland habitat. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments), and would temporarily affect tidal emergent wetlands: test trenches, CPTs, soil borings, electrical resistivity tomography, groundwater testing and monitoring, and monument installation. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts. These environmental commitments effectively reduce impacts by (1) minimizing locating test trenches, CPTs, and borings in aquatic features, to the extent possible, in areas where there would be no additional surface disturbance during construction; (2) training construction staff on the needs of protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (3) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of aquatic habitat; and (4) having a biological monitor present to ensure that all other protective measures are being implemented where applicable.

Operations

As discussed in Chapter 5, *Surface Water*, project operations would not substantially alter river flows on the Sacramento and San Joaquin Rivers. Therefore, project operations would not substantially affect tidal freshwater emergent wetlands.

Maintenance

Though maintenance activities would take place in existing/developed facilities, some activities may occur adjacent to tidal freshwater emergent wetlands and could result in inadvertent impacts related to repaving of access roads every 15 years and semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application). These activities also create the potential for runoff of paving material or materials from parked vehicles or staging areas.

CEQA Conclusion—All Project Alternatives

The project alternatives would cause the removal, conversion, and temporary disturbance of tidal freshwater emergent wetlands due to project construction and maintenance.

Temporary disturbances and indirect impacts on tidal freshwater emergent wetlands would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources*. Even with these environmental commitments, however, the loss of tidal freshwater emergent wetlands from construction and potential impacts from maintenance activities would be significant. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would reduce impacts on tidal freshwater emergent wetlands during project construction. Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would reduce impacts on tidal freshwater emergent wetland during project maintenance. Mitigation Measure BIO-2c: *Electrical Power Line Support Placement* would minimize impacts on tidal freshwater emergent wetlands from electric power line installation. Mitigation Measure CMP: *Compensatory Mitigation Plan* would offset permanent and temporary loss of tidal freshwater emergent wetland. Therefore, the impacts on tidal freshwater emergent wetland from the project alternatives would be less than significant with mitigation.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

DWR will evaluate all project activities for their impacts on special-status natural communities and special-status plants and avoid or minimize impacts on special-status natural communities and special-status plants that occur on project sites. Diamond-petaled California poppy and caper-fruited tropidocarpum, which are quite rare and on the verge of extinction, will be avoided. Impacts on other special-status plant species will be avoided to the extent feasible.

DWR will conduct preconstruction surveys for special-status natural communities and special-status plants within and adjacent to all project sites in areas of potential suitable habitat, as identified in the habitat models. The purposes of these surveys will be to (1) identify and map any special-status natural communities present, (2) determine whether the locations of special-status plants identified in previous record searches or surveys are extant, (3) identify any new special-status plant occurrences, (4) cover any portions of the study area not previously surveyed, and (5) identify where mitigation measures would be implemented to avoid or offset impacts. The extent of mitigation for direct loss of or indirect effects on special-status plants will be based on these survey results.

All surveys for special-status natural communities and special-status plants will be conducted by qualified biologists following *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (California Department of Fish and Wildlife 2018b:1–12), or the most current versions of these protocols. The surveys will be floristic in nature and conducted in a manner that maximizes the likelihood of locating special-status plant species or special-status natural communities that may be present (i.e., during the appropriate season and at an appropriate level of ground coverage). Locations of special-status plants in construction areas will be recorded using a GPS unit and flagged.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

DWR will implement the following process and measures to avoid and minimize potential impacts on terrestrial biological resources when maintenance activities occur at DWR project facilities. Consistent with current DWR environmental clearance review procedures, DWR will implement the following measures to avoid and minimize impacts on sensitive species, sensitive natural communities, and sensitive vegetation alliances during project maintenance activities, to the greatest extent practicable. Additional measures may be developed for site-specific conditions or specific biological resources and implemented, as necessary. If additional permits and approvals are determined to be necessary through the environmental clearance review, then the conditions of those permits and approvals will supersede the measures listed below.

1. Prior to the start of maintenance activities, DWR environmental staff will conduct an environmental review of the potential for maintenance to impact sensitive resources. Using occurrence databases, aerial imagery, and prior knowledge of maintenance areas, DWR environmental staff will evaluate the potential for suitable habitat for special-status species, sensitive natural communities, and/or cultural resources to occur in the vicinity of the maintenance footprint. A site visit may be conducted to verify whether sensitive resources have the potential to be present within the maintenance area. Based on the results of the desktop review and/or site visit, the following avoidance measures may be required, as appropriate for the timing, location, and nature of the maintenance activity.

2. Depending on site-specific conditions and timing, a preconstruction survey may be required to determine potential presence of suitable habitat for sensitive species prior to the start of maintenance activities. Surveys will be conducted by a qualified biologist with experience identifying the resources in question using standard survey protocols and during appropriate timeframes specific to each sensitive resource.

3. Appropriate non-disturbance buffers may be applied around sensitive biological resources and habitat identified during the environmental clearance review or preconstruction surveys. Non-disturbance buffers will be established by a qualified biologist and will take into consideration the nature of the maintenance activity, the sensitivity of the species, site-specific conditions, and applicable state and federal recommendations. Non-disturbance

buffers may be removed after a qualified biologist determines the sensitive resource is no longer present or at risk of impacts due to maintenance activities.

4. When feasible, maintenance activities will avoid impacts on rodent burrows, wetlands, or other areas that may provide potential habitat to avoid impacts on sensitive biological resources. Areas to be avoided will be flagged. Debris or cut vegetation may not be left where it may enter aquatic habitat.
5. Appropriate work windows and weather restrictions may be applied to avoid impacts on sensitive biological resources identified during the environmental clearance review or preconstruction survey.
6. A Worker Awareness Training may be required if sensitive natural resources are present. DWR will provide training to maintenance personnel on the importance of protecting sensitive natural resources (e.g., special-status fish species, wildlife species, plant species, and designated critical and/or suitable habitats for these species). Preconstruction training will be conducted so that maintenance personnel are aware of their responsibilities and the importance of compliance. Construction personnel will be educated on the types of sensitive resources in the project area and the measures required to avoid and minimize impacts on these resources. Materials covered in the training program will include environmental rules and regulations for the specific site requirements for limiting activities to approved work areas, timing restrictions, and avoidance of sensitive resource areas. A record of personnel that completed the environmental training will be kept. Operations and maintenance personnel working in and adjacent to special-status species habitat and natural communities may also be required to complete the existing DWR environmental trainings at regular intervals such as the Employee Environmental Responsibility training.
7. Qualified biologists may be required to monitor maintenance activities in areas identified during the environmental clearance review and preconstruction surveys as having special-status fish, wildlife, and plant species and their habitats, designated critical habitat, and sensitive natural communities.
8. Any wildlife that is encountered within the maintenance area will be avoided and allowed to move out of harm's way of its own accord.
9. Vegetation removal will be kept to the minimum necessary to accomplish maintenance need.
10. Spill prevention measures will be implemented to prevent and respond to petroleum product discharges into wetlands or waters of the United States and State.
11. Maintenance vehicles will observe a maximum speed limit of 15 miles per hour on un-paved non-public access roads where it is safe and feasible to do so, and 30 miles per hour on paved non-public access roads.
12. All ingress/egress at the project site will be restricted to those routes identified in the project plans and description. Cross-country access routes will be clearly marked in the field with appropriate flagging and signs.
13. All vehicle parking will be restricted to established areas, existing roads, or other suitable areas.
14. To prevent harassment, injury, or mortality of sensitive wildlife, no pets will be permitted in the maintenance area.

15. Plastic monofilament netting or similar material will not be used for erosion control, because smaller wildlife may become entangled or trapped in it. Acceptable substitutes include burlap-wrapped straw wattles, coconut coir matting or tackified hydroseeding compounds.

16. Rodenticides and herbicides will be used in accordance with the manufacturer recommended uses and applications and in such a manner as to prevent primary or secondary poisoning of special-status fish, wildlife, and plant species and depletion of prey populations upon which they depend. All uses of such compounds will observe label and other restrictions mandated by EPA, the California Department of Pesticide Regulation, and other appropriate state and federal regulations, as well as additional project-related restrictions imposed by USFWS, NMFS, and/or CDFW. If rodent control must be conducted in San Joaquin kit fox habitat, zinc phosphide should be used because of its proven lower risk to kit fox. Use of pesticides may be limited in other resource-specific instances as well. In addition, the method of rodent control will comply with those discussed in the 4(d) rule published in the final listing rule for California tiger salamander (69 *Federal Register* [FR] 47211–47248).

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

1. DWR will contract with electric utilities to provide primary power to designated locations for project construction and operation. DWR will coordinate with electric utilities to design and construct power transmission and distribution lines and the locations of necessary appurtenances such as supports and substations to avoid sensitive terrestrial and aquatic habitats to the maximum extent feasible and to minimize take and encumbrance of agricultural lands. In cases where sensitive habitat cannot be feasibly avoided, disturbance will be minimized to the greatest degree feasible, and disturbed areas will be returned as near as reasonably and practically feasible to preconstruction conditions by reestablishing surface conditions through carefully grading, reconstructing features such as irrigation and drainage facilities, and replanting vegetation and crops and/or compensating farmers for crops losses. This will be accomplished through an agreement with the utility providers. Implementation of this measure relies, in part, on coordination and cooperation with all appropriate utility providers and local agencies to integrate with other construction projects and minimize disturbances.

2. DWR will coordinate with electric utilities to design tower and pole placement and location of substations to avoid existing structures (e.g., agricultural irrigation infrastructure) to the extent feasible. In cases where existing structures and improvements cannot be feasibly avoided, DWR will relocate structures and improvements or compensate the owner for the loss, and will return temporarily disturbed areas to preconstruction conditions. Where poles or towers are to be constructed in agricultural areas, DWR will require incorporation of the following BMPs where feasible.

    a. Select means and methods of construction to minimize crop damage.

    b. Use single-pole structures instead of H-frame or other multiple-pole structures to reduce the potential for interference with farm machinery, reduce land impacts, and minimize weed encroachment issues.

    c. Locate lines adjacent to roads and existing property lines to reduce property take and encumbrance.

   d. Use transmission structures with longer spans to clear longer sections of fields or sensitive areas where feasible. Longer spans may not be feasible in areas where aerial spraying and seeding is common. In areas where aerial spraying and seeding are common, install markers on the shield wires above the conductors.

   e. Minimize the use of guy wires, and keep guy wires out of crop and hay lands. Place highly visible shield guards on guy wires in farm vehicle and equipment traffic areas.

   f. Locate new transmission lines along existing transmission line corridors.

   g. Locate new powerlines on existing poles on same vertical plane as the existing wires.

3. As part of and prior to approval of construction, DWR will work with electric utilities to ensure incorporation of bird and raptor-safe design in accordance with the applicable recommendations presented by the Avian Power Line Interaction Committee (APLIC) in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006) and *Reducing Avian Collisions with Power Lines: State of the Art in 2012* (Avian Power Line Interaction Committee 2012), or with more current guidance if it becomes available. Applicable APLIC recommendations include, but are not limited to:

   a. Ensuring sufficient spacing of phase conductors to prevent bird electrocution.

   b. Minimizing the use of guywires. Where the use of guywires is unavoidable, demarcating guywires using the best available methods to minimize avian collisions (e.g., line markers).

   c. Reusing or co-locating new transmission facilities and other ancillary facilities with existing facilities and disturbed areas to minimize habitat impacts and avoid potential collisions.

   d. Configuring lines to reduce vertical spread of lines and/or decreasing the span length if such options are feasible.

   e. Marking lines to increase the visibility of lines and reduce the potential for collision.

4. DWR will work with electric utilities to mark all aboveground project lines and towers within 3 miles of known greater sandhill crane roost sites with bird flight diverters that are visible under all conditions (e.g., glow-in-the-dark markers, near-UV line markers). Bird flight diverters will be installed with the following conditions:

   a. If a new project line will be placed on poles or towers with existing lines that have bird diverters installed, bird diverters will not be required on the new project lines if the new project lines can be placed within the same vertical prism as the existing lines.

   b. If a new project line will be placed on poles or towers with existing lines but cannot be placed within the same vertical prism as the existing lines (e.g., a new project SCADA line that will be placed on a transmission tower with existing transmission lines), bird diverters will be required on both the new and existing lines.

   DWR will work with electric utilities to:

   c. Select the most effective and appropriate bird flight diverter for minimizing collisions based on APLIC recommendations (Avian Power Line Interaction Committee 2006, 2012), or more current guidance if available.

d. Install bird flight diverters in a configuration, frequency, and spacing consistent with APLIC recommendations (Avian Power Line Interaction Committee 2006, 2012), or more current guidance if available.

e. Periodically inspect and replace bird flight diverters as needed until or unless the project or existing line is removed.

Mitigation Measure CMP: Compensatory Mitigation Plan

Under the CMP (see Impact BIO-1 for a summary discussion of the CMP), tidal freshwater emergent wetland habitat would be created or acquired and permanently protected to compensate for project impacts and ensure no significant loss of tidal freshwater emergent wetland habitat functions and values (Appendix 3F, Section 3F.3.2.5 and Attachment 3F.1, Table 3F.1-2, CMP-2: *Tidal Freshwater Emergent Wetland*).

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

Implementing the CMP on Bouldin Island and at the I-5 ponds would not result in the permanent loss of tidal freshwater emergent wetland (Appendix 13C, Table 13C-20). The creation and enhancement of wetlands and other waters as well as habitat for special-status species under the project's CMP could result in temporary impacts on tidal freshwater emergent wetland from channel margin enhancement and tidal restoration.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would not likely result effects on tidal freshwater emergent wetland because they would not likely occur within or adjacent to this community. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These activities would not result in effects on tidal freshwater emergent wetland relative to baseline conditions because agricultural practices on these properties would continue as they currently do and the protection of natural communities would not likely result in any impacts on the tidal freshwater emergent wetland community in the study area. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure that there is no significant loss of habitat or habitat value by adjusting the overall mitigation commitment (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The activities to enhance channel margins would generally include the removal of existing riprap, modification of the existing channel margin with heavy equipment, and placement of large woody debris on the channel margin. Tidal restoration activities would include grading, creation of setback levees, planting, and breaching of existing levees. Implementation of Environmental Commitments EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for discharge of construction materials into tidal freshwater emergent wetlands. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would mitigate impacts on tidal freshwater emergent wetlands by identifying locations where special-status natural communities and special-status plants would be avoided when the CMP is implemented. Therefore, the impacts on tidal freshwater emergent wetlands from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would have impacts on tidal freshwater emergent wetlands similar to those described under Impact BIO-1: *Impacts of the Project on the Tidal Perennial Aquatic Natural Community.* The impacts of habitat loss, ground disturbance, and exposure to hazardous materials on tidal freshwater emergent wetlands would be reduced through implementation of the CMP, environmental commitments, and mitigation measures as detailed under Impact BIO-1: *Impacts of the Project on the Tidal Perennial Aquatic Natural Community*. Therefore, impacts on tidal freshwater emergent wetlands from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on tidal freshwater emergent wetlands from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would still be less than significant with mitigation.

Impact BIO-3: Impacts of the Project on Valley/Foothill Riparian Habitat

All Project Alternatives

Construction

Constructing water conveyance facilities would permanently and temporarily eliminate areas of valley/foothill riparian habitat. Permanently affected lands would no longer be available as plant and wildlife habitat. Valley/foothill riparian habitat that would be permanently or temporarily removed by implementing the project alternatives are summarized in Table 13-9 and shown in Mapbooks 13-1–13-3. These impacts would occur primarily from constructing access roads, intakes, levee improvements, power transmission lines, substations, and underground power transmission lines. The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would have a greater overall effect due to a larger amount of levee improvements. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-9. Impacts [a] on the Valley/Foothill Riparian Natural Community by Alternative

Alternative	Permanent Impacts (acres)	Long-Term Temporary Impacts (acres)	Temporary Impacts (acres)	Total Impacts (acres)
1	51.90	2.61	17.49	72.00
2a	51.18	3.82	20.02	75.02
2b	47.47	1.63	19.05	68.15
2c	48.70	2.90	19.54	71.14
3	13.93	2.79	10.57	27.29
4a	15.60	3.82	11.20	30.62
4b	11.88	1.63	10.25	23.76
4c	13.11	2.90	10.72	26.73
5	15.41	4.05	9.85	29.31

[a] See Section 13.3.1.2, *Evaluation of Construction Activities,* for definition of impact types.

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on valley/foothill riparian habitat. Geotechnical investigations associated with tunnels for all alternatives, which include CPTs and soil borings, would result in temporary impacts on valley/foothill riparian habitat (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations would not affect valley/foothill riparian habitat. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, electrical resistivity tomography (ERT), groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprint. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on the needs of protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures and by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

<u>Operations</u>

As discussed in Chapter 5, *Surface Water*, project operations would not substantially alter river flows on the Sacramento and San Joaquin Rivers. Therefore, project operations would not substantially affect valley/foothill riparian habitats.

Modeling results from Chapter 5 (Appendix 5A, Section B, Attachment 3, *CalSim 3 Modeling Results*) for flows upstream of the Delta in the Sacramento, Feather, and American Rivers under all project alternatives show that they are not expected to change substantially beyond the existing variation in flows. Thus, the project is not anticipated to alter riparian vegetation on these rivers relative to existing conditions.

Though the project would not change operational criteria associated with SWP and CVP north-of-Delta reservoirs, the operation of the project could indirectly affect how these reservoirs operate and reservoir levels. Some of these reservoirs may have associated valley/foothill riparian habitat located along inlet channels. As discussed in Chapter 5, Section 5.3.2.2, *Changes to SWP and CVP Reservoir Storage*, the changes to these reservoir levels are extremely minimal and would thus not likely significantly affect riparian habitat associated with these reservoirs.

<u>Maintenance</u>

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on valley/foothill riparian habitat. Maintenance activities across all facilities that could affect valley/foothill riparian habitat include repaving of access roads every 15 years and semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application). These activities also create the potential for runoff of paving material or materials from parked vehicles or staging areas.

CEQA Conclusion—All Project Alternatives

Constructing the project alternatives would cause the removal, conversion, and temporary disturbance of valley/foothill riparian habitat. Maintenance activities could result in periodic temporary disturbances to valley/foothill riparian habitat.

Temporary disturbances and indirect impacts on valley/foothill riparian habitat would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources*. Even with these environmental commitments, however, the loss of valley/foothill riparian habitat from construction and potential impacts from maintenance activities would be significant. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would reduce impacts on valley/foothill riparian habitat during project construction. Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would reduce impacts on valley/foothill riparian habitat during project maintenance. Mitigation Measure BIO-2c: *Electrical Power Line Support Placement* would minimize impacts on valley/foothill riparian habitat from electric power line installation. Mitigation Measure CMP: *Compensatory Mitigation Plan* would offset permanent and temporary loss of valley/foothill riparian habitat. Therefore, the impacts on valley/foothill riparian habitat from the project alternatives would be less than significant with mitigation.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure CMP: Compensatory Mitigation Plan

Under the CMP (see Impact BIO-1 for a summary discussion of the CMP), DWR would create and preserve valley/foothill riparian habitat on Bouldin Island and at the I-5 ponds and manage these areas in perpetuity (Appendix 3F, Section 3F.3.2.3 and Attachment 3F.1, Table 3F.1-2, CMP-3: *Valley/Foothill Riparian Habitat*).

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands and other waters as well as habitat for special-status species on Bouldin Island and the I-5 ponds under the project's CMP would result in permanent and temporary losses of valley/foothill riparian habitat from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats (Appendix 13C, Table 13C-20). The CMP could also affect valley/foothill riparian through tidal wetland habitat restoration and channel margin enhancement because potential areas identified generally support this community in the study area (Appendix 3F, Section 3F.4.3.4.2, *Site Selection Criteria and Tools*).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would not result in effects on valley/foothill riparian because they would not likely occur within or adjacent to this community. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Except for croplands, some areas could potentially contain valley/foothill riparian but management activities in these areas would be limited in scope and would not likely involve physical changes to this community. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure that there is no significant loss in habitat or habitat value by adjusting the overall mitigation commitment (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. Temporary disturbances and indirect impacts valley/foothill riparian habitat would be reduced by Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* and Mitigation

Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants*. Therefore, the impacts on valley/foothill riparian habitat from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would have impacts on valley/foothill riparian habitat similar to those described under Impact BIO-1: *Impacts of the Project on the Tidal Perennial Aquatic Natural Community.* The impacts of habitat loss, ground disturbance, and exposure to hazardous materials on valley/foothill riparian habitat would be reduced through the CMP, environmental commitments, and mitigation measures as detailed under Impact BIO-1: *Impacts of the Project on the Tidal Perennial Aquatic Natural Community*. Therefore, impacts on valley/foothill riparian habitat from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on valley/foothill riparian habitat from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would still be the less than significant with mitigation.

Impact BIO-4: Impacts of the Project on the Nontidal Perennial Aquatic Natural Community

All Project Alternatives

Construction

Constructing the water conveyance facilities would permanently and temporarily eliminate areas of nontidal perennial aquatic habitat. Permanently affected lands would no longer be available as plant and wildlife habitat. Impacts would primarily result from constructing the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), and the Bethany Complex (Alternative 5), from constructing shafts and installing power transmission lines (all alternatives), and improving levees (all alternatives). Nontidal perennial aquatic habitat that would be permanently or temporarily lost by implementation of the project alternatives are summarized in Table 13-10 and shown in Mapbooks 13-1–13-3. Environmental Commitments EC-1: *Conduct Worker Awareness Training,* EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on the needs of protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; by implementing spill prevention and containment plans that would avoid material spills that could affect aquatic habitat; and by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

Table 13-10. Impacts [a] on the Nontidal Perennial Aquatic Natural Community by Alternative

Alternative	Permanent Impacts (acres)	Long-Term Temporary Impacts (acres)	Temporary Impacts (acres)	Total Impacts (acres)
1	0.26	0.29	0.51	1.06
2a	0.39	0.29	0.76	1.44
2b	0.22	0.10	0.46	0.78
2c	0.22	0.19	0.55	0.96

Alternative	Permanent Impacts (acres)	Long-Term Temporary Impacts (acres)	Temporary Impacts (acres)	Total Impacts (acres)
3	0.21	0.29	0.38	0.88
4a	0.38	0.29	0.59	1.26
4b	0.21	0.10	0.29	0.60
4c	0.21	0.19	0.38	0.78
5	0.53	0.83	0.32	1.68

[a] See Section 13.3.1.2, *Evaluation of Construction Activities,* for definition of impact types.

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on nontidal perennial aquatic habitat. Geotechnical investigations associated with tunnels for all alternatives, which include CPTs and soil borings, would result in temporary impacts on nontidal perennial aquatic habitat (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations, pilot studies for settlement, agronomic testing, and utility potholing would not occur in nontidal perennial aquatic habitat. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, and monument installation. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprint. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) minimizing locating test trenches, CPTs, and borings in aquatic features, to the extent possible, in areas where there would be no additional surface disturbance during construction; (2) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

<u>Operations</u>

The project would not operate in nontidal perennial aquatic natural communities and would have no operational effects on this habitat within the study area.

Though the project would not change operational criteria associated with SWP and CVP north-of-Delta reservoirs, which would be considered a nontidal perennial aquatic community, the operation of the project could indirectly affect how these reservoirs operate and reservoir levels. As discussed in Chapter 5, Section 5.3.2.2, *Changes to SWP and CVP Reservoir Storage*, the changes to these reservoirs are extremely minimal and would thus not significantly change the extent of nontidal perennial aquatic habitat.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on nontidal perennial aquatic habitat. Maintenance activities across all facilities that could affect nontidal perennial aquatic habitat include repaving of access roads every 15 years and semiannual general and ground maintenance, which could result in advertent discharge of fill material. These activities also create the potential for runoff of paving material or materials from parked vehicles or staging areas.

CEQA Conclusion—All Project Alternatives

Constructing the project alternatives would cause the removal, conversion, and temporary disturbance of nontidal aquatic perennial habitat. Maintenance activities could result in periodic temporary disturbances to nontidal perennial aquatic habitat.

Temporary disturbances and indirect impacts on nontidal perennial aquatic habitat would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources*. Even with these environmental commitments, however, the loss of nontidal perennial aquatic habitat from construction and potential impacts from maintenance activities would be significant. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would mitigate impacts on nontidal perennial aquatic habitat by identifying locations where special-status natural communities and special-status plants would be avoided. Under Mitigation Measure CMP: *Compensatory Mitigation Plan*, nontidal perennial aquatic habitat would be created or acquired and permanently protected to compensate for project impacts from project construction to ensure no significant loss of nontidal perennial aquatic habitat functions and values. Therefore, the impacts on nontidal perennial aquatic habitat from the project alternatives would be less than significant with mitigation.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure CMP: Compensatory Mitigation Plan

Under the CMP (see Impact BIO-1 for a summary discussion of the CMP), DWR would create and preserve nontidal perennial aquatic habitat on Bouldin Island and at the I-5 ponds and manage these areas in perpetuity (Appendix 3F, Section 3F.3.2.3 and Attachment 3F.1, Table 3F.1-2, CMP-4: *Nontidal Perennial Aquatic Habitat*).

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>*Compensatory Mitigation*</u>

The creation and enhancement of wetlands and other waters as well as habitat for special-status species on Bouldin Island and the I-5 ponds under the project's CMP would result in the conversion of nontidal perennial aquatic communities (Appendix 13C, Table 3C-20) from grading to create the appropriate topography and soil conditions to establish or restore habitats. The CMP could also impact nontidal perennial aquatic habitat through tidal wetland habitat restoration and channel margin enhancement because potential areas identified generally support this community in the study area (Appendix 3F, Section 3F.4.3.4.2 *Site Selection Criteria and Tools*).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would not result in effects on the nontidal perennial aquatic plants because they would not likely occur within or adjacent to habitat for these species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Except for croplands, some areas could potentially contain the nontidal perennial aquatic plant habitat or occurrences but management activities in these areas would be limited in scope and would not likely involve physical changes to this community. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure that there is no significant loss in habitat or habitat value by adjusting the overall mitigation commitment (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore would reduce any habitat losses associated with the CMP to less than significant. Environmental Commitments EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); and Mitigation Measure BIO-2a: A*void or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would reduce the impacts on nontidal perennial aquatic habitat from the project alternatives with the CMP to less than significant with mitigation.

<u>*Other Mitigation Measures*</u>

Some mitigation measures would have impacts on the nontidal perennial aquatic natural community similar to those described under Impact BIO-1: *Impacts of the Project on the Tidal Perennial Aquatic Natural Community.* The impacts of habitat loss, ground disturbance, and exposure to hazardous materials on the nontidal perennial aquatic natural community would be reduced through the CMP, environmental commitments, and mitigation measures as detailed under Impact BIO-1: *Impacts of the Project on the Tidal Perennial Aquatic Natural Community*. Therefore, impacts on the nontidal perennial aquatic natural community from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on the nontidal perennial aquatic natural community from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would still be less than significant with mitigation.

Impact BIO-5: Impacts of the Project on Nontidal Freshwater Perennial Emergent Wetland

All Project Alternatives

Construction

Constructing the water conveyance facilities would permanently and temporarily eliminate areas of nontidal freshwater perennial emergent wetlands. Permanently affected lands would no longer be available as plant and wildlife habitat. The impacts would result primarily from improving levees (Alternatives 1, 2a, 2b, and 2c) and access roads (all alternatives). Nontidal freshwater perennial emergent wetlands that would be permanently or temporarily lost by implementing the project alternatives are summarized in Table 13-11 and are shown in Mapbooks 13-1–13-3. The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would have a larger effect on nontidal freshwater wetlands than the eastern and Bethany Reservoir alignment alternatives (Alternatives 3, 4a, 4b, 4c, and 5) due to greater impacts from improving levees and access roads and constructing other roads. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; by implementing spill prevention and containment plans that would avoid material spills that could affect wetland habitat; and by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

Table 13-11. Impacts [a] on Nontidal Freshwater Perennial Emergent Wetland by Alternative

Alternative	Permanent Impacts (acres)	Long-Term Temporary Impacts (acres)	Temporary Impacts (acres)	Total Impacts (acres)
1,	5.07	0.00	4.55	9.62
2a, 2c	3.63	0.00	5.94	9.57
2b	3.41	0.00	5.64	9.05
3, 4a, 4c	0.24	0.00	0.61	0.85
4b	0.02	0.00	0.31	0.33
5	0.30	0.00	0.45	0.75

[a] See Section 13.3.1.2, *Evaluation of Construction Activities,* for definition of impact types.

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on nontidal freshwater perennial emergent wetlands. Geotechnical investigations associated with tunnels for all alternatives, which include CPTs and soil borings, would result in temporary impacts on nontidal freshwater perennial emergent wetlands (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations, pilot studies for settlement, agronomic testing, and utility potholing would not occur in nontidal freshwater perennial emergent wetlands. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments), and would temporarily affect tidal emergent wetlands: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprint. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) minimizing locating test trenches, CPTs, and borings in aquatic features, to the extent possible, in areas where there would be no additional surface disturbance during construction; (2) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

Operations

The project would not operate in nontidal freshwater perennial emergent wetlands and would have no operational effects on this habitat in the study area.

Though the project would not change operational criteria associated with SWP and CVP north-of-Delta reservoirs, the operation of the project could indirectly affect how these reservoirs operate and reservoir levels. Some of these reservoirs may have associated nontidal freshwater perennial emergent wetland habitat located on the margins of the reservoir or along inlet channels. As discussed in Chapter 5, Section 5.3.2.2, *Changes to SWP and CVP Reservoir Storage*, the changes to these reservoir levels are extremely minimal and would thus not likely significantly affect wetlands associated with these reservoirs.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on nontidal freshwater perennial emergent wetlands. Maintenance activities across all facilities that could affect nontidal freshwater perennial emergent wetlands include repaving of access roads every 15 years and semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application). These activities also create the potential for runoff of paving material or materials from parked vehicles or staging areas.

CEQA Conclusion—All Project Alternatives

Constructing the project alternatives would cause the removal, conversion, and temporary disturbance of nontidal freshwater perennial emergent wetlands. Maintenance activities could result in periodic temporary disturbances to this community.

Temporary disturbances and indirect impacts on nontidal freshwater perennial emergent wetland would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill*

Prevention, Containment, and Countermeasure Plans; and Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources*. Even with these environmental commitments, however, the loss of nontidal freshwater perennial emergent wetland from construction and potential impacts from maintenance activities would be significant. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would mitigate impacts on nontidal freshwater emergent wetlands by identifying locations where special-status natural communities and special-status plants would be avoided or where measures to minimize impact would be implemented. Under Mitigation Measure CMP*: Compensatory Mitigation Plan*, nontidal perennial emergent wetlands would be created or acquired and permanently protected to compensate for project impacts from project construction and ensure no significant loss of nontidal perennial aquatic habitat functions and values. Therefore, the impacts on nontidal freshwater perennial emergent wetland from the project alternatives would be less than significant with mitigation.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure CMP: Compensatory Mitigation Plan

Under the CMP (see Impact BIO-1 for a summary discussion of the CMP), DWR would create and preserve nontidal freshwater perennial emergent wetland habitat and manage these areas in perpetuity (Appendix 3F, Section 3F.3.2.3 and Attachment 3F.1, Table 3F.1-2, CMP-5: *Nontidal Freshwater Perennial Emergent Wetland*).

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>*Compensatory Mitigation*</u>

The creation and enhancement of wetlands and other waters as well as habitat for special-status species on Bouldin Island and the I-5 ponds under the project's CMP would result in the conversion of nontidal freshwater perennial emergent wetlands to other natural communities (Appendix 13C, Table 13C-20) from grading to create the appropriate topography and soil conditions to establish or restore habitats. The CMP could also affect this community through tidal wetland habitat restoration and channel margin enhancement because potential areas identified generally support this community in the study area (Appendix 3F, Section 3F.4.3.4.2, *Site Selection Criteria and Tools*).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would not result in effects on nontidal freshwater emergent wetland because they would not likely occur within or adjacent to this community. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Except for croplands, some areas could potentially contain nontidal freshwater emergent wetland but management activities in these areas would be limited in scope and would not likely involve physical changes to this community. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure that there is no significant loss in habitat or habitat value by adjusting the overall mitigation commitment (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. Environmental Commitments EC-3: *Develop and Implement Spill Prevention, Containment and Countermeasure Plans* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for discharge of construction materials into aquatic resources. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would mitigate impacts on nontidal freshwater perennial emergent wetlands. Therefore, the impacts on nontidal freshwater perennial emergent wetlands from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would have impacts on nontidal freshwater perennial emergent wetland similar to those described under Impact BIO-1: *Impacts of the Project on the Tidal Perennial Aquatic Natural Community.* The impacts of habitat loss, ground disturbance, and exposure to hazardous materials on nontidal freshwater perennial emergent wetland would be reduced through the CMP, environmental commitments, and mitigation measures as detailed under Impact BIO-1: *Impacts of the Project on the Tidal Perennial Aquatic Natural Community*. Therefore, impacts on nontidal freshwater perennial emergent wetland from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on nontidal freshwater perennial emergent wetland from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would still be less than significant with mitigation.

Impact BIO-6: Impacts of the Project on Nontidal Brackish Emergent Wetland

All Project Alternatives

Construction

Construction of the alternatives would not result in impacts on nontidal brackish emergent wetland (Table 13-12).

Table 13-12. Impacts [a] on Nontidal Brackish Emergent Wetland by Alternative

Alternative	Permanent Impacts (acres)	Log-Term Temporary Impacts (acres)	Temporary Impacts (acres)	Total Impacts (acres)
All	0.00	0.00	0.00	0.00

[a] See Section 13.3.1.2, *Evaluation of Construction Activities,* for definition of impact types.

<u>*Operations*</u>

The project would not operate in nontidal brackish emergent wetlands and would have no operational effects on this habitat.

<u>*Maintenance*</u>

No nontidal brackish emergent wetlands were mapped within or adjacent to project facilities and thus there would not likely be any maintenance-related effects on this community.

CEQA Conclusion—All Alternatives

All project alternatives would result in no impact on nontidal brackish emergent wetland because this community does not occur in the vicinity of project construction, operations, or maintenance areas, or compensatory mitigation areas.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>*Compensatory Mitigation*</u>

Implementation of the CMP on Bouldin Island and the I-5 ponds would not result in impacts on nontidal brackish emergent wetland (Appendix 13C, Table 13C-20). However, implementation of the CMP could result in impacts on nontidal brackish emergent wetland through tidal wetland habitat restoration and channel margin enhancement because potential areas identified for restoration include the Cache Slough Complex and lower Yolo Bypass (Appendix 3F, Section 3F.4.3.4.2, *Site Selection Criteria and Tools*), which occur adjacent to nontidal brackish emergent wetland. Grading and fill to support these activities could directly affect habitat or result in changes to topography and soils such that the hydrology of nontidal brackish emergent wetland could be adversely affected.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would not result in effects on nontidal brackish emergent wetland because they would not likely occur within or adjacent to this community. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting*

Habitat, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Except for croplands, some areas could potentially contain nontidal brackish emergent wetland but management activities in these areas would be limited in scope and would not likely involve physical changes to this community. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

Temporary disturbances and indirect impacts on nontidal brackish emergent wetland would be reduced by Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources*. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants*, Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, and Mitigation Measure CMP: *Compensatory Mitigation Plan* (Attachment 3F.1) would reduce this impact to a less-than-significant level with mitigation.

Therefore, the impacts on nontidal brackish emergent wetland from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Other mitigation measures proposed would not have impacts on nontidal brackish emergent wetland because this community does not occur in the vicinity of project construction areas.

Impact BIO-7: Impacts of the Project on Alkaline Seasonal Wetland Complex

All Project Alternatives

Construction

Constructing the water conveyance facilities would permanently and temporarily eliminate areas of alkaline seasonal wetland complex. Permanently affected lands would no longer be available as plant and wildlife habitat. Alkaline seasonal wetland complex that would be permanently or temporarily removed by implementing the project alternatives is summarized in Table 13-13 and shown in Mapbooks 13-1–13-3. Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would have greater impacts than Alternative 5. Under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, impacts would be associated with the Southern Complex facilities and geotechnical investigations. Under Alternative 5, impacts would be associated primarily with geotechnical investigations. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-13. Impacts [a] on Alkaline Seasonal Wetland Complex by Alternative

Alternative	Permanent Impacts (acres)	Long-Term Temporary Impacts (acres)	Temporary Impacts (acres)	Total Impacts (acres)
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	1.86	0.40	2.50	4.76
5	0.22	0.00	0.54	0.76

[a] See Section 13.3.1.2, *Evaluation of Construction Activities,* for definition of impact types.

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on alkaline seasonal wetland complex. Geotechnical investigations associated with tunnels for all alternatives, which include CPTs and soil borings, would result in temporary impacts on alkaline seasonal wetland complex (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations would not affect alkaline seasonal wetland complex. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, electrical resistivity tomography, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprint. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) minimizing locating test trenches, CPTs, and borings in aquatic features, to the extent possible, in areas where there would be no additional surface disturbance during construction; (2) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

<u>Operations</u>

Project operations would not take place in alkaline seasonal wetlands and would not affect this habitat.

<u>Maintenance</u>

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on alkaline seasonal wetland complex, when the occur adjacent to facilities. Maintenance activities across all facilities that could affect this community include repaving of access roads every 15 years and semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application). These activities also create the potential for runoff of paving material or materials from parked vehicles or staging areas.

CEQA Conclusion—All Project Alternatives

Under all project alternatives, project construction and maintenance would remove, convert, or temporarily disturb alkaline seasonal wetland complex.

Temporary disturbances and indirect impacts on alkaline seasonal wetland complex would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill*

Prevention, Containment, and Countermeasure Plans; and EC-14: *Construction Best Management Practices for Biological Resources*. Even with these environmental commitments, however, the loss of alkaline seasonal wetland complex from construction and potential impacts from maintenance activities would be significant. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would reduce impacts on alkaline seasonal wetlands during project construction. Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would reduce impacts on alkaline seasonal wetlands during project maintenance. Mitigation Measure BIO-2c: *Electrical Power Line Support Placement* would minimize impacts on alkaline seasonal wetland from electric power line installation. Under Mitigation Measure CMP: *Compensatory Mitigation Plan* alkaline seasonal wetland complex would be created or acquired and permanently protected to compensate for project impacts from project construction and ensure no significant loss of nontidal perennial aquatic habitat functions and values. The total acreage to be conserved would be based on the criteria presented in the CMP. Therefore, the impacts on alkaline seasonal wetland complex from the project alternatives would be less than significant with mitigation.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of alkaline seasonal wetland complex by purchasing credits at an agency-approved mitigation bank or at a non-bank site approved by the agencies supporting and implementing the design commitments and guidelines for special-status plants (Appendix 3F, Section 3F.3.2.4 and Attachment 3F.1, Table 3F.1-2, CMP-7: *Alkaline Seasonal Wetland Complex*).

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands and other waters as well as habitat for special-status species under the project's CMP would not affect alkaline seasonal wetland complex because this natural community does not occur at the I-5 ponds nor on Bouldin Island, and is not located within the areas where tidal restoration and channel margin enhancement could occur.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of existing alkaline seasonal wetlands but would ultimately in a benefit to the community. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Alkaline seasonal wetlands would not be targeted for these specific site protection instruments so there would not likely be any effects on this community. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The impacts on alkaline seasonal wetland complex from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance and the use of heavy equipment that would have the potential to result in loss of areas of alkaline seasonal wetland complex from ground disturbance, movement of construction vehicles, or inadvertent discharge of construction-related fluids such as fuels, oils, and cement. Impacts on alkaline seasonal wetland complex resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to alkaline seasonal wetland complex impacts of the project alternatives.

The impacts of habitat loss, ground disturbance, and exposure to hazardous materials on alkaline seasonal wetland complex would be reduced through the CMP and Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans;* and EC-14: *Construction Best Management Practices for Biological Resources*. Additionally, Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would reduce impacts on alkaline seasonal wetland complex. Therefore, impacts on alkaline seasonal wetland complex from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on alkaline seasonal wetland complex from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would still be less than significant with mitigation.

Impact BIO-8: Impacts of the Project on Vernal Pool Complex

All Project Alternatives

<u>*Construction*</u>

Under all project alternatives, constructing the water conveyance facilities would permanently and temporarily eliminate areas of vernal pool complex. Permanently affected lands would no longer be available as plant and wildlife habitat. The Bethany Reservoir alternative (Alternative 5) would have a larger impact on vernal pool complex than the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) and the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) from the construction of the Bethany Reservoir Aqueduct. Under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, impacts would be associated with the Southern Complex facilities. Alternatives 2b and 4b would have slightly smaller impacts than Alternatives 1, 2a, 2c, 3, 4a, and 4c because fewer roads would be constructed. Vernal pool complex that would be permanently or temporarily removed by implementing the project alternatives is summarized in Table 13-14 and shown in Mapbooks 13-1–13-3. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-14. Impacts [a] on the Vernal Pool Complex by Alternative

Alternative	Permanent Impacts (acres)	Long-Term Temporary Impacts (acres)	Temporary Impacts (acres)	Total (acres)
1, 2a, 2c, 3, 4a, 4c	9.02	0.00	10.15	19.17
2b, 4b	8.95	0.00	9.90	18.85
5	11.91	11.61	2.56	26.08

[a] See Section 13.3.1.2, *Evaluation of Construction Activities,* for definition of impact types.

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on vernal pool complex. Geotechnical investigations that would occur in the West Tracy Fault Study area and over the tunnel alignment footprints which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on vernal pool complex. The Bethany Fault Study investigations would not affect modeled vernal pool complex. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprint. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) minimizing locating test trenches, CPTs, and borings in aquatic features, to the extent possible, in areas where there would be no additional surface disturbance during construction; (2) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

Operations

Project operations would not take place in vernal pools and would not affect vernal pool habitat.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on vernal pool complex, when they occur adjacent to facilities. Maintenance activities across all facilities that could affect this community include repaving of access roads every 15 years and semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application). These activities also create the potential for runoff of paving material or materials from parked vehicles or staging areas.

CEQA Conclusion—All Project Alternatives

Constructing the project alternatives would cause the removal, conversion, and temporary disturbance of vernal pool complex. Maintenance activities could result in periodic temporary disturbances to this community.

Temporary disturbances and indirect impacts on vernal pool complex would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources*. Even with these environmental commitments, however, the loss of vernal pool complex from construction and potential impacts from maintenance activities would be significant. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would reduce impacts on vernal pool complex during project construction. Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would reduce impacts on vernal pool complex during project maintenance. As described in Appendix 3F and Attachment 3F.1, under Mitigation Measure CMP: *Compensatory Mitigation Plan,* vernal pool complex would be created or acquired and permanently protected to compensate for project impacts from project construction and ensure no significant loss of vernal pool complex functions and values. The total acreage to be conserved would be based on the criteria presented in the CMP. Therefore, the impacts on vernal pool complex from the project alternatives would be less than significant with mitigation.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of vernal pool complex by purchasing credits at an agency-approved mitigation bank or at a non-bank site approved by the agencies supporting and implementing the design commitments and guidelines for special-status plants (Appendix 3F, Section 3F.3.2.4 and Attachment 3F.1, Table 3F.1-2, CMP-8: *Vernal Pool Complex*).

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

Implementation of the CMP on Bouldin Island and the I-5 ponds would not result in impacts on vernal pool complex (Appendix 13C, Table 13C-20). However, implementation of the CMP could result in impacts on vernal pool complex through tidal wetland habitat restoration and channel margin enhancement because potential areas identified for restoration include the Cache Slough Complex and Yolo Bypass (Appendix 3F, Section 3F.4.3.4.2, *Site Selection Criteria and Tools*), which occur adjacent to areas of vernal pool complex. Grading and fill to support these activities could directly affect habitat or result in changes to topography and soils such that the hydrology of vernal pool complex could be adversely affected.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of existing vernal pool complexes but would ultimately in a benefit to the community. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Vernal pool complexes would not be targeted for these specific site protection instruments so there would not likely be any effects on this community. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

Temporary disturbances and indirect impacts on vernal pool complex would be reduced by Environmental Commitment EC-14: *Construction Best Management Practices for Biological*

Resources. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants*, Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, and Mitigation Measure CMP: *Compensatory Mitigation Plan* (Attachment 3F.1) would reduce this impact to a less-than-significant level with mitigation.

The impacts on vernal pool complex from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would have impacts on vernal pool complex similar to those described under Impact BIO-7: *Impacts of the Project on Alkaline Seasonal Wetland Complex.* The impacts of habitat loss, ground disturbance, and exposure to hazardous materials on vernal pool complex would be reduced through the CMP, environmental commitments, and mitigation measures as detailed under Impact BIO-7: *Impacts of the Project on Alkaline Seasonal Wetland Complex*. Therefore, impacts on vernal pool complex from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on vernal pool complex from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would still be less than significant with mitigation.

13.3.3.3 Impacts of the Project Alternatives on Special-Status Plant Species

The methods for analyzing effects on special-status plants appear in Section 13.3.1, *Methods for Analysis*. Impacts on plants would be considered significant if they have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or USFWS. For this analysis, a *substantial adverse effect* is defined as a permanent net loss of individual plants within a population or habitat loss within a population of a special-status plant.

An initial list of all special-status plants with potential to occur in or near the study area was compiled to identify which species could be affected by the project (Appendix 13A, *Special-Status Species with Potential to Occur in the Study Area*). From this list, 29 special-status plants species that could be affected were identified. For each species, the project footprint was overlain on a map of the known occurrences, and occurrences intersected by the project footprint were considered to be affected. In addition, for each species, a habitat model was created to identify areas where the project alternatives could potentially affect unknown species occurrences. The models are not intended to identify locations where impacts would occur, but rather to characterize potential impacts and to identify locations where preconstruction surveys would be focused. These 29 species are discussed below according to the plant communities they are associated with.

Impact BIO-9: Impacts of the Project on Special-Status Vernal Pool Plants

Information on the special-status vernal pool plants' life history and habitat suitability models are presented in the following species accounts in Appendix 13B: Section 13B.8, *Dwarf Downingia*, Section 13B.11, *Spiny-Sepaled Button-Celery*, Section 13B.16, *Legenere*, Section 13B.30.4, *Hogwallow Starfish*, and Section 13B.30.8, *Delta Woolly Marbles*.

All Project Alternatives

Construction

None of the project alternatives would affect known occurrences of dwarf downingia, spiny-sepaled button-celery, legenere, hogwallow starfish, or Delta woolly marbles (Tables 13-15 through 13-18).

Table 13-15. Impacts on Dwarf Downingia by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat (acres) in Project Footprint	Occurrences in Study Area	Occurrences Affected
1, 2a, 2c, 3, 4a, 4c, 5	12,302	0.32	6	0
2b, 4b	12,302	0.00	6	0

Table 13-16. Impacts Spiny-Sepaled Button-Celery by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat (acres) in Project Footprint	Occurrences in Study Area	Occurrences Affected
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	565	17.85	1	0
5	565	0.36	1	0

Table 13-17. Impacts on Legenere by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat (acres) in Project Footprint	Occurrences in Study Area	Occurrences Affected
1, 2a, 2c, 3, 4a, 4c, 5	11,987	0.32	5	0
2b, 4b	11,987	0.00	5	0

Table 13-18. Impacts on Hogwallow Starfish and Delta Woolly Marbles by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat (acres) in Project Footprint	Estimated Occurrences in Study Area [a]	Occurrences Affected
1, 2a, 2c, 3, 4a, 4c	1,253	19.17	3	0
2b, 4b	1,253	18.85	3	0
5	1,253	26.08	3	0

[a] Estimated due to non-specificity of occurrence locations.

There are 12,302 acres of modeled habitat for dwarf downingia in the study area. Alternatives 1, 2a, 2c, 3, 4a, 4c, and 5 intersect a small amount of modeled habitat for dwarf downingia (Table 13-15). The primary project features intersecting modeled habitat are roads. Alternatives 2b and 4b do not intersect modeled habitat for dwarf downingia.

There are 565 acres of modeled habitat for spiny-sepaled button-celery in the study area. Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c intersect the most modeled habitat for spiny-sepaled button-celery (Table 13-16). Alternative 5 intersects the least amount of modeled habitat (Table 13-16). Project features crossing modeled habitat include roads and the Southern Forebay.

Constructing these facilities could potentially affect spiny-sepaled button-celery plants and their habitat.

There are 11,987 acres of modeled habitat for legenere in the study area. Alternatives 1, 2a, 2c, 3, 4a, 4c, and 5 intersect a very small amount of modeled habitat for legenere (Table 13-17). The primary project features intersecting modeled habitat are roads. Alternatives 2b and 4b do not intersect modeled habitat for legenere.

There are 1,253 acres of modeled habitat for hogwallow starfish and Delta woolly marbles in the study area. Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would have access roads intersecting modeled habitat for these species (Table 13-18). The Bethany Complex under Alternative 5 would intersect modeled habitat for these species and would result in slightly more impacts than the other alternatives (Table 13-18).

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b), and could result in impacts on special-status vernal pool plants. Geotechnical investigations that would occur in the West Tracy Fault Study area and over the tunnel alignment footprints, which include test trenches, CPTs, soil borings, and geophysical arrays, would result in impacts on modeled habitat for hogwallow starfish, Delta woolly marbles, and spiny-sepaled button-celery (Appendix 13C); however, no modeled habitat for dwarf downingia and legenere would be affected. The Bethany Fault Study investigations would not affect modeled habitat for special-status vernal pool plants. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprint. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures and by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

Operations

Project operations would not occur in vernal pool habitat and would have no effects on special-status vernal pool plants.

Maintenance

Project maintenance of aboveground water conveyance facilities for all project alternatives would not occur in vernal pool habitat but could result in impacts on special-status vernal pool plants, when habitat occurs adjacent to facilities. Maintenance activities across all facilities that could affect this community include repaving of access roads every 15 years and semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application). These activities also create the potential for runoff of paving material or materials from parked vehicles or staging areas.

CEQA Conclusion—All Project Alternatives

No project alternatives would have impacts on known occurrences of dwarf downingia, spiny-sepaled button-celery, legenere, hogwallow starfish, or Delta woolly marbles.

Alternatives 1, 2a, 2c, 3, 4a, and 4c would intersect modeled habitat for dwarf downingia, and legenere. All project alternatives would intersect modeled habitat for spiny-sepaled button-celery. Project construction under these alternatives could cause a net loss of individual plants (take) or habitat loss within an occurrence of a rare and endangered plant if the species is present. Because dwarf downingia, spiny-sepaled button-celery are moderately threatened in California and legenere is seriously threatened in California, these impacts would represent a substantial loss and would be significant.

All project alternatives intersect modeled habitat for hogwallow starfish and could adversely affect unknown occurrences. Hogwallow starfish is a regionally rare taxon in Alameda and Contra Costa Counties (California Native Plant Society 2021), and it is associated with a habitat that has substantially declined in California. Therefore, the project's impacts on hogwallow starfish would be significant.

All project alternatives intersect modeled habitat for Delta woolly marbles and could adversely affect unknown occurrences. Delta woolly marbles is a regionally rare taxon in Alameda and Contra Costa Counties (California Native Plant Society 2021), and it is associated with a habitat that has substantially declined in California. Therefore, the project's impacts on Delta woolly marbles would be significant.

Temporary disturbances and indirect impacts on special-status vernal pool plants would be reduced by Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources.* Even with this environmental commitment, however, the effects on vernal pool plants from construction and potential impacts from maintenance activities would be significant. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would reduce impacts on special-status vernal pool plants during project construction. Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would reduce impacts on special-status vernal pool plants during project maintenance. Under Mitigation Measure CMP: *Compensatory Mitigation Plan*, habitat for special-status vernal pool plants would be created and permanently protected or mitigation credits would be acquired to compensate for project impacts and ensure no significant loss of habitat, as described in Appendix 3F and Attachment 3F.1. Therefore, the project's impacts on special-status vernal pool plants would be less than significant with mitigation.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of vernal pool complex by purchasing credits at an agency-approved mitigation bank or through the use of site protection instruments, such as conservation easements, at a non-bank site approved by the agencies and supporting and implementing the design commitments and guidelines for special-status plants (Appendix 3F, Section 3F.3.2.4 and Attachment 3F.1, Table 3F.1-3, CMP-9: *Special-Status Plants*).

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

Compensatory mitigation through the construction of the proposed initial mitigation sites on Bouldin Island and at the I-5 ponds would not affect any known occurrences of dwarf downingia, spiny-sepaled button-celery, legenere, hogwallow starfish, or Delta woolly marbles, and the construction footprint of the compensatory habitat does not intersect modeled habitat for any of these species (Appendix 13C, Table 13C-10). However, implementation of the CMP could result in impacts on special-status vernal pool plants through tidal wetland habitat restoration and channel margin enhancement because potential areas identified include the Cache Slough Complex and Yolo Bypass (Appendix 3F, Section 3F.4.3.4.2, *Site Selection Criteria and Tools*), which are adjacent to modeled habitat for special-status vernal pool plants and several records of the species that occur in these general areas. Tidal restoration activities could also result in impacts on Solano grass, Colusa grass, and Boggs Lake hedge hyssop if these activities take place in the Cache Slough Complex within or adjacent to Jepson Prairie, which is an area with habitat and known records for these vernal pool plant species (Appendix 13A). The extent of habitat within the range of these species in the study area is roughly equivalent to the modeled habitat for delta green ground beetle depicted in Appendix 13B, Figure 13B.40-1. Grading and fill to support these activities could directly affect habitat or result in changes to topography and soils such that the hydrology of vernal pools supporting these species is altered.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in impacts on special-status vernal pool plants. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area

(Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Vernal pool complexes would not be targeted for these specific site protection instruments so there would not likely be any effects on special-status vernal pool plants. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

Temporary disturbances and indirect impacts on special-status vernal pool plants would be reduced by Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources.* Implementing Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants*, Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, and Mitigation Measure CMP: *Compensatory Mitigation Plan* would reduce this impact to a less-than-significant level with mitigation.

The impacts on special-status vernal pool plants from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would have impacts on special-status vernal pool plants similar to those described under Impact BIO-8: *Impacts of the Project on Vernal Pool Complex.* The impacts of habitat loss, ground disturbance, and exposure to hazardous materials on special-status vernal pool plants would be reduced through the CMP, environmental commitments, and mitigation measures as detailed under Impact BIO-7: *Impacts of the Project on Alkaline Seasonal Wetland Complex*. Therefore, impacts on special-status vernal pool plants from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on special-status vernal pool plants from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would still be less than significant with mitigation.

Impact BIO-10: Impacts of the Project on Special-Status Alkaline Seasonal Wetland Complex Plants

Information on the alkaline seasonal wetland complex species' life history and habitat suitability models are presented in the following species accounts in Appendix 13B: Section 13B.1, *Alkali Milk-Vetch*, Section 13B.2, *Brittlescale*, Section 13B.7, *Recurved Larkspur*, Section 13B.13, *San Joaquin Spearscale*, Section 13B.22, *California Alkali Grass*, Section 13B.26, *Long-Styled Sand-Spurrey*, and Section 13B.30.1, *Crownscale*.

All Project Alternatives

Construction

Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c could remove known occupied habitat for recurved larkspur, San Joaquin spearscale, long-styled sand-spurrey, and crownscale. Alternative 5 could remove known occupied habitat for long-styled sand-spurrey. These alternatives could impact recurved larkspur, San Joaquin spearscale, long-styled sand-spurrey, and crownscale through loss of individual plants and occupied habitat. No known occurrences of alkali milk-vetch, brittlescale, California alkali grass, Ferris' goldfields, or little mousetail would be affected.

All project alternatives also intercept modeled habitat for alkali milk-vetch, brittlescale, recurved larkspur, San Joaquin spearscale, long-styled sand-spurrey, California alkali grass, crownscale, Ferris' goldfields, and little mousetail. Locations where the project footprint crosses modeled habitat identify where the highest potential for impacts on undocumented occurrences of these species could occur. Road construction crosses modeled habitat for all nine special-status alkaline seasonal wetland plant species. The outlet and control structure footprint intersects modeled habitat for alkali milk-vetch, recurved larkspur, and San Joaquin spearscale. Footprints for the forebay, shafts, and power transmission lines cross modeled habitat for San Joaquin spearscale. In general, Alternatives 1, 2a, 2b, 2c, 3 4a, 4b, and 4c intercept more modeled habitat for these species than Alternative 5. The amount of modeled habitat intercepted differs among alternatives and among species. Potential project impacts on special-status alkaline seasonal wetland plants are summarized in Tables 13-19 through 13-27.

Table 13-19. Impacts on Alkali Milk-Vetch by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2b, 2c, 3, 4b, 4c	10,782	46.78	14	0
2a, 4a	10,782	45.56	14	0
5	10,782	21.53	14	0

Table 13-20. Impacts on Brittlescale by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	4,976	16.80	4	0
5	4,976	0.14	4	0

Table 13-21. Impacts on Recurved Larkspur by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2b, 2c, 3, 4b, 4c	836	25.21	4	1
2a, 4a	836	23.66	4	1
5	836	0.14	4	0

Table 13-22. Impacts on San Joaquin Spearscale by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2b, 2c	27,430	122.53	11	2
2a	27,430	200.78	11	2
3, 4b, 4c	27,430	123.87	11	2

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
4a	27,430	202.12	11	2
5	27,430	96.04	11	0

Table 13-23. Impacts on Long-Styled Sand-Spurrey by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	2,846	16.39	6	3
5	2,846	0.14	6	1

Table 13-24. Impacts on California Alkali Grass by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	596	5.82	2	0
5	596	0.19	2	0

Table 13-25. Impacts on Crownscale by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	468	4.76	5	1
5	468	0.76	5	0

Table 13-26. Impacts on Ferris' Goldfields by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	468	4.76	4	0
5	468	0.76	4	0

Table 13-27. Impacts on Little Mousetail by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	468	4.76	1	0
5	468	0.76	1	0

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations. Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on special-status alkaline seasonal wetland complex plants. Geotechnical investigations associated with the tunnels for all project alternatives, which include CPTs and soil borings, would result in impacts on modeled habitat for alkali milk-vetch, California alkali grass, brittlescale, crownscale, Ferris' goldfields, little mousetail, long-styled sand-spurrey, recurved larkspur, and San Joaquin spearscale (Appendix 13C). West Tracy Fault Study investigations, which involve test trenches, CPTs, soil borings, and geophysical arrays, would result in impacts on modeled habitat for alkali milk-vetch, long-styled sand-spurrey, recurved larkspur, and San Joaquin spearscale (Appendix 13C). The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). Because of the small footprint and the short (1-day) duration of the Bethany Fault Study, impacts on modeled habitat are not quantified; however, they would occur within modeled habitat for San Joaquin spearscale. The following field investigations would be conducted within proposed surface construction footprints (including portions of tunnel alignments), and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprint. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures and by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

<u>Operations</u>

Project operations would not occur in alkaline seasonal wetland habitat and would have no effects on special-status alkaline seasonal wetland complex plants.

<u>Maintenance</u>

Project maintenance of aboveground water conveyance facilities for all project alternatives would not occur in alkali seasonal wetland habitat but could result in impacts on special-status alkaline seasonal wetland plants when habitat occurs adjacent to facilities. Maintenance activities across all facilities that could affect this community include repaving of access roads every 15 years and semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application). These activities also create the potential for runoff of paving material or materials from parked vehicles or staging areas.

CEQA Conclusion—All Project Alternatives

The project alternatives would cause the permanent removal of all or parts of occurrences of recurved larkspur, San Joaquin spearscale, and long-styled sand-spurrey and would intersect modeled habitat for all three species. The project alternatives would not affect occurrences of alkali milk-vetch, brittlescale, or California alkali grass, but would intersect modeled habitat for all three species. Because this impact would result in a net loss of individual plants (take) or habitat loss within populations of rare and endangered plant species, these losses would be substantial and would be a significant impact.

Most project alternatives (1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would result in the loss of one crownscale occurrence. All alternatives intersect modeled habitat and could adversely affect unknown crownscale occurrences. Crownscale is a regionally rare taxon in Alameda and Contra Costa Counties (California Native Plant Society 2021). Populations in the study area are significant because they are at the northern periphery of the species' range and occur in alkaline habitats that have declined substantially in California. Therefore, the project's impacts on crownscale would be significant.

The project would not affect any known occurrences of Ferris' goldfields. However, all alternatives intersect modeled habitat and could adversely affect unknown Ferris' goldfields occurrences. Ferris' goldfields is a regionally rare taxon in Alameda and Contra Costa Counties (California Native Plant Society 2021), and it is associated with a habitat that has substantially declined in California. Populations in the study area are at the northern periphery of the species' range, where it is particularly uncommon. Therefore, the project's impacts on Ferris' goldfields would be significant.

The project would not affect any known occurrences of little mousetail. However, all project alternatives intersect modeled habitat and could adversely affect unknown little mousetail occurrences. Little mousetail is a regionally rare taxon in Alameda and Contra Costa Counties (California Native Plant Society 2021), and it is associated with a habitat that has substantially declined in California. Therefore, the project's impacts on little mousetail would be significant.

Temporary disturbances and indirect impacts special-status alkaline seasonal wetland complex plants would be reduced by Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources*. Even with this environmental commitment, however, the loss of alkaline wetland plants from construction and potential impacts from maintenance activities would be significant. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants*, would reduce impacts on special-status alkaline seasonal wetland complex plants during project construction. Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would reduce impacts on special-status alkaline seasonal wetland complex plants during project maintenance. Under Mitigation Measure CMP: *Compensatory Mitigation Plan*, habitat for special-status alkaline seasonal wetland plants would be created and permanently protected or mitigation credits would be acquired to compensate for project impacts and ensure no significant loss of habitat, as described in Appendix 3F, and Attachment 3F.1. Therefore, the project's impacts on special-status alkaline seasonal wetland plants would be less than significant with mitigation.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of alkaline seasonal wetland complex by purchasing credits at an agency-approved mitigation bank or through the use of site protection instruments, such as conservation easements, at a non-bank site approved by the agencies and supporting and implementing the design commitments and guidelines for special-status plants (Appendix 3F, Section 3F.3.2.4 and Attachment 3F.1, Table 3F.1-2, CMP-7: *Alkaline Seasonal Wetland Complex*) and Table 3F.1-3, CMP-9: *Special-Status Plants*).

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>Compensatory Mitigation</u>

Compensatory mitigation on Bouldin Island and the I-5 ponds would not occur in alkaline seasonal wetlands and would not affect any known occurrences of special-status alkaline seasonal wetland plant species. In addition, the construction footprint for the compensatory habitat does not intersect modeled habitat for any of these species (Appendix 13C, Table 13C-10). However, implementation of the CMP could result in impacts on special-status alkaline seasonal wetland plants through tidal wetland habitat restoration and channel margin enhancement because potential areas identified include the Cache Slough Complex and Yolo Bypass (Appendix 3F, Section 3F.4.3.4.2 Site Selection Criteria and Tools), which are adjacent to modeled habitat for special-status alkaline seasonal wetland plants and several records of the species that occur in these general areas. Grading and fill to support these activities could directly affect habitat or result in changes to topography and soils such that the hydrology of alkaline seasonal wetlands supporting these species is altered.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in impacts on special-status alkaline seasonal wetland plants. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Alkaline seasonal wetland complexes would not be targeted for these specific site protection instruments so there would not likely be any effects on special-status alkaline seasonal wetland plants. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

Temporary disturbances and indirect impacts on special-status alkaline seasonal wetland plants would be reduced by Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources*. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants*, Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, and Mitigation Measure CMP: *Compensatory Mitigation Plan* would reduce this impact to a less-than-significant level with mitigation.

The impacts on special-status alkaline seasonal wetland plants from the project alternatives with the CMP would be less than significant with mitigation.

<u>*Other Mitigation Measures*</u>

Some mitigation measures would have impacts on special-status alkaline seasonal wetland complex plants similar to those described under Impact BIO-7: *Impacts of the Project on Alkaline Seasonal Wetland Complex.* The impacts of habitat loss, ground disturbance, and exposure to hazardous materials on special-status alkaline seasonal wetland complex plants would be reduced through the CMP, environmental commitments, and mitigation measures as detailed under Impact BIO-7: *Impacts of the Project on Alkaline Seasonal Wetland Complex*. Therefore, impacts on special-status alkaline seasonal wetland complex plants from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on special-status alkaline seasonal wetland complex plants from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would still be less than significant with mitigation.

Impact BIO-11: Impacts of the Project on Special-Status Grassland Plants

Information on the special-status grassland species' life history and habitat suitability models are presented in the following species accounts in Appendix 13B: Section 13B.9, *Jepson's Coyote-Thistle*, Section 13B.12, *Diamond-Petaled California Poppy*, Section 13B.17, *Heckard's Peppergrass*, Section 13B.20, *Shining Navarretia*, Section 13B.28, *Saline Clover*, Section 13B.29, *Caper-Fruited Tropidocarpum*, Section 13B.30.2, *Small-Flowered Morning-Glory*, and Section 13B.30.7, *Cotula Navarretia*.

All Project Alternatives

<u>*Construction*</u>

No project alternatives would affect known occurrences of Jepson's coyote-thistle, diamond-petaled California poppy, Heckard's peppergrass, shining navarretia, saline clover, caper-fruited tropidocarpum, small-flowered morning-glory, stinkbells, or cotula navarretia.

However, the project would intersect modeled habitat for all of these species. Locations where the project footprint crosses modeled habitat identify where the highest potential for impacts on undocumented occurrences of these species could occur. If the modeled habitat is occupied, then project construction could cause the removal, habitat loss or conversion, and temporary disturbance of special-status grassland species. Project activities that intersect the greatest amount of modeled habitat for diamond-petaled California poppy, shining navarretia, caper-fruited tropidocarpum, small-flowered morning-glory, stinkbells, and cotula navarretia include construction of the outlet and control structure under Alternatives 2a and 4a, and construction of access roads and an aqueduct under Alternative 5. Project activities that intersect the greatest amount of modeled habitat for Heckard's peppergrass and saline cover under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c are construction of the Byron Tract on-site access road, the realigned Byron Highway, and the Southern Forebay. Project activities that intersect the greatest amount of modeled habitat for Heckard's peppergrass and saline clover under Alternative 5 are construction of the Bethany Reservoir Aqueduct. In general, Alternatives 1, 2b, 2c, 3, 4b, and 4c intersect the least amount of modeled habitat for special-status grassland plants, and Alternatives 2a and 4a intersect the greatest amount of modeled habitat for special-status grassland plants. Potential project impacts on special-status grassland plants are summarized in Tables 13-28 through 13-36.

Table 13-28. Impacts on Jepson's Coyote-Thistle by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	9,065	0.56	2	0
5	9,065	0.18	2	0

Table 13-29. Impacts on Diamond-Petaled California Poppy by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2b, 2c, 3, 4b, 4c	2,523	17.53	1	0
2a, 4a	2,523	79.38	1	0
5	2,523	34.92	1	0

Table 13-30. Impacts on Heckard's Peppergrass by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2a, 2c, 3, 4a, 4c	12,831	21.14	5	0
2b, 4b	12,831	21.13	5	0
5	12,831	2.73	5	0

Table 13-31. Impacts on Shining Navarretia by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2b, 2c, 3, 4b, 4c	7,896	17.53	0	0
2a, 4a	7,896	79.38	0	0
5	7,896	61.77	0	0

Table 13-32. Impacts on Saline Clover by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2a, 2c, 3, 4a, 4c	14,790	22.67	7	0
2b, 4b	14,790	22.35	7	0
5	14,790	26.82	7	0

Table 13-33. Impacts on Caper-Fruited Tropidocarpum by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2b, 2c, 3, 4b, 4c	3,158	17.53	6	0
2a, 4a	3,158	79.38	6	0
5	3,158	61.77	6	0

Table 13-34. Impacts on Small-Flowered Morning-Glory by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2b, 2c, 3, 4b, 4c	7,896	17.53	0	0
2a, 4a	7,896	79.38	0	0
5	7,896	61.77	0	0

Table 13-35. Impacts on Stinkbells by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2b, 2c, 3, 4b, 4c	7,896	17.53	1	0
2a, 4a	7,896	79.38	1	0
5	7,896	61.77	1	0

Table 13-36. Impacts on Cotula Navarretia by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2b, 2c, 3, 4b, 4c	7,896	17.53	3	0
2a, 4a	7,896	79.38	3	0
5	7,896	61.77	3	0

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b), and could result in impacts on special-status grassland plants. Geotechnical investigations associated with the West Tracy Fault Study area and over the tunnel alignment footprints, which include test trenches, CPTs, soil borings, and geophysical arrays, would result in impacts on modeled habitat for saline clover and Heckard's peppergrass (Appendix 13C). Geotechnical investigations associated with the tunnels for all alternatives would affect modeled habitat for Jepson's coyote-thistle (Appendix 13C). Geotechnical investigations associated with the tunnel for the Bethany Complex tunnel (Alternative 5) would affect modeled habitat for diamond-petaled California poppy, shining navarretia, caper-fruited tropidocarpum, small-flowered morning-glory, stinkbells, and cotula navarretia. The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). Because of the small footprint and the short (1-day) duration of the Bethany Fault Study, impacts on modeled habitat are not quantified, however they would occur within modeled habitat for diamond-petaled California poppy, shining navarretia, caper-fruited tropidocarpum, small-flowered morning-glory, stinkbells, and cotula navarretia. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprint. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures and by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

Operations

Project operations would not occur in grassland habitat and would have no effects on special-status grassland plant species.

Maintenance

Project maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on special-status grassland plants. Maintenance activities across all facilities that could affect this community include repaving of access roads every 15 years and semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application). These activities also create the potential for runoff of paving material or materials from parked vehicles or staging areas.

CEQA Conclusion—All Project Alternatives

Because all alternatives would cross modeled habitat for Jepson's coyote-thistle, Heckard's peppergrass, diamond-petaled California poppy, shining navarretia, saline cover, and caper-fruited tropidocarpum, these alternatives could cause a net loss of individual plants (take) or habitat loss within an occurrence of a special-status plant. Because diamond-petaled California poppy and caper-fruited tropidocarpum are both seriously threatened, and because Heckard's peppergrass, Jepson's coyote-thistle, shining navarretia, and saline clover are moderately threatened in California, these impacts would represent a substantial loss and would be a significant impact.

All alternatives intersect modeled habitat and could adversely affect unknown small-flowered morning-glory occurrences. Small-flowered morning-glory is a regionally rare taxon in Alameda and Contra Costa Counties (California Native Plant Society 2021). Populations in Contra Costa County are significant because they are at the northernmost periphery of the species' range and because the species is much more uncommon at the northern end of its range than in the southern portion. Based on its rarity in the northern part of its range, the project's impacts on small-flowered morning-glory would be significant.

All alternatives intersect modeled habitat and could adversely affect unknown stinkbells occurrences. Stinkbells is a regionally rare taxon in Alameda and Contra Costa Counties and is moderately endangered in California (California Native Plant Society 2021). Therefore, the project's impacts on stinkbells would be significant.

All alternatives intersect modeled habitat and could adversely affect unknown cotula navarretia occurrences. Cotula navarretia is a regionally rare taxon in Alameda and Contra Costa Counties (California Native Plant Society 2021) and is moderately endangered in California (California Native Plant Society 2021). Therefore, the project's impacts on cotula navarretia would be significant.

Temporary disturbances and indirect impacts on special-status grassland plants would be reduced by Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources*. Even with this environmental commitment, however, the loss of grassland plants from construction and potential impacts from maintenance activities would be significant. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would reduce impacts on special-status grassland plants during project construction. Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would reduce impacts on special-status grassland plants during project maintenance. Under Mitigation Measure CMP: *Compensatory Mitigation Plan,* habitat for special-status grassland plants would be created and permanently protected or mitigation credits would be acquired to compensate for project impacts and to ensure no significant loss of habitat. Therefore, the project's impacts on special-status grassland plants would be less than significant with mitigation.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure CMP: Compensatory Mitigation Plan

Through the CMP (see Impact BIO-1 for a summary discussion of the CMP), DWR would implement the design commitments and guidelines for restoring suitable habitat for special-status plants (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-9: *Special-Status Plants*).

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

Compensatory mitigation on Bouldin Island and at the I-5 ponds would not affect any known occurrences of Jepson's coyote-thistle, diamond-petaled California poppy, Heckard's peppergrass, shining navarretia, saline clover, caper-fruited tropidocarpum, small-flowered morning-glory, stinkbells, or cotula navarretia, and the construction footprint of the compensatory mitigation site does not intersect modeled habitat for any of these species (Appendix 13C, Table 13C-10). Tidal wetland habitat restoration and channel margin enhancement under the CMP could result in impacts on special-status grassland plants because potential areas identified include the Cache Slough Complex and Yolo Bypass (Appendix 3F, Section 3F.4.3.4.2, Site Selection Criteria and Tools), which are adjacent to modeled habitat for these species and several records of the species that occur in these general areas. Grading and fill to support these activities could directly affect habitat.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in impacts on special-status grassland plants if creation and enhancement occurs in grasslands supporting these plants. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Except for croplands, some areas could potentially contain grassland but management activities in these areas would be limited in scope and would not likely involve physical changes to this community. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The impacts on special-status grassland plants from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would have impacts on special-status grassland plants similar to those described under Impact BIO-7: *Impacts of the Project on Alkaline Seasonal Wetland Complex.* The impacts of habitat loss, ground disturbance, and exposure to hazardous materials on special-status grassland plants would be reduced through the CMP, environmental commitments, and mitigation measures as detailed under Impact BIO-7: *Impacts of the Project on Alkaline Seasonal Wetland Complex*. Therefore, impacts on special-status grassland plants from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on special-status grassland plants from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would still be less than significant with mitigation.

Impact BIO-12: Impacts of the Project on Tidal Freshwater Emergent Wetland Plants

Information on the tidal freshwater emergent wetland plants' life history and habitat suitability models are presented in the following species accounts in Appendix 13B: Section 13B.4, *Bristly Sedge*, Section 13B.6, *Bolander's Water-Hemlock*, Section 13B.14, *Woolly Rose-Mallow*, Section 13B.15, *Delta Tule Pea*, Section 13B.18, *Mason's Lilaeopsis*, Section 13B.19, *Delta Mudwort*, Section 13B.23, *Sanford's Arrowhead*, Section 13B.24, *Marsh Skullcap*, Section 13B.25, *Side-Flowering Skullcap*, and Section 13B.27, *Suisun Marsh Aster*.

All Project Alternatives

Construction

All project alternatives would potentially have impacts on occurrences of special-status tidal freshwater emergent plants. The number of occurrences and potential for affecting undocumented occurrences in areas of modeled habitat varies by species and by alternative (Table 13-37 through Table 13-46). Locations where the project footprint crosses modeled habitat identify where the highest potential for impacts on undocumented occurrences of these species could occur.

Table 13-37. Impacts on Bolander's Water-Hemlock by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1	548	0.19	5	0
2a, 2b, 2c	548	0.18	5	0
3, 4a, 4b, 4c	548	0.15	5	0
5	548	0.09	5	0

Table 13-38. Impacts on Bristly Sedge by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1	1,345	3.11	18	2
2b	1,345	1.82	18	1
2c	1,345	2.76	18	2
3, 4a	1,345	2.59	18	2
4b	1,345	1.40	18	1
4c	1,345	2.34	18	2

1 **Table 13-39. Impacts on Delta Mudwort by Alternative**

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1	2,238	6.41	58	0
2a	2,238	7.78	58	0
2b	2,238	5.80	58	0
2c	2,238	6.27	58	0
3	2,238	4.17	58	0
4a	2,238	5.60	58	0
4b	2,238	3.62	58	0
4c	2,238	4.09	58	0
5	2,238	1.49	58	0

2

3 **Table 13-40. Impacts on Delta Tule Pea by Alternative**

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1	5,300	39.20	62	4
2a	5,300	40.71	62	4
2b	5,300	36.28	62	4
2c	5,300	38.87	62	4
3	5,300	8.41	62	1
4a	5,300	9.98	62	1
4b	5,300	5.53	62	1
4c	5,300	8.14	62	1
5	5,300	8.62	62	1

4

5 **Table 13-41. Impacts on Marsh Skullcap by Alternative**

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2c	795	0.37	5	0
2a, 2b	795	0.33	5	0
3, 4a, 4b	795	0.16	5	0
4c	795	0.20	5	0
5	795	0.14	5	0

6

7 **Table 13-42. Impacts on Mason's Lilaeopsis by Alternative**

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1	2,231	6.41	158	1
2a	2,231	7.78	158	1

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
2b	2,231	5.80	158	1
2c	2,231	6.27	158	1
3	2,231	4.17	158	0
4a	2,231	5.60	158	0
4b	2,231	3.62	158	0
4c	2,231	4.09	158	0
5	2,231	1.49	158	0

Table 13-43. Impacts on Sanford's Arrowhead by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1	1,915	0.93	23	0
2a, 2b, 2c	1,915	0.78	23	0
3, 4a, 4b, 4c	1,915	0.18	23	0
5	1,915	0.33	23	0

Table 13-44. Impacts on Side-Flowering Skullcap by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1, 2c	1,111	0.37	13	1
2a, 2b	1,111	0.33	13	1
3, 4a, 4b	1,111	0.16	13	0
4c	1,111	0.20	13	0
5	1,111	0.14	13	0

Table 13-45. Impacts on Suisun Marsh Aster by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1	5,520	34.08	125	12
2a	5,520	35.33	125	12
2b	5,520	31.77	125	12
2c	5,520	33.60	125	12
3	5,520	5.36	125	1
4a	5,520	6.69	125	1
4b	5,520	3.14	125	1
4c	5,520	4.97	125	1
5	5,520	4.83	125	1

Table 13-46. Impacts on Woolly Rose-Mallow by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1	700	0.10	119	0
2a, 2b, 2c	700	0.09	119	0
3, 4a, 4b, 4c	700	0.13	119	0
5	700	0.06	119	0

No project alternatives would affect known occurrences of Bolander's water-hemlock. All project alternatives would intersect modeled habitat for Bolander's water-hemlock. Alternatives 1, 2a, 2b and 2c intersects the most modeled habitat for Bolander's water-hemlock, and Alternative 5 intersects the least modeled habitat.

All project alternatives would affect known occurrences of bristly sedge. Alternatives 1, 2a, 2c, 3, 4a, 4c, and 5 would affect two known occurrences, and Alternatives 2b and 4b would affect one known occurrence. All project alternatives intersect modeled habitat for bristly sedge. Alternatives 1 and 2a intersect the most modeled habitat for bristly sedge, and Alternative 4b intersects the least modeled habitat.

No project alternatives would affect known occurrences of Delta mudwort. All project alternatives intersect modeled habitat for Delta mudwort. Alternative 2a intersects the most modeled habitat for Delta mudwort, and Alternative 5 intersects the least modeled habitat.

All project alternatives would affect known occurrences of Delta tule pea and intersect modeled habitat for Delta tule pea. The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would affect four occurrences and intersect modeled habitat. The eastern and Bethany Reservoir alignment alternatives (Alternatives 3, 4a, 4b, 4c, and 5) would affect one occurrence and intersect modeled habitat.

No project alternatives would affect known occurrences of Marsh skullcap. All alternatives intercept modeled habitat for Marsh skullcap. Alternatives 1 and 2c intercepts the most modeled habitat for Marsh skullcap, and Alternative 5 intercepts the least modeled habitat.

The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would affect one known occurrences of Mason's lilaeopsis and intercept more modeled habitat for Mason's lilaeopsis than the eastern and Bethany Reservoir alignment alternatives (Alternatives 3, 4a, 4b, 4c, and 5). The eastern and Bethany Reservoir alignment alternatives would not affect known Mason's lilaeopsis occurrences and would intercept fewer acres of modeled habitat.

No project alternatives would affect known occurrences of Sanford's arrowhead. The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) intercept more modeled habitat for Sanford's arrowhead than the eastern and Bethany Reservoir alignment alternatives (Alternatives 3, 4a, 4b, 4c, and 5).

The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would affect one known side-flowering skullcap occurrence and intercept more modeled habitat (0.33 to 0.37 acre) than the eastern and Bethany Reservoir alignment alternatives (Alternatives 3, 4a, 4b, 4c, and 5). The eastern and Bethany Reservoir alignment alternatives would affect no occurrences and intercept modeled habitat.

The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would affect 12 known Suisun Marsh aster occurrences and intersect modeled habitat for Suisun Marsh aster. The eastern and Bethany Reservoir alignment alternatives (Alternatives 3, 4a, 4b, 4c, and 5) would have much lower impacts, affecting only one occurrence of Suisun Marsh aster and intersecting modeled habitat.

No project alternatives would affect known occurrences of woolly rose-mallow. All project alternatives intersect modeled habitat for woolly rose-mallow.

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and would involve some in-water boring that could affect special-status tidal freshwater emergent wetland plants (Section 3.15, *Field Investigations*). Geotechnical investigations associated with the tunnels for all project alternatives, which include CPTs and soil borings, would result in impacts on modeled habitat for special-status tidal freshwater emergent plants (Appendix 13C). Geotechnical investigations associated with the West Tracy Fault, pilot studies for settlement, agronomic testing, and utility potholing would not occur in modeled habitat for special-status tidal freshwater emergent plants. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect modeled habitat for special-status tidal freshwater emergent plants: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, and monument installation. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; by implementing spill prevention and containment plans that would avoid material spills that could affect the viability of aquatic habitat; and by having a biological monitor present to ensure that all other protective measures are being implemented where applicable.

Operations

As discussed in Chapter 5, *Surface Water*, project operations would not substantially alter river flows on the Sacramento and San Joaquin Rivers. Therefore, project operations would not substantially affect tidal freshwater emergent habitat for special-status plants.

Maintenance

Project maintenance of water conveyance facilities for all project alternatives could result in impacts on special-status tidal freshwater emergent wetland plants. Maintenance activities across all facilities that could affect this community include repaving of access roads every 15 years and semiannual general and ground maintenance. These activities also create the potential for runoff of paving material or materials from parked vehicles or staging areas.

CEQA Conclusion—All Project Alternatives

Project features cross occurrences of bristly sedge, Delta tule pea, Mason's lilaeopsis, side-flowering skullcap, Suisun Marsh aster and cross modeled habitat for all 10 special-status tidal wetland plants. Alternatives could cause a net loss of individual plants (take) or habitat loss within occurrences of special-status plants if the species are present. Impacts on known occurrences and potential impacts on unknown occurrences where habitat is modeled vary among species and alternatives. Because these species are seriously to moderately threatened in California, these impacts would represent a substantial loss and would be significant.

Temporary disturbances and indirect impacts on special-status tidal freshwater emergent wetland plants would be reduced by Environmental Commitment EC-14: *Construction Best Management Practices for Biological*. Even with this environmental commitment, however, the loss of tidal freshwater emergent plants from construction and potential impacts from maintenance activities would be significant. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would reduce impacts on special-status tidal freshwater emergent wetland species during project construction. Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would reduce impacts on tidal freshwater emergent wetland during project maintenance. Under Mitigation Measure CMP: *Compensatory Mitigation Plan* (Appendix 3F, Section 3F.3.2.5 and Attachment 3F.1, Table 3F.1-2, CMP-2: *Tidal Freshwater Emergent Wetland*, and Table 3F.1-3, CMP-9: *Special-Status Plants*), habitat for special-status tidal freshwater emergent wetland plants would be created or acquired and permanently protected to compensate for project impacts and ensure no significant loss of special-status tidal perennial aquatic wetland habitat functions and values. Therefore, project impacts on special-status tidal freshwater emergent wetland plants would be less than significant with mitigation.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure CMP: Compensatory Mitigation Plan

Under the CMP (see Impact BIO-1 for a summary discussion of the CMP), DWR would ensure that tidal freshwater emergent wetland habitat would be created or acquired and permanently protected to compensate for project impacts and ensure no significant loss of tidal freshwater emergent wetlands and implement the design commitments and guidelines for restoring suitable habitat for special-status plants (Appendix 3F, Section 3F.3.2.5 and Attachment 3F.1, Table 3F.1-2, CMP-2: *Tidal Freshwater Emergent Wetland*, and Table 3F.1-3, CMP-9: *Special-Status Plants*).

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>Compensatory Mitigation</u>

Compensatory mitigation on Bouldin Island and at the I-5 ponds would not affect any known occurrences of special-status tidal freshwater emergent wetland plants. However, the construction footprint of the compensatory habitat intersects modeled habitat for three species: bristly sedge, Delta tule pea, and Sanford's arrowhead. Therefore, the CMP could potentially have impacts on these three species. In addition, implementation of the CMP could result in other impacts on special-status tidal freshwater emergent plants because other identified areas for tidal wetland habitat restoration and channel margin enhancement include the Cache Slough Complex and Yolo Bypass (Appendix 3F, Section 3F.4.3.4.2, *Site Selection Criteria and Tools*), which are adjacent to modeled habitat for special-status tidal freshwater emergent wetland plants and several records of the species that occur in these general areas. Grading and fill to support these activities could directly affect habitat supporting these species.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would not likely result effects on tidal freshwater emergent wetland plants because they would not likely occur within or adjacent to this community. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These activities would not likely result in effects on tidal freshwater emergent wetland plants because management activities in these areas would be limited in scope and would not likely involve physical changes to habitats where these species are typically found. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure that there is no significant loss in habitat or habitat value by adjusting the overall mitigation commitment (Appendix 3F, Section 3F.1,Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. Mitigation Measure CMP: *Compensatory Mitigation Plan* would offset permanent and temporary loss of tidal freshwater emergent wetland. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants*, during implementation of the CMP, would reduce impacts on special-status tidal freshwater emergent wetland plants.

The impacts on special-status tidal freshwater emergent wetland plants from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would have impacts on tidal freshwater emergent wetland plants similar to those described under Impact BIO-1: *Impacts of the Project on the Tidal Perennial Aquatic Natural Community.* The impacts of habitat loss, ground disturbance, and exposure to hazardous materials on tidal freshwater emergent wetland plants would be reduced through the CMP, environmental commitments, and mitigation measures as detailed under Impact BIO-1: *Impacts of the Project on the Tidal Perennial Aquatic Natural Community*. Therefore, impacts on tidal freshwater emergent wetland plants from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on tidal freshwater emergent wetland plants from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would still be less than significant with mitigation.

Impact BIO-13: Impacts of the Project on Special-Status Nontidal Perennial Aquatic Plants

Information on the special-status nontidal perennial aquatic plants' life history and habitat suitability models are presented in the following species accounts in Appendix 13B: Section 13B.3, *Watershield,* and Section 13B.21, *Eel-Grass Pondweed*.

All Project Alternatives

Construction

The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) intersect one known watershield occurrence at Bouldin Island. Although the occurrence is reported to be extirpated and the likelihood of affecting the species is low, potential habitat is still present, and constructing shaft facilities and RTM areas could affect the species. The eastern and Bethany Reservoir alignment alternatives (Alternatives 3, 4a, 4b, 4c, and 5) would not affect known watershield occurrences, and no project alternatives would affect known eel-grass pondweed occurrences.

The potential for affecting undocumented occurrences in areas of modeled habitat varies by species and by alternative (Table 13-47 and Table 13-48). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would intercept more modeled habitat for watershield than the eastern and Bethany Reservoir alignment alternatives (Alternatives 3, 4a, 4b, 4c, and 5). The central alignment alternatives would also intercept more modeled habitat for eel-grass pondweed than the eastern and Bethany Reservoir alignment alternatives (Alternatives 3, 4a, 4b, 4c, and 5). Project features crossing modeled habitat for nontidal wetland plants include the levee and access road improvements, power transmission lines, and geotechnical investigations. Constructing these facilities could potentially affect plants and occupied habitat of both nontidal wetland plant species.

Table 13-47. Impacts on Watershield by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1	8,153	7.73	2	1

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
2a	8,153	8.12	2	1
2b	8,153	7.44	2	1
2c	8,153	7.63	2	1
3	8,153	3.43	2	0
4a	8,153	3.81	2	0
4b	8,153	3.14	2	0
4c	8,153	3.33	2	0
5	8,153	3.01	2	0

Table 13-48. Impacts on Modeled Habitat for Eel-Grass Pondweed by Alternative

Alternative	Modeled Habitat in Study Area (acres)	Modeled Habitat in Project Footprint (acres)	Occurrences in Study Area	Occurrences Affected
1	15,081	10.69	1	0
2a	15,081	11.01	1	0
2b	15,081	9.83	1	0
2c	15,081	10.54	1	0
3	15,081	1.73	1	0
4a	15,081	2.12	1	0
4b	15,081	0.93	1	0
4c	15,081	1.63	1	0
5	15,081	2.42	1	0

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b), and could result in impacts on special-status nontidal wetland plants. Geotechnical investigations associated with tunnels for all alternatives, which include CPTs and soil borings, would result in temporary impacts on modeled habitat for special-status nontidal perennial aquatic plants (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations, pilot studies for settlement, agronomic testing, and utility potholing would not affect modeled habitat for these species. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, electrical resistivity tomography, groundwater testing and monitoring and monument installation. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprint. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures and by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

Operations

Project operations would not occur in nontidal perennial aquatic habitat and would have no effects on special-status nontidal perennial aquatic plants.

Maintenance

Project maintenance of water conveyance facilities for all project alternatives could result in impacts on special-status nontidal perennial aquatic plants. Maintenance activities across all facilities that could affect this community include repaving of access roads every 15 years and semiannual general and ground maintenance. These activities also create the potential for runoff of paving material or materials from parked vehicles or staging areas.

CEQA Conclusion—All Project Alternatives

The project alternatives could remove occupied habitat for watershield. Watershield is not very threatened in California, but the Great Valley occurrences are particularly sensitive because they are regionally rare and are peripheral to the species' range. The project alternatives could also impact habitat for both watershield and eel-grass pondweed. Because this impact would cause a net loss of individual plants (take) or habitat loss within an occurrence of a special-status plant, it would be a significant impact.

Temporary disturbances and indirect impacts of nontidal perennial aquatic habitat would be reduced by Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources.* Even with this environmental commitment, however, the loss nontidal perennial aquatic plants from construction and potential impacts from maintenance activities would be significant. Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* would reduce impacts on special-status nontidal perennial aquatic plants during project construction. Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would reduce impacts on special-status nontidal perennial aquatic plants during project maintenance. Under Mitigation Measure CMP: *Compensatory Mitigation Plan,* habitat for special-status nontidal perennial aquatic plants would be created or acquired and permanently protected to compensate for project impacts and ensure no significant loss of special-status nontidal perennial aquatic plants or their habitat functions and values.

The project impacts on these special-status nontidal perennial aquatic plants would be less than significant with mitigation.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure CMP: Compensatory Mitigation Plan

Under the CMP (see Impact BIO-1 for a summary discussion of the CMP), DWR would create and preserve nontidal freshwater perennial emergent wetland and nontidal perennial aquatic habitat and manage these areas in perpetuity and implement the design commitments and guidelines for restoring suitable habitat for special-status plants (Appendix 3F, Section 3F.3.2.3 and Attachment 3F.1, Table 3F.1-2, CMP-4: *Nontidal Perennial Aquatic Habitat,* and CMP-5: *Nontidal Freshwater Perennial Emergent Wetland,* and Table 3F.1-3, CMP-9: *Special-Status Plants*).

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The CMP (Appendix 3F) proposes habitat creation and restoration activities on Bouldin Island that could affect a known watershield occurrence. These activities could adversely affect watershield if the population is still extant and plants are present in the work areas. The CMP footprints on Bouldin Island and at the I-5 ponds intersects modeled habitat for watershield and eel-grass pondweed, which means that both species could potentially be affected by the CMP. In addition, implementation of the CMP could result in impacts on special-status nontidal freshwater perennial aquatic plants through tidal wetland habitat restoration and channel margin enhancement because potential areas identified include the Cache Slough Complex and Yolo Bypass (Appendix 3F, Section 3F.4.3.4.2, *Site Selection Criteria and Tools*), which are adjacent to modeled habitat for special-status nontidal freshwater perennial aquatic plants and several records of the species that occur in these general areas. Grading and fill to support these activities could directly affect habitat or result in changes to topography and soils such that the hydrology of nontidal freshwater perennial aquatic wetlands supporting these species is altered.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would not result in effects on the nontidal perennial aquatic community because they would not likely occur within or adjacent to this community. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Except for croplands, some areas could potentially contain the nontidal perennial aquatic community but management activities in these areas would be limited in scope and would not likely involve physical changes to this community. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure that there is no significant loss in habitat or habitat value by adjusting the overall mitigation commitment (Appendix 3F, Section 3F.1,Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant.

Temporary disturbances and indirect impacts of nontidal perennial aquatic habitat would be reduced by Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources.* Mitigation Measure BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants* and Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would reduce impacts on special-status nontidal perennial aquatic plants to less than significant when the CMP is implemented.

The impacts on special-status nontidal perennial aquatic plants from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would have impacts on nontidal freshwater perennial aquatic plants similar to those described under Impact BIO-1: *Impacts of the Project on the Tidal Perennial Aquatic Natural Community.* The impacts of habitat loss, ground disturbance, and exposure to hazardous materials on nontidal freshwater perennial aquatic plants would be reduced through the CMP, environmental commitments, and mitigation measures as detailed under Impact BIO-1: *Impacts of the Project on the Tidal Perennial Aquatic Natural Community*. Therefore, impacts on nontidal freshwater perennial aquatic plants from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on nontidal freshwater perennial aquatic plants from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would still be less than significant with mitigation.

13.3.3.4 Impacts of the Project Alternatives on Special-Status Wildlife Species

Impact BIO-14: Impacts of the Project on Vernal Pool Aquatic Invertebrates

The impact analysis for vernal pool aquatic invertebrates covers multiple species that occur in vernal pools and other seasonal wetlands, which includes the federally listed vernal pool fairy shrimp and vernal pool tadpole shrimp, as well as the nonlisted midvalley fairy shrimp, California linderiella, hairy water flea, and Ricksecker's water scavenger beetle. The methods for the analysis of effects on these species appear in Section 13.3.1.1, *Impact Mechanisms*, and information on the species life histories and habitat suitability models are presented in the following species accounts in Appendix 13B, *Species Accounts*: Section 13B-32, *Vernal Pool Fairy Shrimp*, Section 13B-33, *Midvalley Fairy Shrimp*, Section 13B-34, *California Linderiella*, Section 13B-35, *Vernal Pool Tadpole Shrimp*, Section 13B-36, *Hairy Water Flea*, and Section 13B-41, *Ricksecker's Water Scavenger Beetle*.

All Project Alternatives

<u>*Construction*</u>

The construction of Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would result in permanent, temporary, and indirect effects on modeled habitat for vernal pool aquatic invertebrates. Construction-related grading and excavation would result in the permanent and temporary loss of vernal pool aquatic invertebrate modeled habitat (Table 13-49). These impacts would occur as a result of the construction of new roads and a temporary railroad spur near Clifton Court Forebay (permanent, temporary, and indirect), the construction of the new South Delta Outlet and Control Structure on the California Aqueduct approach channel (indirect), construction of a new transmission line around Clifton Court Forebay (permanent, temporary, and indirect) and the construction of the park-and-ride facility off Hood-Franklin Road, east of I-5 (indirect). The park-and-ride lot would be removed following construction. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B). Construction-related grading and excavation could result in indirect effects on aquatic habitat within 250 feet of this disturbance. USFWS typically considers construction within 250 feet of vernal pool habitat to constitute a possible impact on the habitat unless more detailed information is provided to further refine the limits of any such effects. For the purposes of this analysis, the 250-foot buffer was applied to the project work areas where ground-disturbing activities would take place. Activities such as grading and excavation have the potential to change the supporting surface and subsurface hydrology such that aquatic habitat potentially becomes drier over time and does not provide suitable hydrology to support the life cycles of these species.

Table 13-49. Impacts on Modeled Habitat for Vernal Pool Aquatic Invertebrates by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Indirect Impacts (acres)	Total (acres)
1, 2b, 2c, 3, 4b, 4c	3.26	3.67	72.53	79.46
2a, 4a	3.26	3.67	75.88	82.81
5	0.42	0.76	11.55	12.73

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Alternative 5 would also have impacts on vernal pool aquatic invertebrates in a similar fashion as described for the other alternatives but would result from construction of the Bethany Reservoir Aqueduct (permanent, temporary, and indirect), road improvements along Mountain House Road, and the construction of the park-and-ride facility off Hood-Franklin Road, east of I-5 (indirect) (Table 13-49).

Construction activities associated with all project alternatives could result in the injury or mortality of vernal pool aquatic invertebrates as a result of the inadvertent discharge of construction-related fluids or sediment into aquatic habitat that occurs adjacent to work areas, typically within 250 feet. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans,* EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on the needs of protecting aquatic habitat for sensitive species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect species and aquatic habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

No CNDDB occurrences of vernal pool fairy shrimp, vernal pool tadpole shrimp, midvalley fairy shrimp, hairy water flea, and Ricksecker's water scavenger beetle would be permanently, temporarily, or indirectly affected by project construction for any of the alternatives (California Department of Fish and Wildlife 2020a). There is one occurrence of California linderiella (CNDDB occurrence #388) that overlaps with the road improvements off Hood-Franklin Road just west of Stone Lakes; however, the mapped location displayed in the CNDDB GIS data, despite having an accuracy defined as being a "specific area," is large and encompasses both the road and other areas of non-habitat (California Department of Fish and Wildlife 2020a). The record describes the species occurring in several pools just south of North Stone Lake (California Department of Fish and Wildlife 2020a). There is no modeled habitat at the portion of the occurrence polygon that overlaps with the road improvement area.

All project alternatives would result in permanent, temporary, and indirect impacts on modeled habitat within critical habitat for vernal pool fairy shrimp (unit 19B) as a result of the construction of new roads, a temporary work area, and a temporary railroad right-of-way between Clifton Court Forebay and Byron Highway (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the West Tracy Fault work as part of field investigations (discussed below) under all alternatives (Table 13-50). This critical habitat unit (unit 19B) is also identified as part of the Altamont Hills core area in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (U.S. Fish and Wildlife Service 2005:Figure III-6a). There are approximately 1,475 acres of critical habitat within the study area, 4,925 areas of critical habitat in unit 19B, and 597,821 acres of critical habitat for vernal pool fairy shrimp in total. No critical habitat for vernal pool tadpole shrimp would be affected by the project alternatives.

Table 13-50. Impacts on Modeled Habitat within Critical Habitat for Vernal Pool Fairy Shrimp by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	1.60	0.84	2.44

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
5	0.00	0.23	0.23

Note: Total modeled habitat in critical habitat in the study area is 338 acres, total impacts by alternative range between 0.07%–0.72% of this total.

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations;* Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury and mortality of vernal pool aquatic invertebrates. Geotechnical investigations that would occur in the West Tracy Fault Study area and over the tunnel alignment footprints, which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on habitat (Appendix 13C, *Impact Tables*). Geotechnical investigations associated with the tunnels linking the Southern Forebay to the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the eastern alignment tunnel to the Bethany Complex and the tunnel to the Bethany Reservoir Discharge Structure (Alternative 5) would avoid impacts on vernal pool aquatic invertebrate habitat as specified in EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B), which commits to geotechnical investigations avoiding impacts on wetlands, except for the West Tracy Fault work, which has less flexibility on locations of work. The Bethany Fault Study investigations would not affect modeled vernal pool aquatic invertebrate habitat. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans,* EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would minimize these potential impacts by training construction staff on the needs of protecting aquatic habitat for sensitive species, reporting requirements, and the ramifications for not following these measures; by implementing spill prevention and containment plans that would avoid material spills that could affect species and aquatic habitat; and by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

<u>Operations</u>

None of the project alternatives would result in operational impacts on vernal pool aquatic invertebrates or habitat because operating conveyance facilities would not involve disturbance or removal of habitat or effects on vernal pool species.

<u>*Maintenance*</u>

The maintenance of the Southern Complex on Byron Tract and west of Byron Highway (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) could result in periodic, temporary impacts on vernal pool aquatic invertebrates. Maintenance at the Southern Forebay would include repaving of access roads every 15 years, quarterly weed management (e.g., mechanical removal and herbicide application), and semiannual general and ground maintenance (e.g., mowing, vegetation trimming) could result in impairment to the water quality of vernal pool aquatic invertebrate habitat immediately adjacent to where these activities are taking place. Maintenance activities at the South Delta Outlet and Control Structure, which would include annual cleaning (pressure washing), semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, could result in the impairment of the water quality of vernal pool aquatic habitat occurring adjacent to where these activities are taking place. These impacts would occur if chemicals used during these activities reach aquatic habitat through spills or from storm runoff. There is modeled aquatic habitat within 50 feet of the facility.

No maintenance activities at the Bethany Complex (Alternative 5) are anticipated to result in impacts on vernal pool aquatic invertebrates because there are no aboveground facilities that occur within 250 feet of aquatic habitat. Although the Bethany Reservoir Aqueduct would affect a pool during construction and would be within 250 feet of the remaining portions of that pool, as well as another pool, this section of the aqueduct would be buried and maintenance would be limited to vegetation management around manways (i.e., access points to buried pipelines), which would be more than 500 feet from the nearest pool and would not likely result in direct or indirect effects on these pools.

CEQA Conclusion—All Project Alternatives

The construction of all project alternatives and the maintenance of Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would result in impacts on vernal pool aquatic invertebrates through the permanent and temporary loss of modeled habitat and the potential for injury and mortality of these species. The potential impacts of injury and mortality from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these environmental commitments, however, the loss of habitat from constructing project alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction and maintenance activities on vernal pool aquatic invertebrates would be significant. Implementation of the CMP would be required to offset the loss of vernal pool aquatic invertebrate habitat, which would be achieved through the purchase of mitigation credits specifically for impacts on vernal pool fairy shrimp and vernal pool tadpole shrimp at a USFWS-approved mitigation bank (Appendix 3F, Section 3F.3.3.3, and Attachment 3F.1, Table 3F.1-3, CMP-11: *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat*), which would also benefit the other vernal pool aquatic invertebrates analyzed and reduce the impact associated with habitat loss on vernal pool aquatic invertebrates to a less-than-significant level. Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance* and BIO-14: *Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp* would be required to avoid and minimize the potential for injury and mortality and disturbances to habitat. The impacts on vernal pool aquatic invertebrates from the project alternatives would be less than significant with mitigation because the measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by avoiding and minimizing activities during construction and maintenance that could adversely affect habitat, which include establishing non-disturbance buffers around pools with construction fencing, by surveying suitable habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp, and by avoiding adverse modification of critical habitat and indirect effects on vernal pool aquatic invertebrate habitat through work area redesigns, to the extent practicable.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of vernal pool aquatic invertebrate habitat by purchasing credits at a USFWS-approved mitigation bank or at a non-bank site approved by USFWS supporting habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3, CMP-11: *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat*). Mitigation at a non-bank location would be prioritized in the Altamont Hills recovery area, which is one of the core recovery areas identified in the Vernal Pool Recovery Plan (U.S. Fish and Wildlife Service 2005:III-38). This mitigation would also benefit the other vernal pool aquatic invertebrates analyzed in the EIR.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-14: Avoid and Minimize Impacts from Construction on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp

All Project Alternatives

As properties become accessible for initiating project activities, planning level surveys will be conducted to assess the suitability of modeled habitat and, where suitable, conduct protocol-level surveys for vernal pool fairy shrimp and vernal pool tadpole shrimp. To the extent practicable, work areas will be designed to avoid habitat for vernal pool aquatic invertebrates and critical habitat for vernal pool fairy shrimp. Where practicable, the project will be planned and designed to avoid ground-disturbing activities or alterations to hydrology within 250 feet of vernal pool aquatic invertebrate habitat. Where activities need to occur within 250 feet of habitat, those work areas will be assessed for their potential to alter the hydrology of the pool habitat such that the hydroperiod of the pool will no longer support the species. Where the USFWS agrees that any changes to the hydroperiod will not permanently affect habitat functionality, compensatory mitigation would not be required.

To the extent practicable, DWR will minimize impacts on critical habitat for vernal pool fairy shrimp. To achieve this, project construction will occur at least 250 feet from vernal pool fairy shrimp critical habitat containing the primary constituent elements defined below unless it is determined through USFWS review that the activities within the buffer will not substantially modify the primary constituent elements of vernal pool fairy shrimp critical habitat.

Primary constituent elements for vernal pool fairy shrimp are defined as follows (70 FR 46924–46998).

1. Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described below, providing for dispersal and promoting hydroperiods of adequate length in the pools.
2. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days, in all but the driest years, thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.
3. Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding.
4. Structure within the pools described above, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

For suitable aquatic habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp that will be affected by the project, protocol-level surveys for these species will be conducted to determine whether they are present or where time does not allow for surveys to be completed (e.g., dry years, timely access), the suitable habitat will be assumed to be occupied. Surveys will be conducted according to the most recent USFWS guidelines by USFWS-approved biologists with the appropriate recovery permit under Section 10(a)(1)(A) of the ESA.

Project elements will be designed to avoid direct and indirect effects on vernal pool aquatic invertebrate habitat to the extent practicable. Where construction occurs within 250 feet of vernal pool crustacean habitat, construction BMPs will be implemented to ensure that construction activities minimize effects on the habitat. Protective fencing will be installed around vernal pool aquatic invertebrate habitat with signage identifying these areas as containing sensitive biological resources. A biological monitor will ensure that fencing and BMPs are maintained for the duration of construction and that construction personnel are provided the necessary worker awareness training.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>Compensatory Mitigation</u>

Implementation of the CMP could result in impacts on vernal pool aquatic invertebrates through tidal wetland habitat restoration and channel margin enhancement because potential areas identified include the Cache Slough Complex and Yolo Bypass (Appendix 3F, Section 3F.4.3.4.2, *Site*

Selection Criteria and Tools), which are adjacent to modeled habitat for vernal pool aquatic invertebrates and several records of the species are in these general areas. Grading and fill to support these activities, including introducing areas to tidal hydrology, could directly affect habitat or result in changes to topography and soils such that the hydrology of vernal pools supporting these species is altered.

The creation and enhancement of wetlands and other waters as well as habitat for special-status species under the project's CMP on Bouldin Island and the I-5 ponds would not result in effects on vernal pool aquatic invertebrates because there is no habitat for these species in these areas.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of existing habitat and the potential for injury or mortality of vernal pool aquatic invertebrates but would ultimately provide benefits for these species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Vernal pool complexes and alkaline seasonal wetlands would not be targeted for these specific site protection instruments so there would not likely be any effects on vernal pool aquatic invertebrates. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of vernal pool aquatic habitat from tidal wetland habitat restoration and channel margin enhancement by mitigating for any habitat losses (Appendix 3F, Section 3F.1, *Introduction*, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*), and therefore reducing any habitat losses associated with the CMP to a less-than-significant level. The habitat creation activities would also have the potential to cause injury and mortality of vernal pool aquatic invertebrates. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality to a less-than-significant level. These impacts would be less than significant because the aforementioned measures would (1) train construction staff on the needs of protecting vernal pools, reporting requirements, and the ramifications of not following these measures; (2) implement spill prevention and containment plans that would avoid material spills that could affect the viability of nearby pools; and (3) have a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

The impacts on vernal pool aquatic invertebrates from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, the use of heavy equipment, or have the potential for inadvertent discharge of construction-related fluids or sediment within 250 feet of vernal pools that would have the potential to have direct and indirect impacts on modeled habitat or result in injury or mortality of vernal pool aquatic invertebrates due to discharge of sediment and hazardous materials. Construction-related grading and excavation could result in direct and indirect impacts on vernal pool aquatic invertebrate modeled habitat and could result in the mortality of individuals. Impacts on vernal pool aquatic invertebrates resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to vernal pool aquatic invertebrates impacts of the project alternatives.

However, the impacts of habitat loss, ground disturbance, and exposure to sediment or hazardous materials on vernal pool aquatic invertebrates would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-14: *Construction Best Management Practices for Biological Resources*, and Mitigation Measure BIO-14: *Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp*. Therefore, impacts on vernal pool aquatic invertebrates from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on vernal pool aquatic invertebrates from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact from less than significant with mitigation.

Impact BIO-15: Impacts of the Project on Conservancy Fairy Shrimp

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for Conservancy fairy shrimp are presented in the species account in Appendix 13B, Section 13B.31, *Conservancy Fairy Shrimp*.

All Project Alternatives

Construction

The construction of the project alternatives (all alternatives) would not result in impacts on Conservancy fairy shrimp (Table 13-51). The modeled habitat for Conservancy fairy shrimp depicted in Figure 13B.31-1 is more than 6 miles from the nearest project infrastructure, which is more than 8 miles from the nearest CNDDB occurrence (California Department of Fish and Wildlife 2020a).

Table 13-51. Impacts on Modeled Habitat for Conservancy Fairy Shrimp by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
All Alternatives	0.00	0.00	0.00

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Operations

The operations of all project alternatives would not result in impacts on Conservancy fairy shrimp because of the distance of modeled and known occupied habitat from the project infrastructure.

Maintenance

The maintenance of all project alternatives would not result in impacts on Conservancy fairy shrimp because of the distance of modeled and known occupied habitat from the project infrastructure.

CEQA Conclusion—All Project Alternatives

All project alternatives would result in no impact on Conservancy fairy shrimp because no modeled or known habitat for this species occurs in the vicinity of project construction, operations, or maintenance areas.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

Implementation of the CMP could result in impacts on Conservancy fairy shrimp through tidal wetland habitat restoration and channel margin enhancement because one of the potential areas identified is the Cache Slough Complex (Appendix 3F, Section 3F.4.3.4.2), which is adjacent to modeled Conservancy fairy shrimp habitat and several records of the species. Grading and fill to support tidal wetland restoration and channel margin enhancement could directly affect habitat or result in changes to topography and soils such that the hydrology of vernal pools supporting Conservancy fairy shrimp is altered.

The creation and enhancement of wetlands and other waters as well as habitat for special-status species under the project's CMP on Bouldin Island and the I-5 ponds would not result in effects on Conservancy fairy shrimp because there is no habitat for this species in these areas.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of existing habitat and the potential for injury or mortality of Conservancy fairy shrimp if these activities occur within the range of the species but could ultimately provide benefits for the species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3 CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and

CMP-22b: *Tricolored Blackbird Foraging Habitat*). Vernal pool complexes would not be targeted for these specific site protection instruments so there would not likely be any effects on Conservancy fairy shrimp. Site-specific analyses are not provided because locations of potential site protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of Conservancy fairy shrimp habitat from tidal restoration and channel margin enhancement by mitigating for any habitat losses (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*), and therefore reducing any habitat losses associated with the CMP to a less-than-significant level. The habitat creation and enhancement activities would also have the potential to cause injury and mortality of Conservancy fairy shrimp. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality to a less-than-significant level. These impacts would be less than significant because the aforementioned measures would (1) train construction staff on the needs of protecting Conservancy fairy shrimp habitat, reporting requirements, and the ramifications of not following these measures; (2) implement spill prevention and containment plans that would avoid material spills that could affect the viability of nearby pools; and (3) have a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable. The impact on Conservancy fairy shrimp from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Other mitigation measures proposed would not have impacts on Conservancy fairy shrimp because no modeled or known habitat for this species occurs in the vicinity of project construction areas; the modeled habitat for this species depicted in Figure 13B.31-1 is more than 6 miles from the nearest project infrastructure, which is more than 8 miles from the nearest CNDDB occurrence (California Department of Fish and Wildlife 2020a).

Overall, the construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the no impact conclusion for the project alternatives and the compensatory mitigation conclusion of less than significant with mitigation.

Impact BIO-16: Impacts of the Project on Vernal Pool Terrestrial Invertebrates

The impact analysis for vernal pool terrestrial invertebrates covers two species, molestan blister beetle and vernal pool andrenid bee, both of which are associated with upland portions of vernal pool complexes and aquatic portions once dry and supporting flowering plants. The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability models are presented in the following species accounts in Appendix 13B: Section 13B.43, *Molestan Blister Beetle*, and Section 13B.44, *Blennosperma Vernal Pool Andrenid Bee*.

All Project Alternatives

Construction

The construction of Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would result in the permanent and temporary loss of modeled habitat, including potential indirect effects on habitat for vernal pool terrestrial invertebrates. These impacts would occur as a result of the construction of new roads and a temporary railroad near Clifton Court Forebay (permanent, temporary, and indirect), the construction of the South Delta Outlet and Control Structure (indirect), and the construction of the park-and-ride facility off Hood-Franklin Road east of I-5 (indirect). The park-and-ride lot would be removed following construction. The implementation of Environmental Commitments EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B). Construction-related grading and excavation would result in the permanent and temporary loss of vernal pool terrestrial invertebrate habitat (Table 13-52) as well as indirect effects on habitat from ground disturbance within 250 feet of vernal pools. USFWS typically considers construction within 250 feet of vernal pool aquatic habitat to constitute a possible impact on the habitat unless more detailed information is provided to further refine the limits of any such effects. For the purposes of this analysis, the 250-foot buffer USFWS utilizes for determining indirect effects on vernal pool branchiopods was applied to the project work areas where disturbance activities would take place. Although these species are not aquatic, they do forage on the flowering plants associated with vernal pools and associated grasslands (vernal pool andrenid bees forage exclusively on *Blennosperma* sp.; molestan blister beetles forage on plants associated with both vernal pools and associated grasslands). Grading and excavation within the buffer have potential to change the supporting surface and subsurface hydrology such that aquatic habitat potentially becomes drier over time and does not provide suitable hydrology to support the flowering plants that these species forage on.

Table 13-52. Impacts on Modeled Habitat for Vernal Pool Terrestrial Invertebrates by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Indirect Impacts (acres) [b]	Total (acres)
1, 2c, 3, 4c	9.02	10.13	8.53	27.68
2a, 4a	9.02	10.13	11.87	31.02
2b, 4b	8.95	9.88	8.53	27.36
5	23.53	2.54	9.60	35.67

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

[b] Indirect impacts only include vernal pools.

The construction of Alternative 5 would also result in the permanent and temporary loss of vernal pool terrestrial invertebrate habitat, including indirect effects on habitat as a result of grading and excavation. These impacts would occur as a result of a temporary access road to the Bethany Reservoir Aqueduct off Kelso Road (indirect impacts), construction of the Bethany Reservoir Aqueduct (temporary and permanent impacts), and the construction of the park-and-ride facility off Hood-Franklin Road east of I-5 (indirect), similar to the discussion above. The construction of the Bethany Reservoir Aqueduct would affect a portion of a linear vernal pool that appears to feed into a large pool further downslope and would be within 30 feet of another pool. Constructing these facilities could result in a permanent change to the hydrology of this aquatic habitat from a reduction in the size of the supporting watershed and the potential to alter the subsurface hydrology, subsequently reducing the habitat's ability to support foraging habitat (vernal pool plants) for vernal pool terrestrial invertebrates.

Construction activities associated with all project alternatives could result in the injury or mortality of vernal pool terrestrial invertebrates occurring in habitats that are subject to direct ground disturbance and vehicle traffic, or if hazardous construction materials are spilled in areas occupied by the species. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources and reporting requirements; (2) implementing spill prevention and containment plans that would avoid material spills that could directly harm vernal pool terrestrial invertebrates and affect the viability of habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

No CNDDB (California Department of Fish and Wildlife 2020a) occurrences of molestan blister beetle or vernal pool andrenid bee would be permanently, temporarily, or indirectly affected by project construction for any of the project alternatives.

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations;* Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury and mortality of vernal pool terrestrial invertebrates. Geotechnical investigations that would occur in the West Tracy Fault Study area and over the tunnel alignment footprints, which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on habitat (Appendix 13C). Geotechnical investigations associated with the tunnels linking the Southern Forebay to the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would avoid impacts on vernal pool habitat as specified in Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B), which commits to avoiding impacts on wetlands. The Bethany Fault Study investigations would not affect modeled vernal pool terrestrial invertebrate habitat. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources and reporting requirements; (2) implementing spill prevention and containment plans that would avoid material spills that could directly harm vernal pool terrestrial invertebrates and affect the viability of habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

Operations

None of the project alternatives are anticipated to result in operational impacts on vernal pool terrestrial invertebrates or habitat because operating conveyance facilities would not involve disturbance or removal of habitat or effects on vernal pool terrestrial invertebrates.

Maintenance

The maintenance of the Southern Complex on Byron Tract and west of Byron Highway (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) could result in impacts on vernal pool terrestrial invertebrates.

Maintenance at the Southern Forebay and South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would include repaving of access roads every 15 years, quarterly weed management (e.g., mechanical removal and herbicide application), and semiannual general and ground maintenance (e.g., mowing, vegetation trimming) could result in the injury, mortality, and disruption of normal behaviors of vernal pool terrestrial invertebrates and impacts on flowering plants occurring immediately adjacent to where these activities are taking place.

No maintenance activities at the Bethany Complex (Alternative 5) are anticipated to result in impacts on vernal pool terrestrial invertebrates because there are no aboveground facilities that occur within 250 feet of aquatic habitat. The Bethany Reservoir Aqueduct would be within 250 feet of vernal pools; however, the aqueduct would be buried and maintenance would be limited to vegetation management around manways (i.e., access points to buried pipelines), which would be more than 500 feet from the nearest pool and would not likely result in direct or indirect effects on these pools.

CEQA Conclusion—All Project Alternatives

The construction of all project alternatives and the maintenance of Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would result in impacts on vernal pool terrestrial invertebrates through the permanent and temporary loss of modeled habitat and the potential for injury and mortality of these species.

The temporary loss of habitat and the potential impacts of injury and mortality from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these environmental commitments, however, the loss of habitat from the construction of the alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction and maintenance activities on vernal pool terrestrial invertebrates would be significant. Implementation of the CMP would offset the loss of vernal pool terrestrial invertebrate habitat, which would be achieved through the purchase of mitigation credits specifically for impacts on vernal pool fairy shrimp and vernal pool tadpole shrimp at a USFWS-approved mitigation bank (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3 CMP-11: *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat*), which would also benefit the vernal pool terrestrial invertebrates analyzed and reduce the impact associated with habitat loss to less than significant. Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance* and BIO-14:

Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp, which would also benefit terrestrial species, would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on vernal pool terrestrial invertebrates from the project alternatives would be less than significant with mitigation because these aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by avoiding and minimizing activities during construction and maintenance that could adversely affect habitat, which include establishing non-disturbance buffers around habitat with construction fencing, and by avoiding indirect effects on vernal pool habitat to the extent practicable.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of vernal pool habitat (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3, CMP-11: *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat*) by purchasing credits at a USFWS-approved mitigation bank or at a non-bank site approved by USFWS supporting habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp, which would also benefit vernal pool terrestrial invertebrates. Though these mitigation areas would be specifically targeting vernal pool fairy shrimp and vernal pool tadpole shrimp, they would be within the range of these vernal pool terrestrial invertebrates and would generally provide suitable conditions for them to occur there.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-14: Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp

See description of Mitigation Measure BIO-14 under Impact BIO-14.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

Implementation of the CMP could result in impacts on vernal pool terrestrial invertebrates through tidal wetland habitat restoration and channel margin enhancement because potential areas identified include the Cache Slough Complex and Yolo Bypass (Appendix 3F, Section 3F.4.3.4.2), which are adjacent to modeled habitat for vernal pool terrestrial invertebrates and there are two records for andrenid bee in the vicinity of the Cache Slough Complex. Grading and fill to support these activities could directly affect habitat or result in changes to topography and soils such that the hydrology of vernal pools supporting these species is altered.

The creation and enhancement of wetlands and other waters as well as habitat for special-status species under the project's CMP on Bouldin Island and the I-5 ponds would not result in effects on vernal pool terrestrial invertebrates because there is no habitat for these species in these areas.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of existing habitat and the potential for injury or mortality of vernal pool terrestrial invertebrates but would ultimately provide benefits for these species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2 and Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Vernal pool complexes would not be targeted for these specific site protection instruments so there would not likely be any effects on vernal pool terrestrial invertebrates. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of vernal pool habitat from tidal wetland habitat restoration and channel margin enhancement by mitigating for any habitat losses (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*), and therefore reducing any habitat losses associated with the CMP to a less-than-significant level. The habitat creation activities would also have the potential to cause injury and mortality of vernal pool terrestrial invertebrates. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality to a less-than-significant level. These impacts would be less than significant because the aforementioned measures would (1) train construction staff on the needs of protecting vernal pools and associated uplands, reporting requirements, and the ramifications of not following these measures; (2) implement spill prevention and containment plans that would avoid material spills that could affect the viability of nearby pools; and (3) have a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

The impacts on vernal pool terrestrial invertebrates from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, the use of heavy equipment, or inadvertent discharge of construction-related fluids or sediment within 250 feet of vernal pools that would have the potential to have direct and indirect impacts on modeled habitat or result in injury or mortality of vernal pool terrestrial invertebrates due to discharge of sediment and hazardous materials. Construction-related grading and excavation could result in direct and indirect impacts on vernal pool terrestrial invertebrate modeled habitat and could result in the mortality of individuals. The mitigation measures with potential to result in impacts on vernal pool terrestrial invertebrates are similar to those discussed under Impact BIO-14: *Impacts of the Project on Vernal Pool Aquatic Invertebrates*. Impacts on vernal pool terrestrial invertebrates resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to vernal pool terrestrial invertebrate impacts of the project alternatives. The impacts of habitat loss, ground disturbance, noise, visual disturbance, and exposure to dust or hazardous materials on vernal pool terrestrial invertebrates would be reduced through the CMP and environmental commitments as detailed under Impact BIO-14. In addition, Mitigation Measure BIO-14: *Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp* would require species-specific measures to reduce these impacts. Therefore, implementation of other mitigation measures is unlikely to affect vernal pool terrestrial invertebrates.

Overall, the impacts on vernal pool terrestrial invertebrates from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion from less than significant with mitigation.

Impact BIO-17: Impacts of the Project on Sacramento and Antioch Dunes Anthicid Beetles

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the Antioch Dunes and Sacramento anthicid beetles life histories are presented in the following species accounts in Appendix 13B: Section 13B.37, *Antioch Dunes Anthicid Beetle*, and Section 13B.38, *Sacramento Anthicid Beetle*.

All Project Alternatives

Construction

The construction of the project alternatives (all alternatives) is not anticipated to result in impacts on habitat or result in the injury or mortality of Sacramento and Antioch Dunes anthicid beetles (Table 13-53). Based on a review of aerial imagery, there are no suitable dredge spoil piles (sandy spoils) within or adjacent to the construction footprint for any of the project alternatives and there are no activities proposed near the Antioch Dunes. A review of intake locations and levee improvement areas did not reveal any sandbars along the channel margins. These portions of the Sacramento River have steep channel banks lined with riprap that are likely not conducive to the formation of sandbars. The nearest occurrence for either species to the facilities for the project alternatives is an extant occurrence of Sacramento anthicid beetle from 1974 near Rio Vista, which is 1.25 miles from the park-and-ride lot off SR 12 (California Department of Fish and Wildlife 2020a).

Table 13-53. Impacts on Habitat for Sacramento and Antioch Dunes Anthicid Beetles by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
All Alternatives	0.00	0.00	0.00

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Operations

The operations of the project alternatives are not anticipated to result in effects on Sacramento and Antioch Dunes anthicid beetles or their habitat because changes in flows are not anticipated to result in changes to the extent of habitat and because no suitable habitat or species records were identified near project facilities.

Maintenance

The maintenance of the project alternatives is not anticipated to result in impacts on Sacramento and Antioch Dunes anthicid beetles or their habitat because no suitable habitat or species records were identified near project facilities.

CEQA Conclusion—All Project Alternatives

All project alternatives would result in no impact on Sacramento and Antioch Dunes anthicid beetles because no known habitat or records for these species occurs in the vicinity of project construction, operations, or maintenance areas.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

CMP activities on Bouldin Island and the I-5 ponds would not result in impacts on Sacramento and Antioch Dunes anthicid beetles because these areas do not contain habitat for the species. Tidal restoration would not likely result in impacts on these species because the areas prioritized (lower Yolo Bypass and Cache Slough) are outside of areas of known occurrences and generally do not have areas where dredge spoil piles are located. The areas selected for potential channel margin enhancement, which includes areas along the Sacramento River and its tributaries, could potentially occur in areas where these species are known to occur or where there is potential habitat (Appendix 3F, Section 3F.4.3.4.2). Grading and fill to support channel margin enhancement could directly affect habitat and the species.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or grasslands are located, which are not habitats for Sacramento and Antioch Dunes anthicid beetles; therefore, there would not likely be any effects on these species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Areas of potential Sacramento and Antioch Dunes anthicid beetle habitat would not be targeted for these specific site protection instruments so there would not likely be any effects on these species. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of anthicid beetle habitat from channel margin enhancement by mitigating for any habitat losses (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*), and therefore reducing any habitat losses associated with the CMP to a less-than-significant level. The habitat creation and enhancement activities would also have the potential to cause injury and mortality of Sacramento and Antioch Dunes anthicid beetles. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality to a less-than-significant level. These impacts would be less than significant because the aforementioned measures would (1) train construction staff on the needs of protecting habitat, reporting requirements, and the ramifications of not following these measures; (2) implement spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; and (3) have a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

The impact on Sacramento and Antioch Dunes anthicid beetles from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Other mitigation measures proposed would not have impacts on Sacramento and Antioch Dunes anthicid beetles because no known habitat or records for these species occurs in the vicinity of project construction.

Overall, the impacts on Sacramento and Antioch Dunes anthicid beetles from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the no impact conclusion for the project alternatives and the compensatory mitigation conclusion of less than significant with mitigation.

Impact BIO-18: Impacts of the Project on Valley Elderberry Longhorn Beetle

The methods for the analysis of effects on valley elderberry longhorn beetle appear in Section 13.3.1.1 and information on the species life history and habitat suitability model are presented in the species account in Appendix 13B, Section 13B.39, *Valley Elderberry Longhorn Beetle*.

All Project Alternatives

Construction

The construction of all the project alternatives would affect modeled riparian habitat for valley elderberry longhorn beetle through the permanent and temporary loss of modeled habitat, and habitat fragmentation. The loss of habitat would primarily occur as a result of the levee improvement work, new roads and road improvements, and the intake construction (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment (Table 13-54). The losses of habitat would result from vegetation removal in advance of grading and excavation for the construction of project infrastructure. Also, work within 165 feet of host elderberry shrubs could result in dust and the discharge of construction-related fluids, which could affect the vigor of shrubs, resulting in a further loss of habitat for valley elderberry longhorn beetle. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-54. Impacts on Modeled Habitat for Valley Elderberry Longhorn Beetle by Alternative

Alternative	Permanent Riparian Impacts (acres) [a]	Temporary Riparian Impacts (acres)	Total (acres)
1	54.52	17.50	72.02
2a	55.00	20.02	75.02
2b	49.08	19.06	68.14
2c	51.59	19.55	71.14
3	16.72	10.57	27.29
4a	19.41	11.20	30.61
4b	13.50	10.24	23.74
4c	16.01	10.71	26.72
5	19.47	9.84	29.31

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities associated with all alternatives could result in the injury, mortality, or the disruption of normal behaviors of valley elderberry longhorn beetle during the removal of occupied shrubs, construction material spills in areas where shrubs occur, or if work is conducted adjacent to habitat during the flight season (March to July), which could disrupt feeding, breeding, and dispersal and cause potential injury or mortality of valley elderberry longhorn beetle. These effects may occur in modeled riparian habitat as well as other potential habitat included as part of the model. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on the needs of protecting elderberry shrubs, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby elderberry shrubs; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented; where applicable. These measures would be applied where shrubs are identified within or adjacent to work areas, regardless of the presence of modeled habitat.

No CNDDB (California Department of Fish and Wildlife 2020a) occurrences of valley elderberry longhorn beetle would be permanently or temporarily affected by project construction for any of the alternatives. The nearest CNDDB occurrence to the project alternatives is on Union Island, which is approximately 4 miles south of road improvements on Upper Jones Tract for Alternatives 3, 4a, 4b, 4c, and 5, and 4 miles south of road improvements on Roberts Island for Alternatives 1, 2a, 2b, and 2c (California Department of Fish and Wildlife 2020a).

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b). and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of valley elderberry longhorn beetle. Geotechnical investigations associated with the tunnels for all project alternatives, which include CPTs and soil borings would result in temporary impacts on modeled habitat (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations would not affect modeled habitat for valley elderberry longhorn beetle. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints, but could still result in the potential for injury, mortality, and the disruption of normal behaviors of valley elderberry longhorn beetle, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (2) training construction staff on the needs of protecting elderberry shrubs, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby elderberry shrubs; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable. These measures would be applied where shrubs are identified within or adjacent to work areas, regardless of the presence of modeled habitat.

Operations

None of the project alternatives would directly result in operational impacts on valley elderberry longhorn beetle or habitat because operating conveyance facilities would not involve disturbance or removal of habitat or effects on the species.

Valley elderberry longhorn beetle is known to occur along rivers upstream of the study area that could potentially be indirectly affected by the operation of the project. Chapter 5, *Surface Water,* details the hydrologic modeling methods (Chapter 5, *Surface Water*, Appendix 5A, *Modeling Technical Appendix,* Section B, *Hydrology and Systems Operations Modeling*) and results (Chapter 5, Appendix 5A, Section B, Attachment 3, *CalSim 3 Modeling Results*) with respect to flows within and upstream of the Delta. Modeled flows under all project alternatives are not expected to change substantially beyond the existing variation in flows. Thus, the project is not anticipated to alter riparian vegetation and shrubs occurring there relative to existing conditions.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on valley elderberry longhorn beetle. Maintenance activities across all facilities that could affect valley elderberry longhorn beetle include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle; these maintenance activities could affect shrubs that establish or occur adjacent to facilities (e.g., herbicide drift, damage to shrubs) and could result in the injury, mortality, and disruption of normal behaviors (i.e., feeding, breeding, and dispersal) of valley elderberry longhorn beetle larvae occupying affected shrubs and adults if activities occur during the flight season (March to July).

CEQA Conclusion—All Project Alternatives

Construction and maintenance of all project alternatives would result in impacts on valley elderberry longhorn beetle through the permanent and temporary loss of modeled riparian habitat, habitat fragmentation, and the potential for injury, mortality, and the disruption of normal behaviors.

The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors of larvae and adults from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments, however, the loss of habitat from the construction of the alternatives, and the potential for injury, mortality, and disruption of normal behaviors from construction and maintenance activities on valley elderberry longhorn beetle would be significant. Implementation of the CMP would be required to offset the loss of riparian habitat (Appendix 3F, Section 3F.3.2.3) and individual elderberry shrubs (Appendix 3F, Section 3F.3.3.1 and Attachment 3F.1, Table 3F.1-3, CMP-12: *Valley Elderberry Longhorn Beetle Habitat*), which would reduce the impact associated with habitat loss to a less-than-significant level. Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* and BIO-18: *Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on valley elderberry longhorn beetle from the project alternatives would be less than significant with mitigation because these aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by avoiding and minimizing activities that could injure or kill valley elderberry longhorn beetle, which includes establishing non-disturbance buffers around shrubs with construction fencing, limiting trimming of shrubs to stems less likely to contain larvae (<1 inch in diameter) and during periods when trimming is less likely to affect the vigor of shrubs, and avoiding work to the extent possible during the species active season when they are in flight around shrubs and dispersing.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of riparian habitat (Appendix 3F, Section 3F.3.2.3) by creating riparian habitat on Bouldin Island and at the I-5 ponds and managing these areas in perpetuity. As stated in Appendix 3F, Section 3F.3.3.1 and Attachment 3F.1, Table 3F.1-3, CMP-12: *Valley Elderberry Longhorn Beetle Habitat*, mitigation would follow the guidance in USFWS's 2017 *Framework for Assessing Impacts on Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)* (2017 Framework), which would create and protect areas where elderberry shrubs can be planted and receive shrubs suitable for transplantation. Channel margin restoration would include riparian plantings on rock benches (Appendix 3F, Section 3F.4.3.3.3) that may provide opportunities for the establishment of elderberry shrubs and future colonization by valley elderberry longhorn beetle.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-18: Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle

All Project Alternatives

As properties become accessible for initiating project activities, DWR will require surveys for elderberry shrubs to be conducted in construction areas by a USFWS-approved biologist. Elderberry shrubs will be avoided to the maximum extent practicable. Complete avoidance (i.e., no adverse effects) will be assumed when a buffer of at least 165 feet is established and maintained around elderberry shrubs containing stems measuring 1 inch or greater in diameter at ground level (U.S. Fish and Wildlife Service 2017a:10, 11).

Elderberry shrubs that have stems measuring 1 inch or greater in diameter at ground level determined or assumed to be occupied, according to the criteria in the 2017 Framework or the most recent available guidance at that time, that are identified within project footprints that cannot be avoided (i.e., those in the project footprint) will be transplanted to conservation areas identified in the CMP. Transplanting will follow the guidance outlined in USFWS's 2017 *Framework for Assessing Impacts on Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)* (2017 Framework) or the most recent available guidance at that time.

For shrubs not directly affected by construction but that occur within 165 feet of ground-disturbing activities, the following measures will be implemented, which come from the USFWS 2017 Framework.

1. Fencing. All areas to be avoided during construction activities will be fenced and flagged as close to construction limits as feasible.

2. Avoidance area. Activities that may damage or kill an elderberry shrub (e.g., trenching, paving, etc.) may need an avoidance area of at least 20 feet from the drip-line, depending on the type of activity.

3. Timing. As much as feasible, all activities that occur within 165 feet of an elderberry shrub, will be conducted outside of the flight season of the species (March to July).

4. Trimming. Trimming may remove or destroy valley elderberry longhorn beetle eggs and/or larvae and may reduce the health and vigor of the elderberry shrub. In order to avoid and minimize adverse effects on valley elderberry longhorn beetle, trimming will occur between November 1 and February 1 and will avoid the removal of any branches or stems that are ≥ 1 inch in diameter. Measures to address regular or largescale maintenance (trimming) should be established in consultation with USFWS.

5. Chemical usage. Herbicides will not be used within the drip-line of an elderberry shrub. Insecticides will not be used within 100 feet of an elderberry shrub. All chemicals will be applied using a backpack sprayer or similar direct-application method.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>*Compensatory Mitigation*</u>

The creation and enhancement of wetlands and other waters as well as habitat for special-status species on Bouldin Island and the I-5 ponds under the project's CMP would affect modeled riparian habitat for valley elderberry longhorn beetle (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats. The CMP could also affect modeled riparian habitat for valley elderberry longhorn beetle through tidal wetland habitat restoration and channel margin enhancement because potential areas identified generally overlap with modeled habitat (Appendix 3F, Section 3F.4.3.4.2).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or grasslands are located, which are not habitats for valley elderberry longhorn beetle; therefore, there would not likely be any effects on this species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain elderberry shrubs and management activities could affect this habitat and result in the disruption of normal behaviors, injury, and mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of valley elderberry habitat from habitat creation by adjusting the overall commitment of riparian habitat creation and elderberry shrub planting and transplanting (Appendix 3F, Section 3F.1, Section 3F.2.4, and

Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*), therefore reducing any habitat losses associated with the CMP to a less-than-significant level. The creation and enhancement activities would also have the potential to cause injury, mortality, and the disruption of normal behaviors of valley elderberry longhorn beetle. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) and Mitigation Measure BIO-18: *Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle* would reduce the potential for injury, mortality, and the disruption of normal behaviors of individuals to a less-than-significant level. These impacts would be less than significant because the aforementioned measures would (2) train construction staff on the needs of protecting elderberry shrubs, reporting requirements, and the ramifications of not following these measures; (2) implement spill prevention and containment plans that would avoid material spills that could affect the viability of nearby elderberry shrubs; and (3) have a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

The impact on valley elderberry longhorn beetle from the project alternatives with the CMP would be less than significant with mitigation.

<u>Other Mitigation Measures</u>

Some mitigation measures would involve ground disturbance, the use of heavy equipment, or inadvertent discharge of construction-related fluids or dust within 165 feet of host elderberry shrubs that would have the potential to have direct and indirect impacts on modeled habitat or result in injury or mortality of valley elderberry longhorn beetle due to discharge of dust and hazardous materials. Construction-related grading and excavation could result in direct and indirect impacts on valley elderberry longhorn beetle modeled habitat and could result in injury, mortality, or disruption of normal behavior of individuals. Impacts on valley elderberry longhorn beetle resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to valley elderberry longhorn beetle impacts of the project alternatives.

However, the impacts of habitat loss, ground disturbance, and exposure to dust or hazardous materials on valley elderberry longhorn beetle would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-14: *Construction Best Management Practices for Biological Resources*; and Mitigation Measure BIO-18: *Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle*. Therefore, impacts on valley elderberry longhorn beetle from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on valley elderberry longhorn beetle from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion from less than significant with mitigation.

Impact BIO-19: Impacts of the Project on Delta Green Ground Beetle

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for delta green ground beetle are presented in the species account in Appendix 13B, Section 13B.40, *Delta Green Ground Beetle*.

All Project Alternatives

Construction

The construction of the project alternatives (all alternatives) would not result in impacts on delta green ground beetle (Table 13-55). The modeled habitat for delta green ground beetle depicted in Figure 13B.40-1 is more than 9 miles from the nearest project feature, the park-and-ride off SR 12 on Brannan Island, and the nearest CNDDB record is more than 10 miles from this same feature (California Department of Fish and Wildlife 2020a).

Table 13-55. Impacts on Modeled Habitat for Delta Green Ground Beetle by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
All Alternatives	0.00	0.00	0.00

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Operations

The operations of the project alternatives (all alternatives) would not result in impacts on delta green ground beetle because of the distance of modeled and known occupied habitat from the infrastructure and any affected Delta waterways.

Maintenance

The maintenance of the project alternatives (all alternatives) would not result in impacts on delta green ground beetle because of the distance of modeled and known occupied habitat from the project infrastructure

CEQA Conclusion—All Project Alternatives

All project alternatives would result in no impact on delta green ground beetle because no modeled or known habitat for this species occurs in the vicinity of project construction, operations, or maintenance areas.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

Implementation of the CMP could result in impacts on delta green ground beetle through tidal wetland habitat restoration and channel margin enhancement because one of the potential areas identified is the Cache Slough Complex (Appendix 3F, Section 3F.4.3.4.2), which is adjacent to modeled delta green ground beetle habitat and several records of the species. Grading and fill to support tidal wetland restoration and channel margin enhancement could directly affect habitat or result in changes to topography and soils such that the hydrology of areas supporting delta green ground beetle habitat.

The creation and enhancement of wetlands and other waters as well as habitat for special-status species under the project's CMP on Bouldin Island and the I-5 ponds would not result in effects on delta green ground beetle because there is no habitat for this species in these areas and they are outside of the known range of the species.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of existing habitat and the potential for injury or mortality of delta green ground beetle if these activities occur within the range of the species but could ultimately provide benefits for the species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Vernal pool complexes would not be targeted for these specific site protection instruments so there would not likely be any effects on delta green ground beetle. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of delta green ground beetle habitat from tidal restoration and channel margin enhancement by mitigating for any habitat losses (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*), and therefore reducing any habitat losses associated with the CMP to a less-than-significant level. The habitat creation and enhancement activities would also have the potential to cause injury and mortality of delta green ground beetle. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality to a less-than-significant level. These impacts would be less than significant because the aforementioned measures would (1) train construction staff on the needs of protecting habitat, reporting requirements, and the ramifications of not following these measures; (2) implement spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; and (3) have a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

The impact on delta green ground beetle from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Other mitigation measures proposed would not have impacts on delta green ground beetle because no modeled or known habitat for this species occurs in the vicinity of project construction areas; the modeled habitat for delta green ground beetle depicted in Figure 13B.40-1 is more than 9 miles from the nearest project feature, the park-and-ride off SR 12 on Brannan Island, and the nearest CNDDB record is more than 10 miles from this same feature (California Department of Fish and Wildlife 2020a).

Overall, the construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the no impact conclusion for the project alternatives and the compensatory mitigation conclusion of less than significant with mitigation.

Impact BIO-20: Impacts of the Project on Curved-Foot Hygrotus Diving Beetle

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for curved-foot hygrotus diving beetle are presented in the species account in Appendix 13B, Section 13B.42, *Curved-Foot Hygrotus Diving Beetle*.

All Project Alternatives

Construction

The construction of Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would result in the permanent and temporary loss of curved-foot hygrotus diving beetle modeled habitat. These impacts would occur as a result of the construction of the Southern Forebay and associated infrastructure and work areas (permanent and temporary), the temporary railway (temporary), improvements to Byron Highway (permanent and temporary), the construction of the South Delta Outlet and Control Structure (permanent and temporary impacts), and Jones Outlet and Control Structure (permanent and temporary impacts under Alternatives 2a and 4a). Construction-related grading and excavation would result in the permanent and temporary loss of curved-foot hygrotus diving beetle habitat (Table 13-56). Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-56. Impacts on Modeled Habitat for Curved-Foot Hygrotus Diving Beetle by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1, 2b, 2c, 4b	62.26	19.34	81.60
2a	62.73	19.36	82.09
3	62.77	19.34	82.11
4a	63.64	19.36	83.00
4c	62.55	19.34	81.89
5	4.10	3.27	7.37

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

The construction of Alternative 5 would also result in the permanent and temporary loss of curved-foot hygrotus diving beetle habitat as a result of the construction of the Bethany Reservoir Pumping Plant (permanent and temporary), the Bethany Reservoir Aqueduct (permanent and temporary), improvements on Mountain House Road (permanent and temporary), and the construction-water pipeline east of Byron Highway (temporary). Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Construction activities associated with the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and Bethany Complex (Alternative 5) could result in the injury, mortality, and disruption of normal behaviors of curved-foot hygrotus diving beetle if individuals are occupying affected habitat when it is dewatered for project grading and excavation, or through exposure to construction-related fluids, such as fuels, oils, and cement. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

One CNDDB record for curved-foot hygrotus diving beetle would be affected by the construction of the Bethany Reservoir Pumping Plant. This record (#3) is from 1989, is considered extant, and the habitat is described as an irrigation canal (California Department of Fish and Wildlife 2020a).

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat, or the potential for injury and mortality of curved-foot hygrotus diving beetle. Geotechnical investigations that would occur in the West Tracy Fault Study area and over the tunnel alignment footprints, which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on modeled habitat (Appendix 13C). The Bethany Fault Study investigations would not affect modeled curved-foot hygrotus diving beetle habitat. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury and mortality of the species, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14:

Construction Best Management Practices for Biological Resources (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

Operations

None of the project alternatives would result in operational impacts on curved-foot hygrotus diving beetle or habitat because operating conveyance facilities would not involve disturbance or removal of habitat or effects on this species.

Maintenance

The maintenance of the Southern Complex on Byron Tract and west of Byron Highway (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) could result in impacts on curved-foot hygrotus diving beetle. Maintenance at the Southern Forebay would include repaving of access roads every 15 years, quarterly weed management (e.g., mechanical removal and herbicide application), and semiannual general and ground maintenance (e.g., mowing, vegetation trimming) could result in impairment to the water quality of habitat occurring immediately adjacent to where these activities are taking place. Maintenance activities at the South Delta Outlet and Control Structure, which would include annual cleaning (pressure washing), semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, could result in the impairment of the water quality of habitat occurring adjacent to where these activities are taking place. These impacts would occur if chemicals used during these activities reach aquatic habitat through spills or from storm runoff.

Maintenance associated with Alternative 5 at the Bethany Reservoir Pumping Plant could affect curved-foot hygrotus diving beetle in similar manner as described above for the other alternatives.

CEQA Conclusion—All Project Alternatives

The construction and maintenance of all project alternatives would result in impacts on curved-foot hygrotus diving beetle through the permanent and temporary loss of modeled habitat and the potential for injury and mortality of these species.

The temporary loss of habitat and the potential impacts of injury and mortality from project construction and maintenance would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments, however, the permanent loss of habitat from the construction of the project alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction and maintenance activities on curved-foot hygrotus diving beetle would be significant. Implementation of the CMP could help to offset the loss of curved-foot hygrotus diving beetle habitat through the purchase of mitigation credits specifically for impacts on vernal pool fairy shrimp and vernal pool tadpole shrimp at a USFWS-approved mitigation bank (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3, CMP-11: *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole*

Shrimp Habitat), which would also benefit curved-foot hygrotus diving beetle if the mitigation occurs within the range of the species described in Appendix 13B, Section 13B.42. With the uncertainty of where that mitigation may take place, it is possible there would be a net loss of habitat for the species in the study area. Considering that the permanent losses of modeled habitat by alternative range from 0.2% (Alternative 5) to 3% (Alternative 4a) of the species modeled habitat in the study area and that it is found in ditches and canals, which are widespread in the study area and other portions of Contra Costa County, the net loss of modeled habitat in the study area would not be a significant impact. Mitigation Measures BIO-14: *Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp,* and BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on curved-foot hygrotus beetle from the project alternatives would be less than significant with mitigation because these aforementioned measures would reduce direct effects on the species, including habitat disturbance, by avoiding and minimizing activities during construction and maintenance that could adversely affect habitat, establishing non-disturbance buffers around aquatic habitat with construction fencing and by implementing protective measures during maintenance activities.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP that DWR would implement (see Impact BIO-1 for a summary discussion of the CMP) could provide benefits to curved-foot hygrotus diving beetle habitat by purchasing credits at a USFWS-approved mitigation bank or at a non-bank site approved by USFWS supporting habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3, CMP-11: *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat*), which would also benefit curved-foot hygrotus diving beetle if the mitigation occurs within the range of the species described in Appendix 13B, Section 13B.42.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-14: Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp

See description of Mitigation Measure BIO-14 under Impact BIO-14.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands and other waters as well as habitat for special-status species at the I-5 ponds and on Bouldin Island, and tidal wetland habitat restoration and channel margin enhancement locations (Appendix 3F, Section 3F.4.3.4.2) under the project's CMP would not affect modeled habitat for curved-foot hygrotus diving beetle because these activities are outside of the known range of the species.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of existing habitat and the potential for injury or mortality of curved-foot hygrotus diving beetle if they are within the range of the species and could ultimately provide benefits for the species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Habitat for curved-foot hygrotus diving beetled would not be targeted for these specific site protection instruments so there would not likely be any effects on them. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The impact on curved-foot hygrotus diving beetle from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance that would have the potential to result in loss of modeled curved-foot hygrotus diving beetle habitat or result in injury, mortality, and disruption of normal behaviors of curved-foot hygrotus diving beetle if individuals are occupying affected habitat when it is dewatered for grading and excavation, or through exposure to construction-related fluids, such as fuels, oils, and cement. Impacts on curved-foot hygrotus diving beetle resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to curved-foot hygrotus diving beetle impacts of the project alternatives.

However, the impacts of habitat loss, ground disturbance, and exposure to hazardous materials on curved-foot hygrotus diving beetle would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-14: *Construction Best Management Practices for Biological Resources*, and Mitigation BIO-14: *Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp*. Therefore, impacts on curved-foot hygrotus diving beetle from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on curved-foot hygrotus diving beetle from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-21: Impacts of the Project on Crotch and Western Bumble Bees

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life histories and habitat suitability models for Crotch and western bumble bees are presented in the following species accounts in Appendix 13B: Section 13B.45, *Crotch Bumble Bee*, and Section 13B.46, *Western Bumble Bee*.

All Project Alternatives

Construction

The construction of all the project alternatives would result in the permanent and temporary loss of Crotch and western bumble bee modeled habitat primarily as a result of the levee improvement work, new roads and road improvements, South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), and the Bethany Complex (Alternative 5) (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment (Table 13-57). Environmental Commitments EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-57. Impacts on Modeled Habitat for Crotch and Western Bumble Bees by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	377.75	97.23	474.98
2a	445.03	110.71	555.74
2b	355.14	106.94	462.08
2c	365.15	109.13	474.28
3	133.70	70.43	204.13
4a	213.52	72.00	285.52
4b	123.65	68.24	191.89
4c	133.64	70.43	204.07
5	92.64	45.22	137.86

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities for all project alternatives could result in the injury, mortality, and disruption of normal behaviors of Crotch and western bumble bees. These effects could result from project grading, excavation, the use of construction-related vehicles, and exposure of bumble bees to construction-related fluids, such as fuels, oils, and cement. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect bees and their habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

One CNDDB occurrence for western bumble bee (#211) overlaps with the overhead SCADA line that originates out of Brentwood for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c (California Department of Fish and Wildlife 2020a). This occurrence is from 1940 and was reported to be generally in the vicinity of Brentwood (California Department of Fish and Wildlife 2020a). The location of this occurrence and where the SCADA line would be installed is entirely developed and the line would be attached to existing poles.

There are no CNDDB occurrences of Crotch bumble bee overlapping the footprints for any of the project alternatives and the nearest is approximately 5 miles southeast of Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, and 6.5 miles southeast of Alternative 5 (California Department of Fish and Wildlife 2020a).

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of Crotch and western bumble bee. Geotechnical investigations that would occur in the West Tracy Fault Study area and over the tunnel alignment footprints, which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on habitat (Appendix 13C). The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1 day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of Crotch and western bumble bee, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect bees and their habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

Operations

None of the project alternatives would result in operational impacts on Crotch and western bumble bee or their habitat because operating conveyance facilities would not involve disturbance or removal of habitat or effects on the species.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on Crotch and western bumble bee. Maintenance activities across all facilities that could affect bumble bees include repaving of access roads every 15 years and semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application) could affect bumble bees and foraging habitat (flowers) that occur adjacent to facilities (e.g., herbicide drift, damage to flowers) and could result in the injury, mortality, and disruption of normal behaviors of Crotch and western bumble bee, especially if during their active season (February–November).

CEQA Conclusion—All Project Alternatives

The construction and maintenance of all project alternatives would result in impacts on Crotch and western bumble bee through the permanent and temporary loss of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors.

The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors Crotch and western bumble bees from project construction activities would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments, however, the permanent loss of habitat from the construction of the project alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction and maintenance on Crotch and western bumble would be significant. Implementation of the CMP would offset the loss of modeled habitat by creating and protecting grasslands on Bouldin Island that would be planted with species suitable as foraging habitat for Crotch and western bumble bee, and the creation and enhancement of seasonal wetlands on Bouldin Island would likely support flowering plants along their margins during the spring and the deeper portions during the summer as they dry down (Appendix 3F, Sections 3F.3.2.3, 3F.3.3.2, and 3F.4.1.3.4). The compensatory mitigation for vernal pool fairy shrimp and vernal pool tadpole shrimp (Appendix 3F, Section 3F.3.3.3, and Attachment 3F.1, Table 3F.1-3, CMP-11: *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat*) and protection of upland grasslands as part of California red-legged frog and California tiger salamander mitigation through the purchasing of conservation credits at a USFWS- and CDFW-approved conservation bank (Appendix 3B, Section 3F.3.3.3), could also support habitat for bumble bees. Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities,* and BIO-21: *Avoid and Minimize Impacts on Bumble Bees* would avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on Crotch and western bumble bee from the project alternatives would be less than significant with mitigation because these aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by identifying and avoiding potential habitat to the extent possible during maintenance and construction activities through establishing avoidance buffers, by temporarily delaying work where colonies are identified, and replanting areas of disturbed habitat with suitable foraging plants.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP that DWR will implement (see Impact BIO-1 for a summary discussion of the CMP) would provide benefits to Crotch and western bumble bee habitat by creating and protecting grasslands on Bouldin Island that will be planted with species suitable as foraging habitat for Crotch and western bumble bee and the creation and enhancement of seasonal wetlands on Bouldin Island will likely support flowering plants along their margins during the spring and the deeper portions during the summer as they dry down (Appendix 3F, Sections 3F.3.2.3, 3F.3.3.2, and 3F.4.1.3.4). The protection of upland grasslands as part of vernal pool fairy shrimp, vernal pool tadpole shrimp, California red-legged frog and California tiger salamander mitigation through the purchasing of conservation credits at a USFWS- and CDFW-approved conservation bank (Appendix 3B, Section 3F.3.3.3), could also support habitat for bumble bees. Though these mitigation areas would be specifically targeting suitable habitat for vernal pool fairy shrimp, vernal pool tadpole shrimp, California red-legged frog, and California tiger salamander, they would occur within the range of Crotch and western bumble bee and would generally provide suitable habitat for the species.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-21: Avoid and Minimize Impacts on Bumble Bees

All Project Alternatives

As properties become accessible for initiating project and restoration activities, DWR will require site-level surveys to be conducted to verify the suitability of modeled habitat. Botanical surveys will be conducted by experienced botanists in spring/early summer to identify and map general concentrations of flowering plants that provide food resources (foraging habitat) for Crotch and western bumble bees. The foraging habitat evaluation surveys will be based on recommendations in the *Rusty Patched Bumble Bee Habitat Assessment Form and Guide* (The Xerces Society for Invertebrate Conservation 2017:3–12) or will follow specific guidance for Crotch and western bumble bees available at that time.

If moderate to high quality foraging habitat for Crotch and western bumble bee is identified in construction areas based on the habitat evaluation surveys and these areas will have initial ground disturbance occurring during the nesting season, these areas will be surveyed by qualified invertebrate biologist(s) (familiar with the behavior and life histories of Crotch and western bumble bee) within 1 year prior to the start of construction in a given area. Surveys will be conducted according to the methods in Thorp et al. (1983) or according to any future survey methodologies specifically for Crotch and western bumble bees. Surveys would be conducted during four evenly spaced sampling periods during the flight season for both Crotch and western bumble bees, which is generally between early February and late November (Thorp et al. 1983:18, California Department of Fish and Wildlife 2019b:30). For each sampling event, the biologist(s) will survey suitable habitat using nonlethal netting methods for 1 person-hour per 3 acres of the highest quality habitat or until Crotch or western bumble bees are sighted, whichever comes first. If initial sampling does not find Crotch or western bumble bees and if based on the opinion of a qualified biologist that the habitat is of low quality, no further sampling of that area will be required.

If Crotch and western bumble bees are determined to be absent from a given work area based on negative survey results, or a qualified invertebrate biologist (experienced with bumble bees) concludes that there is a very low likelihood that these species are present, then no additional mitigation is required.

If Crotch or western bumble bees are determined to be present in project work areas, then DWR will implement the following measures.

1. If bumble bee surveys identify occupied Crotch and/or western bumble bee habitat within construction areas, the qualified biologist will then conduct additional preconstruction surveys within the project disturbance footprint for active Crotch and western bumble bee nest colonies and associated floral resources (i.e., flowering vegetation on which bees from the colony are observed foraging) no more than 30 days prior to any ground disturbance between March and September. The purpose of this preconstruction survey is to identify active nest colonies and associated floral resources outside of permanent impact areas (e.g., in staging or other temporary disturbance areas), that could be completely or temporarily avoided by construction personnel. A qualified biologist will establish, monitor, and maintain no-work buffers around Crotch and western bumble bee nest colonies and floral resources identified during surveys. The size and configuration of the no-work buffer will be based on best professional judgment of the biologist. At a minimum, the buffer will provide at least 20 feet of clearance around nest entrances. Construction activities will not occur within the no-work buffers until the colony is no longer active (i.e., no Crotch or western bumble bees are seen flying in or out of the nest for 3 consecutive days, indicating the colony has completed its nesting season and the next season's queens have dispersed from the colony). Monitoring of an active nest could be conducted using a motion-detecting wildlife trail camera or daily by a qualified biologist for a duration suitable for detecting nesting activity based on site-specific conditions, weather, and species behaviors.
2. To minimize temporary disturbance of suitable foraging and nesting habitat for Crotch and western bumble bees, ground disturbance within suitable habitat will be restricted to the minimum area necessary to perform construction activities.
3. Temporarily disturbed grasslands that are revegetated will use a seed mix combination that includes nectar- and pollen-producing plants commonly used as a food source by Crotch and western bumble bees. These plants will be incorporated into the seed mix, as applicable for the existing habitat conditions.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands and other waters as well as habitat for special-status species on Bouldin Island and the I-5 ponds under the project's CMP would affect modeled habitat for Crotch and western bumble bee (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats. The CMP could also affect bumble bees through tidal wetland habitat restoration and channel margin enhancement because potential areas identified generally overlap with modeled habitat (Appendix 3F, Section 3F.4.3.4.2).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of existing bumble bee habitat and the potential for injury or mortality of bumble bees but would ultimately provide benefits for these species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain grasslands suitable for bumble bees and management activities could affect this habitat and result in the disruption of normal behaviors, injury, and mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of bumble bee habitat from restoration activities by adjusting the overall commitment of grassland creation and protection (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to a less-than-significant level. These creation and enhancement activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); and Mitigation Measure BIO-21: *Avoid and Minimize Impacts on Bumble Bees* would reduce these potential impacts to a less-than-significant level by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect bees and their habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

The impact on Crotch and western bumble bee from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance that would have the potential to result in loss of modeled Crotch and western bumble bee habitat or result in injury, mortality, and disruption of normal behaviors of Crotch and western bumble bee from construction equipment conducting grading or excavation, or through exposure to construction-related fluids, such as fuels, oils, and cement. Impacts on Crotch and western bumble bee resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to Crotch and western bumble bee impacts of the project alternatives.

However, the impacts of habitat loss, ground disturbance, and exposure to dust or hazardous materials on Crotch and western bumble bee would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; EC-14: *Construction Best Management Practices for Biological Resources*; and Mitigation Measure BIO-21: *Avoid and Minimize Impacts on Bumble Bees*. Therefore, impacts on Crotch and western bumble bee from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on Crotch and western bumble bee from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-22: Impacts of the Project on California Tiger Salamander

The methods for the analysis of effects on California tiger salamander appear in Section 13.3.1.1 and information on the species life history and habitat suitability model are presented in the species account in Appendix 13B, Section 13B.47, *California Tiger Salamander*.

All Project Alternatives

<u>*Construction*</u>

The construction of the central and eastern alignment alternatives (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), would result in the permanent and temporary loss of California tiger salamander modeled habitat, including potential indirect effects on habitat. These impacts would occur primarily as a result of the construction of new roads and a temporary railroad near Clifton Court Forebay (permanent and temporary upland impacts) and the construction of the South Delta Outlet and Control Structure (permanent and temporary upland impacts). Construction-related grading and excavation would result in the permanent and temporary loss of California tiger salamander upland habitat (Table 13-58). Environmental Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas are restored (Appendix 3B). The South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would be built within less than 50 feet of modeled aquatic habitat that occurs to the west (Figure 13B.47-1), which could result in a permanent change to the hydrology of this aquatic habitat from a reduction in the size of the supporting watershed and the potential to alter the subsurface hydrology, subsequently reducing the habitat's ability to support California tiger salamander breeding. For Alternatives 2a and 4a, a temporary work area associated with the South Delta Outlet and Control Structure would be approximately 125 feet south of modeled aquatic habitat (Figure

13B.47-1) that is known to be occupied by the California tiger salamander (occurrence #965,[1] California Department of Fish and Wildlife 2020a). Depending on the site-specific topography and subsurface hydrology, this temporary work area could temporarily or permanently alter the hydrology of this habitat. Alternatives 2a and 4a would also result in additional impacts on modeled upland habitat on the banks of the Delta-Mendota Canal through the construction of the Jones Outlet Structure.

Table 13-58. Impacts on Modeled Habitat for California Tiger Salamander by Alternative

Alternative	Permanent Impacts—Aquatic (acres) [a]	Permanent Impacts—Upland (acres) [a]	Temporary Impacts—Aquatic (acres)	Temporary Impacts—Upland (acres)	Total (acres)
1, 2b, 2c, 3, 4b, 4c	0.00	94.37	0.00	20.89	115.26
2a, 4a	0.00	143.89	0.00	22.40	166.29
5	0.20	59.58	0.00	18.43	78.21

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

The new intersection for Byron Highway and the extension of Armstrong Road for central and eastern alignment project alternatives (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), would create additional barriers to California tiger salamander potentially dispersing from modeled upland habitat to the east to breeding habitat to the west. Roads servicing the proposed Southern Forebay would also create barriers to movement and fragment modeled upland habitat.

The construction of Alternative 5 would also result in the permanent and temporary loss of California tiger salamander modeled habitat, including potential indirect effects on habitat as result of grading and excavation. These impacts would occur as a result of the improvements to Kelso Road to access the Bethany Reservoir Pumping Plant (permanent and temporary upland impacts), the construction of the Bethany Reservoir Aqueduct and an associated access road off of Kelso Road (permanent and temporary upland and aquatic impacts, indirect aquatic), and construction of the Bethany Reservoir Discharge Structure and associated access road (permanent and temporary upland impacts). The construction of the Bethany Reservoir Aqueduct would affect a portion of a linear vernal pool that appears to feed into a large pool further downslope and would be within 30 feet of another pool (Figure 13B.47-1), all of which are modeled as aquatic habitat for California tiger salamander. Constructing these facilities could result in a permanent change to the hydrology of this aquatic habitat from a reduction in the size of the supporting watershed and the potential to alter the subsurface hydrology, subsequently reducing the habitat's ability to support California tiger salamander breeding.

Alternative 5 would also fragment California tiger salamander upland habitat and create barriers to movement with the widening of Mountain House Road, the construction of the Bethany Reservoir Aqueduct, and construction of the new access road to Bethany Reservoir.

[1] The version of the CNDDB that is cited here, and in the rest of Chapter 13, is from 2020; however, since that time CDFW has split and renumbered the occurrences for California tiger salamander between the three populations. The occurrence numbers referenced in this section (Impact BIO-22: *Impacts of the Project on California Tiger Salamander*) have been updated to reflect those changes as of April 1, 2022 for the central California population of California tiger salamander.

Construction activities associated with the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and Bethany Complex (Alternative 5) for all project alternatives could result in the injury and/or mortality of California tiger salamander if they are moving on the surface or occupying small mammal burrows or soil crevices during activities such as grading, excavation, soil compaction, and the use of construction-related vehicles. California tiger salamander could also be trapped in open trenches or other excavations and become vulnerable to desiccation and predation. Construction activities could also result in the exposure of California tiger salamander to construction-related fluids, such as fuels, oils, and cement, which could result in the injury and/or mortality of eggs, larvae, and adults. Construction lighting during night work could disrupt normal behaviors of California tiger salamander if lighting spills over into adjacent habitats, potentially resulting in delayed dispersal movements and subjecting salamanders to increased predation risk; however, as stated in Chapter 3, Section 3.4.12, *Fencing and Lighting*, construction lighting would be downcast, cut-off type fixtures with non-glare finishes, which would reduce the potential for this impact. Construction noise and vibration could also disrupt normal behaviors and result in increased energy expenditures, predation risk, and potential for injury or mortality from nearby construction if these activities result in individuals leaving underground cover. The use of tunnel boring machines during construction would potentially cause groundborne vibration in the immediate vicinity of tunnel construction areas. However, because of the depth at which the tunnel would be constructed, and because the deep soil cover over the tunnel would effectively dampen and absorb propagated energy from the tunnel crown and the tunnel floor, no significant noise and vibration effects from the operation of the tunnel boring machine on California tiger salamander are anticipated (Chapter 24, *Noise and Vibration*, Section 24.4.3.2, *Impacts of the Project Alternatives Related to Noise and Vibration*). Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic and upland habitat; (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable; and (4) limiting construction vehicle traffic to a maximum speed limit of 15 miles per hour on unpaved, non-public construction access roads and nighttime speed limits to 10 miles per hour on these roads when they are adjacent to suitable habitat for California tiger salamander.

One CNDDB occurrence for California tiger salamander falls within the Southern Complex new road right-of-way at Byron Highway and North Bruns Road and the temporary railroad right-of-way (California Department of Fish and Wildlife 2020a). This record (#152) is from 1982 and is described as a farm pond surrounded by grassland in the vicinity of the junction of Byron Highway and North Bruns Road (California Department of Fish and Wildlife 2020a). No modeled aquatic habitat or aquatic habitat visible in a review of aerial photos (Maxar 2020) or grassland occurs within this CNDDB polygon. A pond surrounded by grassland approximately 0.25 mile southwest of this occurrence has a CNDDB record that was recorded (#965) in 2011. The habitat identified in CNDDB occurrence #152 has either since been removed or the location was incorrectly mapped. No other CNDDB occurrences would be affected by the project alternatives.

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of California tiger salamander. Geotechnical investigations that would occur in the West Tracy Fault Study area, the tunnels linking the Southern Forebay to the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), and the tunnel for the Bethany Reservoir Aqueduct (Alternative 5), which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on California tiger salamander habitat (Appendix 13C). The geotechnical investigations over the conveyance tunnels linking the intakes to the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4) and to the Bethany Complex (Alternative 5) would not take place in modeled California tiger salamander habitat. The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1 day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of California tiger salamander, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans,* EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans,* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic and upland habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

<u>*Operations*</u>

All project alternatives have the potential for impacts on California tiger salamander from operations at project facilities occurring adjacent to modeled habitat, which includes impacts associated with vehicle traffic on access roads and permanent project lighting. California tiger salamanders could be struck by vehicle traffic during the rainy season (November–April), in particular on rainy nights, on access roads to the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex (Alternative 5). Lighting at facilities associated with the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex (Alternative 5) could disrupt normal behaviors of California tiger salamander if lighting at these facilities spills over into adjacent habitats, potentially resulting in delayed dispersal movements and subjecting salamanders to increased predation risk. As stated in Chapter 3, Section 3.4.12, *Fencing and Lighting*, permanent lighting at Bethany Reservoir Pumping Plant and Surge Basin, and discharge structure would be motion activated, downcast, cut-off type fixtures with non-glare finishes, which would minimize the potential for this impact. The analysis in Chapter 18, *Aesthetics and Visual Resources*, Impact AES-4: *Create New Sources of Substantial Light That Would Adversely Affect Day or Nighttime Views of the Construction Areas or Permanent Facilities* shows that with the project designs the lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in levels of light.

Maintenance

The maintenance of the Southern Complex on Byron Tract and west of Byron Highway (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex (Alternative 5) could result in impacts on California tiger salamander.

Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would include repaving of access roads every 15 years, annual embankment repair, quarterly animal burrow filling, quarterly weed management (e.g., mechanical removal and herbicide application), and semiannual general and ground maintenance (e.g., mowing, vegetation trimming), and daily or weekly inspections by vehicle, and could result in the injury and/or mortality of California tiger salamanders occupying burrows and/or dispersing through these areas during these activities. The likelihood of this occurring is low because the Southern Forebay would be constructed in an area that currently does not provide suitable habitat for California tiger salamander, as the nearest modeled aquatic habitat is approximately 1 mile west of the footprint of the proposed forebay, and the ongoing maintenance would likely make it unsuitable for California tiger salamander.

Maintenance activities at the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), which would include annual cleaning (pressure washing), semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, could result in the injury or mortality of California tiger salamanders. These impacts would occur if California tiger salamanders are occupying burrows in areas where vegetation management takes place, if they are dispersing through these areas, or if chemicals used during these activities reach aquatic habitat through spills or from storm runoff. There is modeled aquatic habitat within 50 feet of the facility and occupied habitat that is located approximately 550 feet west of the facility (occurrence #965, California Department of Fish and Wildlife 2020a).

Maintenance activities at the Bethany Complex (Alternative 5), which would include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, could result in the injury or mortality of California tiger salamanders. These impacts would occur if California tiger salamanders are occupying burrows in areas where vegetation management takes place or if they are dispersing through these areas.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of all project alternatives would result in impacts on California tiger salamander through the permanent and temporary loss of modeled habitat, habitat fragmentation, and the potential for injury, mortality, and the disruption of normal behaviors.

The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors of larvae and adults from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments, however, the permanent loss of habitat from the construction of the alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction, operations, and maintenance on California tiger salamander would be significant. Implementation of the CMP would offset the loss of California tiger salamander habitat through the purchase of conservation credits at a USFWS- and CDFW-approved mitigation bank (Appendix 3F, Sections 3F.3.3.3 and 3F.4.2.1.2 and Attachment 3F.1, Table 3F.1-3, CMP-13: *California Tiger Salamander Habitat*), which would reduce the impact associated with habitat loss to a less-than-significant level. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction* (Chapter 18), BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, BIO-22a: *Avoid and Minimize Impacts on California Tiger Salamander,* and BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on California tiger salamander from the project alternatives would be less than significant with mitigation because these aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by designing lighting that avoids spillover into habitats and thus avoiding disrupting dispersal movements; by avoiding construction and maintenance activities in and adjacent to habitat to the extent possible; timing construction activities, installing exclusion fencing, conducting preconstruction surveys, and other protective measures to avoid and minimize the potential for injury and mortality; and by putting in place traffic control measures at DWR facilities during operations to minimize the potential for vehicle strikes.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of California tiger salamander habitat by purchasing conservation credits at a USFWS- and CDFW-approved mitigation bank or though other site protection instruments (Appendix 3F, Sections 3F.3.3.3 and 3F.4.2.1.2 and Attachment 3F.1, Table 3F.1-3, CMP-13: *California Tiger Salamander Habitat*). Mitigation sites would be prioritized for the Concord/Livermore Recovery Unit, which is identified in USFWS's 2017 *Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (*Ambystoma californiense*)* (U S. Fish and Wildlife Service 2017b:II-3).

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-22a: Avoid and Minimize Impacts on California Tiger Salamander

All Project Alternatives

The following measures for California tiger salamander will only be required for construction activities occurring within suitable habitat as identified from the habitat modeling and by additional assessments conducted during the planning for work in a given area.

During project implementation and prior to project construction, DWR will implement the following measures.

1. When each site is available for surveys a USFWS- and CDFW- approved biologist will then delineate California tiger salamander habitat at each project site, based on the definition of suitable habitat, including both aquatic and upland habitat. The criteria used for assessing suitable habitat have been adopted from the primary constituent elements identified in the 2005 critical habitat designation for the Central Valley distinct population segment of California tiger salamander (70 FR 49390). Habitat deemed suitable will include at least one of the following:
    a. Aquatic—Standing bodies of fresh water (including natural and human-made [e.g., stock]) ponds, vernal pools, and other ephemeral or permanent waterbodies that typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall.
    b. Upland—Upland habitats within 1.3 miles of suitable aquatic habitat that contain small mammal burrows or other underground habitat that California tiger salamander depend upon for food, shelter, and protection from the elements and predation. Accessible upland dispersal habitat between occupied locations that allow for movement between such sites.
2. Once habitat has been delineated, the USFWS- and CDFW-approved biologist may use surveys performed using a method approved by USFWS and CDFW to determine presence of the species on the project site to enable further determination of compensatory mitigation requirements. In the event of a dry year, the aquatic habitat will be evaluated based on general suitability (e.g., evidence of suitable ponding depths, proximity to occurrences) and the habitat will be assumed to represent occupied habitat.
3. To the greatest extent possible, identified and delineated habitat will be completely avoided.

For areas verified as being suitable for California tiger salamander and that can’t be avoided, the following measures will be implemented.

4. To the extent practicable, initial ground-disturbing activities will not be conducted between November 1 and March 31, or extended to April 30 during wet years, in areas identified during the planning stages as providing suitable California tiger salamander habitat, to avoid the period when they are most likely to be moving through upland areas. Once the area has been surveyed, initial ground disturbance has occurred, and exclusionary fencing is in place, work within the disturbed area can occur outside the construction window.

5. Where construction takes place in aquatic habitat, activities will not be initiated until after the habitat is no longer ponding water or until a USFWS- and CDFW-approved biologist has surveyed the aquatic habitat for presence of California tiger salamander and results have been submitted to the agencies. No work or dewatering will be allowed in occupied habitat. If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than 5 millimeters to prevent larger aquatic species from entering the pump system.

6. Ground-disturbing activities will be designed to minimize or eliminate effects on rodent burrows that may provide suitable cover habitat for California tiger salamander. Surface-disturbing activities will avoid areas with a high concentration of burrows to the greatest extent practicable. In addition, when a concentration of burrows is present in a work site, the area plus a 50-foot buffer will be staked or flagged to ensure that work crews are aware of their location and to facilitate avoidance of the area.

7. All initial ground disturbance or vegetation removal (clearing) will be limited to periods of no or low rainfall (less than 0.08 inch per 24-hour period and less than 40% chance of rain). To the extent practicable, clearing activities within California tiger salamander habitat will cease 24 hours prior to a 40% or greater forecast of rain from the closest National Weather Service (NWS) weather station. Clearing may continue 24 hours after the rain ceases, if no more than 0.5 inch of precipitation is in the 72-hour forecast. If clearing must continue when rain is forecast (greater than 40% chance of rain), a USFWS- and CDFW-approved biologist will survey the work site before clearing begins each day rain is forecast. If rain exceeds 0.5 inch during a 24-hour period, clearing will cease until the NWS forecasts no further rain. Modifications to this timing may be pursued in coordination with the agencies based on site conditions and expected risks to California tiger salamander. For a given site that has exclusion fencing in place and all surface soil disturbance completed (i.e., no burrows present), these restrictions would no longer apply.

8. To the extent practicable, earthmoving and construction activities will cease no less than 30 minutes before sunset and will not begin again until no less than 30 minutes after sunrise within 300 feet of California tiger salamander habitat. Except when necessary for driver or pedestrian safety, to the greatest extent practicable, artificial lighting at a work site will be prohibited during the hours of darkness.

9. At least 15 days prior to any ground-disturbing activities, DWR will prepare and submit a relocation plan for USFWS's and CDFW's written approval. The relocation plan will contain the name(s) of the USFWS- and CDFW-approved biologist(s) to relocate California tiger salamanders, the method of relocation (if different than described), a map, and a description of the proposed release site(s) within 300 feet of the work area or at a distance otherwise agreed to by USFWS and CDFW, and written permission from the landowner to use their land as a relocation site. The relocation plan will also include methods for searching for California tiger salamander in the work areas to avoid and minimize the potential for injury and mortality. Generally, work areas will be attempted to be cleared of California tiger salamanders by placing pit fall traps along the inside of the exclusion fence (i.e., within work areas) or by hand-excavating mammal burrows. Methods will be selected based on site specific conditions in a given work area and will be approved by USFWS and CDFW. Any California tiger salamanders found will be relocated according to the agency-approved relocation plan and will following the handling protocols outlined below.

10. The perimeter of construction sites within or adjacent to California tiger salamander habitat will be fenced with fencing material suitable for excluding amphibians by no more than 14 days prior to the start of construction activities (e.g., staging, vegetation removal, grading) in a given area. The construction manager and the USFWS- and CDFW-approved biologist will determine where exclusion fencing will be installed to protect California tiger salamander habitat adjacent to the defined site footprint and to minimize the potential for California tiger salamanders to enter the construction work area. The placement of exclusion fencing will be determined, in part, by the locations of suitable habitat for the species (defined above). A conceptual fencing plan will be submitted to USFWS and CDFW prior to the start of construction and the exclusion fencing will be shown on the final construction plans. DWR will include the amphibian exclusion fence specifications including installation and maintenance criteria in the bid solicitation package special provisions. The amphibian exclusion fencing will remain in place for the duration of construction and will be regularly inspected and fully maintained. The biological monitor and construction manager will be responsible for checking the exclusion fencing around the work areas each day of construction for wildlife trapped inside and to ensure that they are intact and upright. This will be especially critical during times of inclement weather that could damage the fencing. Repairs to the amphibian exclusion fence will be made within 24 hours of discovery of a breach. Where construction access is necessary, gates will be installed in the exclusion fence and fencing will be installed to direct animals away from the work area to the extent practicable (e.g., fencing will flare out and turn back toward suitable habitat).

11. Preconstruction surveys will be conducted by a USFWS- and CDFW-approved biologist immediately prior to the initiation of any ground-disturbing activities or vegetation clearing, including immediately prior to exclusion fence installation, in areas identified as having suitable California tiger salamander habitat. These surveys will consist of walking surveys within the work sites and investigating suitable aquatic and upland habitat including potential refugia habitat such as small woody debris, refuse, burrow entrances, etc., that are not directly disturbed by project activities. If there is a lapse in construction in a work area for 7 days or more, these surveys will be repeated before activities resume.

12. The USFWS- and CDFW-approved biologist will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of California tiger salamander. Surveys will be conducted in the same manner as the preconstruction surveys.

13. If a California tiger salamander is observed at any point within a work area, the USFWS- and CDFW-approved biologist will implement the following species observation and handling protocol. Only USFWS- and CDFW-approved biologists will participate in activities associated with the capture, handling, and monitoring of California tiger salamanders. If a California tiger salamander is encountered in a construction area, activities within the vicinity of the individual will cease immediately and the construction manager and USFWS- and CDFW- approved biologist will be notified. The California tiger salamander will be allowed to leave the area of its own volition, and work may resume when it is no longer in harm's way. All personnel on-site will be notified of the finding and at no time will work occur in the vicinity of the California tiger salamander without a USFWS- and CDFW-approved biologist present. If the salamander does not move out of the area on its own, and it is determined by the approved biologist that relocating the California tiger salamander is necessary, these steps will be followed:

a. Prior to handling and relocation, the USFWS- and CDFW-approved biologist will take precautions to prevent introduction of amphibian diseases in accordance with the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (U.S. Fish and Wildlife Service 2003), or the most up-to-date guidance available at the time. Disinfecting equipment and clothing is especially important when biologists are coming to the action area to handle amphibians after working in other aquatic habitats. California tiger salamanders will also be handled and assessed according to the *Restraint and Handling of Live Amphibians* (U.S. Geological Survey National Wildlife Health Center 2001), or the most up-to-date guidance available at the time.

b. California tiger salamanders will be captured by hand, dipnet, or other USFWS- and CDFW-approved methodology, transported, and relocated to nearby suitable habitat outside of the work area and released as soon as practicable the same day of capture. Individuals will be relocated no greater than 300 feet outside of the work area to areas with an active rodent burrow or burrow system (unless otherwise approved by USFWS). Holding/transporting containers and dipnets will be thoroughly cleaned, disinfected, and rinsed with fresh water prior to use within the action area. USFWS and CDFW will be notified within 24 hours of all capture, handling, and relocation efforts. USFWS- and CDFW-approved biologists will wear clean, new disposable surgical style (nitrile, etc.) gloves and/or ensure that their hands are free of soaps, oils, creams, lotions, repellents, or solvents of any sort while capturing and relocating individuals. To avoid transferring disease or pathogens in handling of the amphibians, USFWS- and CDFW-approved biologists will follow the Declining Amphibian Populations Task Force's "Code of Practice" or the most recent guidance.

c. If an injured California tiger salamander is encountered and the USFWS- and CDFW-approved biologist determines the injury is minor or healing and the salamander is likely to survive, the salamander will be released immediately, consistent with the preapproved relocation plan as described above. The California tiger salamander will be monitored until it is determined that it is not imperiled by predators or other dangers.

d. If the USFWS- and CDFW-approved biologist determines that the California tiger salamander has major or serious injuries because of activities at the work site, the USFWS- and CDFW-approved biologist, or designee, will immediately take it to a USFWS- and CDFW-approved facility. If taken into captivity, the individual will not be released into the wild unless it has been kept in quarantine and the release is authorized by USFWS. DWR will bear any costs associated with the care or treatment of such injured California tiger salamanders. The circumstances of the injury, the procedure followed, and the final disposition of the injured animal will be documented in a written incident report. Notification to USFWS and CDFW of an injured or dead California tiger salamander in the project area will be reported within 24 hours and will include details such as whether or not its condition resulted from activities related to the proposed project. In addition, the USFWS- and CDFW-approved biologist will follow up with USFWS and CDFW in writing within 2 calendar days of the finding. Written notification to USFWS and CDFW will include the following information: the species, number of animals taken or injured, sex (if known), date, time, location of the incident or of the finding of a dead or injured animal, how the individual was taken, photographs of the specific animal, the names of the persons who observed the take or found the animal, and any other pertinent information. Dead specimens will be preserved, as appropriate, and held in a secure location until instructions are received from USFWS regarding the disposition of the specimen.

14. The USFWS- and CDFW-approved biologist will have the authority to stop activities at the work site if they determine that any of avoidance and minimization measures are not being fulfilled.

15. If the exclusion fence is compromised during the rainy season, when California tiger salamanders are likely to be active, the fence will be repaired and a survey will be conducted immediately preceding construction activity that occurs in modeled or suitable California tiger salamander habitat, as determined by a USFWS- and CDFW-approved biologist, or in advance of any activity that may result in take of the species. The biologist will search along exclusion fences, and beneath vehicles each morning before they are moved. The survey will include a careful inspection of all potential hiding spots, such as along exclusion fencing; large, downed woody debris; and the perimeter of ponds, wetlands, and riparian areas. Any California tiger salamanders found will be captured and relocated according to the USFWS/CDFW-approved relocation plan.

16. If work must be conducted at night within 300 feet of California tiger salamander habitat, all lighting will be directed away and shielded from California tiger salamander habitat outside the construction area to minimize light spillover to the greatest extent possible. If light spillover into adjacent California tiger salamander habitat occurs, a USFWS- and CDFW-approved biologist will be present during night work to survey for burrows and emerging California tiger salamanders in areas illuminated by construction lighting. If California tiger salamander is found aboveground the USFWS- and CDFW-approved biologist has the authority to terminate the project activities until the light is directed away from the burrows, the California tiger salamander moves out of the illuminated area, or the California tiger salamander is relocated out of the illuminated area by the USFWS- and CDFW-approved biologist.

17. If requested before, during, or upon completion of ground disturbance and construction activities where suitable California tiger salamander habitat is present, DWR will require that USFWS and CDFW can access and inspect the work site for compliance with the description of the project and avoidance and minimization measures, and to evaluate effects on the California tiger salamander and its habitat. A USFWS- and CDFW-approved biologist will be on-site during all activities that may result in take of California tiger salamander.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

DWR will implement the following measures to avoid and minimize wildlife-vehicle collisions on DWR facility access roads.

1. Vehicles will observe a maximum speed limit of 15 miles per hour on unpaved non-public DWR access roads where it is safe and feasible to do so. Vehicles will observe a maximum speed limit of 30 miles per hour on paved, non-public DWR access roads. Speed limits will be posted in both directions.

2. To extent practicable, traffic control structures, such as speed bumps, will be utilized to reduce speeds.

3. Wildlife crossing signs will be posted in both directions on new or widened access roads that overlap with habitat for special-status wildlife, to the extent practicable.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

Implementation of the CMP could result in impacts on California tiger salamander through tidal wetland habitat restoration and channel margin enhancement because potential areas identified include the Cache Slough Complex and Yolo Bypass (Appendix 3F, Section 3F.4.3.4.2), which occurs adjacent to modeled habitat for the species and several records near the western portion of the Cache Slough Complex. Grading and fill to support these activities could directly affect habitat or result in changes to topography and soils such that the hydrology of vernal pools is altered.

The creation and enhancement of wetlands and other waters as well as habitat for special-status species under the project's CMP on Bouldin Island and the I-5 ponds would not result in effects on California tiger salamander because there is no habitat for this species in these areas.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of existing habitat and the potential for injury or mortality of California tiger salamander but could ultimately provide benefits for the species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas would not likely include habitat for California tiger salamander and therefore the species would not likely be affected. Site-specific analyses are not provided because locations of potential site protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of California tiger salamander habitat from restoration and enhancement activities by mitigating for any habitat losses (Appendix 3F, Section 3.F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*), and therefore reducing any habitat losses associated with the CMP to a less-than-significant level. The habitat creation activities would also have the potential to cause injury and mortality of California tiger salamander. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality to a less-than-significant level. These impacts would be less than significant because the aforementioned measures would (1) train construction staff on the needs of protecting habitat, reporting requirements, and the ramifications of not following these measures; (2) implement spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; and (3) have a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

The impact on California tiger salamander from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance and the use of heavy equipment that would have the potential to result in loss of modeled California tiger salamander upland habitat or result in injury, mortality, and disruption of normal behaviors of California tiger salamander adults, larvae, or eggs from ground disturbance, noise, vibration, or inadvertent discharge of construction-related sediment or fluids such as fuels, oils, and cement. Impacts on California tiger salamander resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to California tiger salamander impacts of the project alternatives.

However, the impacts of habitat loss, ground disturbance, noise, visual disturbance, and exposure to sediment or hazardous materials on California tiger salamander would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; EC-14: *Construction Best Management Practices for Biological Resources*; and Mitigation Measure BIO-22a: *Avoid and Minimize Impacts on California Tiger Salamander*. Therefore, impacts on California tiger salamander from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on California tiger salamander from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-23: Impacts of the Project on Western Spadefoot Toad

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for western spadefoot toad are presented in the species account in Appendix 13B, Section 13B.48, *Western Spadefoot*.

All Project Alternatives

Construction

The construction of Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would result in the permanent and temporary loss and indirect effects on modeled western spadefoot toad habitat. Construction-related grading and excavation would result in the permanent and temporary loss of western spadefoot toad upland habitat (Table 13-59). These impacts would primarily occur as a result of the construction of the South Delta Outlet and Control Structure (permanent and temporary upland impacts) and the installation of the SCADA lines in the Southern Complex and near the intakes (temporary upland impacts). Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B). Work associated with the construction of the South Delta Outlet and Control Structure would occur within less than 50 feet west of modeled aquatic habitat and the construction of the park-and-ride facility off Hood-Franklin Road would be within 200 feet of modeled aquatic habitat (Figure 13B.48-1), which could result in a permanent change to the hydrology of this aquatic habitat from a reduction in the size of the supporting watershed and the potential to alter the subsurface hydrology, subsequently reducing the habitat's ability to support western spadefoot toad breeding. The park-and-ride lot would be removed following construction. For Alternatives 2a and 4a, a temporary work area associated with the South Delta Outlet and Control Structure would be approximately 125 feet south of another area of modeled aquatic habitat and similarly could temporarily or permanently change the hydrology of this habitat (Figure 13B.48-1).

Table 13-59. Impacts on Modeled Habitat for Western Spadefoot Toad by Alternative

Alternative	Permanent Impacts—Aquatic (acres) [a]	Permanent Impacts—Upland (acres) [a]	Temporary Impacts—Aquatic (acres)	Temporary Impacts—Upland (acres)	Total (acres)
1	0.00	38.61	0.00	3.20	41.81
2a	0.00	55.62	0.00	3.62	59.24
2b	0.00	35.31	0.00	3.69	39.00
2c	0.00	38.22	0.00	3.59	41.81
3, 4c	0.00	37.75	0.00	3.57	41.32
4a	0.00	55.15	0.00	3.60	58.75
4b	0.00	34.84	0.00	3.65	38.49
5	0.20	32.83	0.00	4.17	37.20

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

The construction of Alternative 5 would also result in the permanent and temporary loss of western spadefoot toad modeled habitat, including potential indirect effects on habitat as a result of grading and excavation. These impacts would occur primarily as a result of the construction of the Bethany Reservoir Aqueduct (permanent and temporary upland and aquatic impacts), construction of the Bethany Reservoir Discharge Structure and associated access road (permanent and temporary upland impacts), and the installation of the SCADA lines near the intakes (temporary upland impacts). Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B). The construction of the Bethany Reservoir Aqueduct would affect a portion of a linear vernal pool that appears to feed into a large pool farther downslope and would be within 30 feet of another pool (Figure 13B.48-1), all of which are modeled as aquatic habitat for western spadefoot toad. Constructing these facilities could result in a permanent change to the hydrology of this aquatic habitat from a reduction in the size of the supporting watershed and the potential to alter the subsurface hydrology, subsequently reducing the habitat's ability to support western spadefoot toad breeding.

Construction activities associated with the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and Bethany Complex (Alternative 5) for all project alternatives could result in the injury and mortality of western spadefoot toad if they are moving on the surface or occupying underground refugia during activities such as grading, excavation, soil compaction, and the use of construction-related vehicles. Western spadefoot toad could also be trapped in open trenches or other excavations and become vulnerable to desiccation and predation. Construction activities could also result in the exposure of toads to construction-related fluids, such as fuels, oils, and cement, which could result in the injury and mortality of eggs, larvae, and adults. Construction lighting during night work could disrupt normal behaviors of western spadefoot toad if lighting spills over into adjacent habitats, potentially resulting in delayed dispersal movements and subjecting toads to increased predation risk. Construction noise and vibration could also disrupt normal behaviors and result in increased energy expenditures, predation risk, and potential for injury and mortality from nearby construction if these activities result in individuals leaving underground cover. The use of tunnel boring machines during construction would potentially cause groundborne vibration in the immediate vicinity of tunnel construction areas. However, because of the depth at which the tunnel would be constructed, and because the deep soil cover over the tunnel would effectively dampen and absorb propagated energy from the tunnel crown and the tunnel floor, no significant noise and vibration effects from the operation of the tunnel boring machine on western spadefoot toad are anticipated (Chapter 24, Section 24.4.3.2, *Impacts of the Project Alternatives Related to Noise and Vibration*). Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic and upland habitat; (3) by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable; and (4) limiting construction vehicle traffic to a maximum speed limit of 15 miles per hour on unpaved, non-public construction access roads.

One CNDDB occurrence for western spadefoot toad falls within road improvement areas for all alternatives just north of SR 4 (California Department of Fish and Wildlife 2020a). This record (#1,366) from 1922 is considered to be being possibly extirpated (California Department of Fish and Wildlife 2020a). There are no other records in the study area. There are several occurrences to the west of the study area in portions of Alameda and San Joaquin Counties (California Department of Fish and Wildlife 2020a).

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of western spadefoot toad. Geotechnical investigations that would occur in the West Tracy Fault Study area for all alternatives and the tunnel for the Bethany Reservoir Aqueduct (Alternative 5), which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on western spadefoot toad habitat

(Appendix 13C). The geotechnical investigations over the conveyance tunnels linking the intakes to the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4) and to the Bethany Complex (Alternative 5), and the Bethany Fault Study investigations would not take place in modeled western spadefoot toad habitat. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of western spadefoot toad, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic and upland habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

Operations

All project alternatives have the potential for impacts on western spadefoot toad from operations at project facilities occurring adjacent to modeled habitat, which includes impacts associated with vehicle traffic on access roads and permanent project lighting. Western spadefoot toad could be struck by vehicle traffic during the rainy season (November–April), in particular on rainy nights, on access roads to the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex (Alternative 5). Lighting at facilities associated with the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex (Alternative 5) could disrupt normal behaviors of western spadefoot toad if lighting at these facilities spills over into adjacent habitats, potentially resulting in delayed dispersal movements and subjecting them to increased predation risk. As stated in Chapter 3, Section 3.14.12, *Fencing and Lighting*, permanent lighting at the Bethany Reservoir Pumping Plant and Surge Basin, and Bethany Reservoir Discharge Structure would be motion activated, downcast, cut-off type fixtures with non-glare finishes, which would minimize the potential for this impact. The analysis in Chapter 18, Impact AES-4: *Create New Sources of Substantial Light That Would Adversely Affect Day or Nighttime Views of the Construction Areas or Permanent Facilities*, shows that with the project designs the lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in levels of light.

Maintenance

The maintenance of the Southern Complex west of Byron Highway (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex (Alternative 5) could result in impacts on western spadefoot toad.

Maintenance activities at the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), which would include annual cleaning (pressure washing), semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, could result in the injury or mortality of western spadefoot toad. These impacts would occur if western spadefoot toads are occupying upland areas where vegetation management takes place, if they are dispersing through these areas, or if chemicals used during these activities reach aquatic habitat through spills or from storm runoff. There is modeled aquatic habitat within 50 feet of the facility.

Maintenance activities at the Bethany Complex (Alternative 5), which would include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, could result in the injury or mortality of western spadefoot toad. These impacts would occur if western spadefoot toads are occupying uplands in areas where vegetation management takes place or if they are dispersing through these areas.

CEQA Conclusion—All Project Alternatives

The construction, operations, and maintenance of all project alternatives would result in impacts on western spadefoot toad through the permanent and temporary loss of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors.

The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors of western spadefoot toad from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments, however, the permanent loss of habitat from the construction of the project alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction, operations, and maintenance, on western spadefoot toad would be significant. Implementation of the CMP would offset the loss of western spadefoot habitat through the purchase of mitigation credits for vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, and California red-legged frog (Appendix 3F, Sections 3F.3.3.3 and 3F.4.2.1.2 and Attachment 3F.1, Table 3F.1-3, CMP-11: *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat,* CMP-13: *California Tiger Salamander Habitat,* and CMP-14: *California Red-legged Frog Habitat*), which would protect habitat also suitable for western spadefoot toad and, therefore, reduce the impact associated with habitat loss to a less-than-significant level. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction* (Chapter 18), BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities,* BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife,* and BIO-23: *Avoid and Minimize Impacts on Western Spadefoot Toad* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on western spadefoot toad from the project alternatives would be less than significant with mitigation because these aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by designing lighting that avoids spillover into habitats, thus avoiding disrupting dispersal movements; by avoiding construction and maintenance activities in and adjacent to habitat to the extent possible; timing construction activities, installing exclusion fencing, conducting preconstruction surveys, and other protective measures to avoid and minimize the potential for injury and mortality; and by putting in place traffic control measures at DWR facilities during operations to minimize the potential for vehicle strikes.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of western spadefoot toad habitat through purchasing mitigation credits for vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, and California red-legged frog (Appendix 3F, Sections 3F.3.3.3 and 3F.4.2.1.2 and Attachment 3F.1, Table 3F.1-3, CMP-11: *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat,* CMP-13: *California Tiger Salamander Habitat,* and CMP-14: *California Red-legged Frog Habitat*), which would protect habitat within the range of and also suitable for western spadefoot toad.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Measure BIO-23: Avoid and Minimize Impacts on Western Spadefoot Toad

All Project Alternatives

As properties become accessible for initiating project activities within areas of modeled western spadefoot toad habitat, the suitability of the modeled habitat will be assessed on the ground by a biologist qualified to identify aquatic and upland habitat for the species.

For areas verified as being suitable for western spadefoot toad, the following measures will be implemented.

1. Except for limited vegetation clearing necessary to minimize effects on nesting birds, initial suitable upland habitat clearance and disturbance will not be conducted between November 1 and March 31, with the period extending to April 30 during wet years. Once the initial ground disturbance has occurred, the area has been surveyed, and exclusionary fencing is in place, work in the disturbed area can occur outside the construction window.

2. Where construction or restoration activities take place in aquatic habitat, activities will not be initiated until after the habitat is no longer ponding water or until a biologist has surveyed the aquatic habitat for presence of western spadefoot toad larvae. No work or dewatering will be allowed in occupied habitat. If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than 5 millimeters to prevent larger aquatic species from entering the pump system.

3. Ground-disturbing activities will be designed to minimize or eliminate effects on rodent burrows that may provide suitable upland habitat for western spadefoot toad. Surface-disturbing activities will avoid areas with a high concentration of burrows to the greatest extent practicable. In addition, when a concentration of burrows is present in a work site,

the area plus a 50-foot buffer will be staked or flagged to ensure that work crews are aware of their location and to facilitate avoidance of the area.

4. All initial ground disturbance or vegetation removal (clearing) will be limited to periods of no or low rainfall (less than 0.08 inch per 24-hour period and less than 40% chance of rain). To the extent practicable, clearing activities within western spadefoot toad habitat will cease 24 hours prior to a 40% or greater forecast of rain from the closest NWS weather station. Clearing may continue 24 hours after the rain ceases, if no more than 0.5 inch of precipitation is in the 72-hour forecast. If clearing must continue when rain is forecast (greater than 40% chance of rain), a qualified biologist will survey the work site before clearing begins each day rain is forecast. If rain exceeds 0.5 inch during a 24-hour period, clearing will cease until the NWS forecasts no further rain. For a given site that has exclusion fencing in place and all surface soil disturbance completed (i.e., no burrows present), these restrictions would no longer apply.

5. To the extent possible, earthmoving and construction activities will cease no less than 30 minutes before sunset and will not begin again until no less than 30 minutes after sunrise within 300 feet of western spadefoot toad habitat. Except when necessary for driver or pedestrian safety, to the greatest extent practicable, artificial lighting at a work site will be prohibited during the hours of darkness.

6. The perimeter of construction and restoration sites within western spadefoot toad habitat will be fenced with fencing material suitable for excluding amphibians by no more than 14 days prior to the start of construction activities (e.g., staging, vegetation removal, grading) in a given area. The construction manager and qualified biologist will determine where exclusion fencing will be installed to protect western spadefoot toad habitat adjacent to the defined site footprint and to minimize the potential for toads to enter the construction work area. DWR will include the amphibian exclusion fence specifications including installation and maintenance criteria in the bid solicitation package special provisions. The amphibian exclusion fencing will remain in place for the duration of construction and will be regularly inspected and fully maintained. A biological monitor and construction manager will be responsible for checking the exclusion fencing around the work areas each day of construction for wildlife trapped inside and to ensure that they are intact and upright. This will be especially critical during times of inclement weather that can damage the fencing. Repairs to the amphibian exclusion fence will be made within 24 hours of discovery of a breach. Where construction access is necessary, gates will be installed in the exclusion fence and fencing will direct animals away from the work area to the extent practicable (e.g., fencing will flare out and turn back toward suitable habitat).

7. Preconstruction surveys will be conducted by a qualified biologist immediately prior to the initiation of any ground-disturbing activities or vegetation clearing, including immediately prior to exclusion fence installation, in areas identified as having suitable western spadefoot toad habitat. These surveys will consist of walking surveys within the work sites and investigating suitable aquatic and upland habitat including potential refugia habitat such as small woody debris, refuse, burrow entrances, etc., that are not directly disturbed by project activities. If there is a lapse in construction in a work area for 7 days or more, these surveys will be repeated before activities resume.

8. If the exclusion fence is compromised during the rainy season, a survey will be conducted immediately preceding construction activity that occurs in suitable western spadefoot toad

habitat, or in advance of any activity that may result in take of the species. The biologist will search along exclusion fences, and beneath vehicles each morning before they are moved. Surveys will be conducted in the same manner as the preconstruction surveys.

9. If a western spadefoot toad is encountered in a construction or restoration area, activities within the vicinity of the animal will cease immediately and the construction manager and biological monitor will be notified. The toad will be allowed to leave the area of its own volition, and work may resume when it is no longer in harm's way. If the toad does not move out of the area on its own, and it is determined by the biologist that relocating is necessary, these steps will be followed:

    a. Prior to handling and relocation, the biologist will take precautions to prevent introduction of amphibian diseases by following guidance in *The Declining Amphibian Task Force Fieldwork Code of Practice* (U.S. Fish and Wildlife Service 2019:1) or the most up-to-date guidance available at the time. Western spadefoot toads will also be handled and assessed according to the *Restraint and Handling of Live Amphibians* (U.S. Geological Survey National Wildlife Health Center 2001) or the most up-to-date guidance available at the time.

    b. Western spadefoot toads will be captured by hand, dipnet, or other CDFW-approved methodology, transported, and relocated to nearby suitable habitat outside of the work area and released as soon as practicable the same day of capture.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands and other waters, as well as habitat for special-status species at the I-5 ponds under the project's CMP, would temporarily affect modeled habitat for western spadefoot toad (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish/restore habitats. The CMP could also affect modeled upland habitat for western spadefoot toad through tidal wetland habitat restoration and channel margin enhancement because potential areas identified generally overlap with modeled habitat (Appendix 3F, Section 3F.4.3.4.2).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of existing habitat and the potential for injury or mortality of western spadefoot toad but could ultimately provide benefits for the species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting*

Habitat, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas would not likely include habitat for western spadefoot toad and therefore would not likely be affected. Site-specific analyses are not provided because locations of potential site protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure that there is no significant loss in habitat or habitat value by adjusting the overall commitment (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and, therefore, reduce any habitat losses associated with the CMP to a less-than-significant level. These activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) and Mitigation Measure BIO-23: *Avoid and Minimize Impacts on Western Spadefoot Toad* would reduce these potential impacts to a less-than-significant level by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect toads and their habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

The impact on western spadefoot toad from the project alternatives with the CMP would be less than significant with mitigation.

<u>Other Mitigation Measures</u>

Some mitigation measures would involve ground disturbance and the use of heavy equipment that would have the potential to result in loss of modeled western spadefoot toad upland habitat or permanently change the hydrology of aquatic habitat within 200 feet of construction areas. Mitigation measures could also result in injury, mortality, and disruption of normal behaviors of western spadefoot toad adults, larvae, or eggs from ground disturbance, noise, vibration, or inadvertent discharge of construction-related sediment or fluids such as fuels, oils, and cement. The mitigation measures with potential to result in impacts on western spadefoot toad are similar to those discussed under Impact BIO-22: *Impacts of the Project on California Tiger Salamander*. Impacts on western spadefoot toad resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to western spadefoot toad impacts of the project alternatives.

The impacts of habitat loss, ground disturbance, noise, visual disturbance, and exposure to sediment or hazardous materials on western spadefoot toad would be reduced through the CMP and environmental commitments as detailed under Impact BIO-22. In addition, Mitigation Measure BIO-23: *Avoid and Minimize Impacts on Western Spadefoot Toad* would require species-specific measures to reduce these impacts. Therefore, impacts on western spadefoot toad from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on western spadefoot toad from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion from less than significant with mitigation.

Impact BIO-24: Impacts of the Project on California Red-Legged Frog

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for California red-legged frog are presented in the species account in Appendix 13B, Section 13B.49, *California Red-Legged Frog*.

All Project Alternatives

Construction

The construction of Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would result in the permanent and temporary loss of modeled California red-legged frog habitat as a result of grading and excavation (Table 13-60). These impacts would occur as a result of the construction of new access roads and the temporary rail spur to the Southern Forebay (permanent and temporary upland and aquatic impacts), realigned Byron Highway (permanent and temporary upland and aquatic impacts), and construction of the Southern Forebay (permanent aquatic impact) (Figure 13B.49-1). The access road and the temporary rail spur, which parallel each other, would cross Brushy Creek and the northern fork of Italian Slough, both of which are identified as modeled aquatic habitat. Another unnamed channel identified as modeled aquatic habitat that ultimately flows into Italian Slough would be affected by the realigned Byron Highway. These crossings would require culverts to maintain the flow of water; however, no specific designs are yet available for these crossings. The modeled aquatic habitat affected by the construction of the Southern Forebay is a small (approximately 0.03 acre) depressional wetland surrounded by agricultural fields (i.e., alfalfa and miscellaneous grain and hay) and is located approximately 2 miles north of a CNDDB occurrence at Italian Slough (#862, California Department of Fish and Wildlife 2020a). Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-60. Impacts on Modeled Habitat for California Red-Legged Frog by Alternative

Alternative	Permanent Impacts—Aquatic (acres) [a]	Permanent Impacts—Upland (acres) [a]	Temporary Impacts—Aquatic (acres)	Temporary Impacts—Upland (acres)	Total (acres)
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	0.47	5.98	1.17	6.48	14.10
5	0.21	7.00	0.12	2.71	10.04

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

The construction of Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would result in the fragmentation of modeled habitat for California red-legged frog and create barriers to the movement of the species from areas east of Byron Highway to areas to the west. These impacts would result from the construction of the new intersection of Byron Highway and Armstrong Road, a new access road from Byron Highway east to the Southern Forebay, and the access road and parallel temporary rail spur (Figure 13B.49-1). There have been two reported observations of California red-legged frog in Italian Slough from 2003 (occurrence #862) (California Department of Fish and Wildlife 2020a). The construction of the permanent access road and the temporary rail spur, which would be used for the construction of the Southern Forebay over a period of 7 years, would add to existing barriers to movement in this area, which include the existing Union Pacific Railroad and Byron Highway. The installation of culverts over Brushy Creek and Italian Slough would maintain connectivity of those aquatic habitat and would allow some adult movement but the rail spur and access road would still represent some barrier to movement. The fragmentation of habitat and barriers to movement would reduce the quality of the remaining habitat and reduce genetic exchange between areas of occupied habitat.

The construction of Alternative 5 would result in the permanent and temporary loss of modeled California red-legged frog habitat as a result of grading and excavation (Table 13-60). These impacts would occur as a result of the construction of the Bethany Reservoir Aqueduct (permanent and temporary upland impacts), Byron Highway/Lindeman Road intersection improvements (permanent upland and aquatic impacts), the widening of Mountain House Road (permanent and temporary upland and aquatic impacts), and the construction of a new interchange for Mountain House Road and Grant Line Road (permanent and temporary upland and aquatic impacts) (Figure 13B.49-1). The improvements on Mountain House Road would require the replacement of existing culverts with longer ones to accommodate the wider road over two unnamed channels, the southernmost of which has a record for California red-legged frog (occurrence #602), and the construction of a new crossing over Mountain House Creek, which also has a record for the species (occurrence #27) (California Department of Fish and Wildlife 2020a). Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

The construction of Alternative 5 would result in the fragmentation of modeled dispersal habitat for California red-legged frog and create barriers to the movement of the species from the presence of the Bethany Reservoir Aqueduct, the widening of Mountain House Road, the construction of a new interchange for Mountain House Road and Grant Line Road, and the new access road to the Bethany Reservoir Discharge Structure (Figure 13B.49-1). The fragmentation of habitat and barriers to movement would reduce the quality of the remaining habitat and reduce genetic exchange between areas of occupied habitat. There are California red-legged frog occurrences that are located approximately 0.4 mile from either side of the Bethany Reservoir Aqueduct (e.g., occurrences #28, #100) (California Department of Fish and Wildlife 2020a); however, the aqueduct does not represent a complete barrier because of the tunneled portion leading to Bethany Reservoir. Mountain House Road and the new access road also increase the barriers to movement between an occurrence immediately to the south (#415) and to several to the north (e.g., #266, #384) (California Department of Fish and Wildlife 2020a). Both roads do not represent complete barriers but do increase the potential for road mortality and the presence of more unsuitable habitat. Construction of the new interchange for Mountain House Road and Grant Line Road would increase barriers to movement for frogs documented in Mountain House Creek (occurrence #27) to areas to the north and south (California Department of Fish and Wildlife 2020a).

Alternative 5 would also result in permanent and temporary impacts on modeled upland and aquatic habitat that is located within critical habitat for California red-legged frog (unit CCS-2B) primarily as a result of constructing the access road to the Bethany Reservoir Discharge Structure and the Aqueduct (Table 13-61). The affected aquatic habitat is a channel that would be affected by the widening of Mountain House Road (Figure 13B.49-1).

Table 13-61. Impacts on Modeled Habitat within Critical Habitat for California Red-Legged Frog by Alternative

Alternative	Permanent Impacts—Aquatic (acres) [a]	Permanent Impacts—Upland (acres) [a]	Temporary Impacts—Aquatic (acres)	Temporary Impacts—Upland (acres)	Total (acres)
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	0.00	0.00	0.00	0.00	0.00
5	0.01	1.64	0.01	1.15	2.81

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities associated with the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and Bethany Complex (Alternative 5) could result in the injury and mortality of California red-legged frog if they are moving on the surface or occupying small mammal burrows or soil crevices during activities such as grading, excavation, soil compaction, and the use of construction-related vehicles. California red-legged frog could also be trapped in open trenches or other excavations and become vulnerable to desiccation and predation. Construction activities could also result in the exposure of California red-legged frog to construction-related fluids, such as fuels, oils, and cement, which could result in the injury and mortality of eggs, larvae, and adults. Construction lighting during night work could disrupt normal behaviors of California red-legged frog if lighting spills over into adjacent habitats, potentially disrupting foraging and breeding activities. Construction noise and vibration could also disrupt normal behaviors and result in increased energy expenditures. The use of tunnel boring machines during construction would potentially cause groundborne vibration in the immediate vicinity of tunnel construction areas. However, because of the depth at which the tunnel would be constructed, and because the deep soil cover over the tunnel would effectively dampen and absorb propagated energy from the tunnel crown and the tunnel floor, no significant noise and vibration effects from the operation of the tunnel boring machine on California red-legged frog are anticipated (Chapter 24, Section 24.4.3.2). Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic and upland habitat; (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable; and (4) limiting construction vehicle traffic to a maximum speed limit of 15 miles per hour on unpaved non-public construction access roads and nighttime speed limits to 10 miles per hour on these roads when they occur adjacent to suitable habitat for California red-legged frog.

One CNDDB occurrence for California red-legged frog falls within the new road right-of-way at Byron Highway and North Bruns Way for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c (#862, California Department of Fish and Wildlife 2020a). This occurrence is a combination of multiple observations, two from 2003, which were discussed above, and three from 2009. The 2009 portion of the occurrence overlaps with the new intersection and is described as an observation of juvenile and adult frogs in a ditch northwest of the current intersection (Byron Highway and North Bruns

Way) and notes its connection to Italian Slough. The habitat model, as written, did not include agricultural ditches as modeled aquatic habitat and agricultural areas as modeled upland; however, this area is nonetheless considered to be an extant occurrence and the loss of the associated aquatic and upland habitat would be determined once on-the-ground conditions are verified.

Two CNDDB occurrences are overlapped by road improvements for Alternative 5, the widening of Mountain House Road (occurrence #602) and the crossing of Mountain House Creek for the new intersection of Mountain House Road and Grant Line Road (occurrence #27) (California Department of Fish and Wildlife 2020a). Both areas contain modeled upland and aquatic habitat as previously discussed and these records consist of multiple observations over many years (California Department of Fish and Wildlife 2020a).

Field investigations for all alternatives would be conducted prior to and during construction under all alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of California red-legged frog. Geotechnical investigations that would occur in the West Tracy Fault Study area, the tunnels linking the Southern Forebay to the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), and the tunnel for the Bethany Reservoir Aqueduct (Alternative 5), which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on modeled habitat (Appendix 13C). The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1 day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The geotechnical investigations over the conveyance tunnels linking the intakes to the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4) and to the Bethany Complex (Alternative 5) would not take place in modeled California red-legged frog habitat. The following field investigations would be conducted within proposed surface construction footprints of proposed facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of California red-legged frog, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic and upland habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

Operations

All alternatives have the potential for impacts on California red-legged frog from vehicle traffic on access roads going to the Southern Forebay and the Bethany Reservoir Discharge Structure. During operations, there may be times that staff need to access these facilities at night, which, if during the rainy season (generally October to March), could result in road mortality of dispersing California red-legged frogs.

Maintenance

Maintenance at the Southern Forebay under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would include repaving of access roads every 15 years, annual embankment repair, quarterly animal burrow filling, quarterly weed management (e.g., mechanical removal and herbicide application), semiannual general and ground maintenance (e.g., mowing, vegetation trimming), and daily or weekly inspections by vehicle, and could result in the injury and mortality of California red-legged frogs occupying burrows or dispersing through these areas during these activities.

Maintenance activities at the Bethany Complex (Alternative 5), which would include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, could result in the injury and mortality of California red-legged frog. These impacts would occur if California red-legged frogs are occupying burrows in areas where vegetation management takes place or if they are dispersing through these areas.

CEQA Conclusion—All Project Alternatives

The construction, operation, and maintenance of all project alternatives would result in impacts on California red-legged frog through the permanent and temporary loss of modeled habitat, the fragmentation of habitat, barriers to dispersal, and the potential for injury, mortality, and the disruption of normal behaviors.

The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors of larvae and adults from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments, however, the permanent loss of habitat from construction of the project alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction, operations, and maintenance on California red-legged frog would be significant. Implementation of the CMP would be required to offset the loss of California red-legged frog habitat through the purchase of conservation credits at a USFWS-approved mitigation bank (Appendix 3F, Sections 3F.3.3.3 and 3F.4.2.1.2 and Attachment 3F.1, Table 3F.1-3, CMP-14: *California Red-Legged Frog Habitat*), which would reduce the impact associated with habitat loss to a less-than-significant level. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction* (Chapter 18), BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, BIO-22b: *Avoid and Minimize*

Operational Traffic Impacts on Wildlife, BIO-24a: *Avoid and Minimize Impacts on California Red-legged frog,* and BIO-24b: *Compensate for Impacts on Red-legged Frog Habitat Connectivity* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on California red-legged frog from the project alternatives would be less than significant with mitigation because these aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by designing lighting that avoids spillover into habitats and thus avoiding potential increases in predation and disrupting normal behaviors; by avoiding construction and maintenance activities in and adjacent to habitat to the extent possible; timing construction activities, installing exclusion fencing, conducting preconstruction surveys, and other protective measures to avoid and minimize the potential for injury and mortality; and by putting in place traffic control measures at DWR facilities during operations to minimize the potential for vehicle strikes.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of California red-legged frog habitat by purchasing conservation credits at a USFWS- and CDFW-approved mitigation bank or though other site protection instruments (Appendix 3F, Sections 3F.3.3.3 and 3F.4.2.1.2 and Attachment 3F.1, Table 3F.1-3, CMP-14: *California Red-Legged Frog Habitat*). California red-legged frog aquatic breeding and upland habitat would be prioritized for protection within the East San Francisco Bay core recovery area as described in the *Recovery Plan for the California Red-Legged Frog* (U.S. Fish and Wildlife Service 2002:51), at a location subject to USFWS approval.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Measure BIO-24a: Avoid and Minimize Impacts on California Red-Legged Frog and Critical Habitat

All Project Alternatives

The following measures for California red-legged frog will only be required for construction activities occurring within suitable habitat as identified from the habitat modeling and by additional assessments conducted during the planning for work in a given area.

To the extent practicable, DWR will minimize impacts on critical habitat for California red-legged frog containing the primary constituent elements listed below.

1. Aquatic Breeding Habitat. Standing bodies of fresh water (with salinities less than 4.5 parts per thousand [ppt]), including: natural and human-made (e.g., stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent waterbodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.

2. Non-Breeding Aquatic Habitat. Freshwater pond and stream habitats, as described above, that may or may not hold water long enough for the species to complete its aquatic life cycle but that do provide for shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult California red-legged frogs. Other wetland habitats that would be considered to meet these criteria include, but are not limited to: plunge pools within intermittent creeks, seeps, quiet water refugia during high water flows, and springs of sufficient flow to withstand short-term dry periods.

3. Upland Habitat. Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian up to a distance of 1 mile in most cases (i.e., depending on surrounding landscape and dispersal barriers) including various vegetational series such as grassland, woodland, forest, wetland, or riparian areas that provide shelter, forage, and predator avoidance. Upland features are also essential in that they are needed to maintain the hydrologic, geographic, topographic, ecological, and edaphic features that support and surround the aquatic, wetland, or riparian habitat. These upland features contribute to the filling and drying of the wetland or riparian habitat and are responsible for maintaining suitable periods of pool inundation for larval frogs and their food sources, and provide breeding, non-breeding, feeding, and sheltering habitat for juvenile and adult frogs (e.g., shelter, shade, moisture, cooler temperatures, a prey base, foraging opportunities, and areas for predator avoidance). Upland habitat can include structural features such as boulders, rocks and organic debris (e.g., downed trees, logs), as well as small mammal burrows and moist leaf litter.

4. Dispersal Habitat. Accessible upland or riparian habitat within and between occupied or previously occupied sites that are located within 1 mile of each other, and that support movement between such sites. Dispersal habitat includes various natural habitats and altered habitats such as agricultural fields, which do not contain barriers to dispersal. Dispersal habitat does not include moderate- to high-density urban or industrial developments with large expanses of asphalt or concrete, nor does it include large lakes or reservoirs over 50 acres in size, or other areas that do not contain those features identified in primary constituent elements 1, 2, or 3 as essential to the conservation of the species.

During project implementation and prior to project construction, DWR will implement the following measures.

5. When each site is available for surveys, biologist approved by USFWS, will then delineate California red-legged frog habitat at each project site, based on an agreed-upon definition of suitable habitat, including both aquatic and upland habitat.

6. Once habitat has been delineated, the qualified biologist may conduct surveys performed using a method approved by USFWS to determine presence of the species on the project site to enable further determination of compensatory mitigation requirements. In the event of a dry year, the aquatic habitat will be evaluated based on general suitability (e.g., evidence of suitable ponding depths, proximity to occurrences) and the habitat will be assumed to represent occupied habitat.

7. To the greatest extent possible, identified and delineated habitat will be completely avoided.

For areas verified as being suitable for California red-legged frog and that can't be avoided, the following measures will be implemented.

8. To the extent practicable, initial ground-disturbing activities will not be conducted between September 1 and April 30, to avoid the wet season which encompasses breeding as well as potential upland migration before and after. Once the area has been surveyed, initial ground disturbance has occurred, and exclusionary fencing is in place, the seasonal restriction would not apply.
9. Ground-disturbing activities will be designed to minimize or eliminate effects on rodent burrows that may provide suitable cover habitat for California red-legged frog. Surface-disturbing activities will avoid areas with a high concentration of burrows to the greatest extent practicable. In addition, when a concentration of burrows is present in a work site, the area will be staked or flagged to ensure that work crews are aware of their location and to facilitate avoidance of the area.
10. All initial ground disturbance or vegetation removal (clearing) will be limited to periods of no or low rainfall (less than 0.08 inch per 24-hour period and less than 40% chance of rain). To the extent practicable, clearing activities within California red-legged frog habitat will cease 24 hours prior to a 40% or greater forecast of rain from the closest NWS weather station. Clearing may continue 24 hours after the rain ceases, if no more than 0.5 inch of precipitation is in the 72-hour forecast. If clearing must continue when rain is forecast (i.e., greater than 40% chance of rain), a USFWS-approved biologist will survey the work site before clearing begins each day rain is forecast. If rain exceeds 0.5 inch during a 24-hour period, clearing will cease until the NWS forecasts no further rain. Modifications to this timing may be approved by USFWS based on site conditions and expected risks to California red-legged frog. For a given site that has exclusion fencing in place and all surface soil disturbance completed (i.e., no burrows present), these restrictions would no longer apply.
11. To the maximum extent practicable, nighttime construction will be minimized or avoided when working in suitable California red-legged frog habitat. To the greatest extent practicable, earthmoving and construction activities will cease no less than 30 minutes before sunset and will not begin again prior to no less than 30 minutes after sunrise. Except when necessary for driver or pedestrian safety, artificial lighting at a work site will be prohibited during the hours of darkness when working in suitable California red-legged frog habitat.
12. If work must be conducted at night within 300 feet of California red-legged frog habitat, all lighting will be directed away and shielded from California red-legged frog habitat outside the construction area to minimize light spillover to the greatest extent possible. If light spillover into adjacent California red-legged frog habitat occurs, a USFWS-approved biologist will be present during night work to survey for California red-legged frogs in areas illuminated by construction lighting. If California red-legged frog is found to be illuminated, the USFWS-approved biologist has the authority to terminate the project activities until the light is directed away from the frog's location, or the California red-legged frog moves out of the illuminated area.
13. At least 15 days prior to any ground disturbance activities, DWR will prepare and submit a relocation plan for USFWS's written approval. The relocation plan will contain the name(s)

of the USFWS-approved biologist(s) to relocate California red-legged frogs, the method of relocation (if different than described), a map, and a description of the proposed release site(s) within 300 feet of the work area or at a distance otherwise agreed to by USFWS, and written permission from the landowner to use their land as a relocation site

14. The perimeter of construction sites will be fenced with fencing material suitable for excluding amphibians by no more than 14 days prior to the start of construction. The construction manager and the USFWS-approved biologist will determine where exclusion fencing will be installed to protect California red-legged frog habitat adjacent to the defined site footprint and to minimize the potential for California red-legged frog to enter the construction work area. The placement of exclusion fencing will be determined, in part, by the locations of suitable habitat for the species. A conceptual fencing plan will be submitted to USFWS prior to the start of construction and the California red-legged frog exclusion fencing will be shown on the final construction plans. DWR will include the amphibian exclusion fence specifications including installation and maintenance criteria in the bid solicitation package special provisions. The amphibian exclusion fencing will remain in place for the duration of construction and will be regularly inspected and fully maintained. The biological monitor and construction manager will be responsible for checking the exclusion fencing around the work areas each day of construction for wildlife trapped inside and to ensure that they are intact and upright. This will be especially critical during times of inclement weather that can damage the fencing. Repairs to the amphibian exclusion fence will be made within 24 hours of discovery of a breach. Where construction access is necessary, gates will be installed in the exclusion fence and fencing will direct animals away from the work area to the extent practicable (e.g., fencing will flare out and turn back toward suitable habitat).

15. Preconstruction surveys will be conducted by a USFWS-approved biologist immediately prior to the initiation of any ground-disturbing activities or vegetation clearing, including immediately prior to exclusion fence installation, in areas identified as having suitable California red-legged frog habitat. These surveys will consist of walking the work site limits. The USFWS-approved biologist will investigate all potential areas that could be used by the California red-legged frog for feeding, breeding, sheltering, movement, or other essential behaviors. If there is a lapse in construction in a work area for 7 days or more, these surveys will be repeated before activities resume.

16. The USFWS-approved biologist will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of California red-legged frog. These surveys will consist of walking surveys within the work sites and investigating suitable aquatic and upland habitat including potential refugia habitat such as small woody debris, refuse, and burrow entrances, that are not directly disturbed by project activities.

17. If a California red-legged frog is encountered at any point within a work area, activities in the vicinity of the animal will cease immediately and the construction manager and biological monitor will be notified. The frog will be allowed to leave the area of its own volition, and work may resume when it is no longer in harm's way. All personnel on-site will be notified of the finding and at no time will work occur in the vicinity of the frog without a USFWS-approved biologist present. If the frog does not move out of the area on its own, and it is determined by the USFWS-approved biologist that relocating the frog is necessary, these steps will be followed:

a. Prior to handling and relocation, the biologist will take precautions to prevent introduction of amphibian diseases by following guidance in *The Declining Amphibian Task Force Fieldwork Code of Practice* (U.S. Fish and Wildlife Service 2019:1), or the most up-to-date guidance available at that time. California red-legged frogs will also be handled and assessed according to the *Restraint and Handling of Live Amphibians* (U.S. Geological Survey National Wildlife Health Center 2001), or the most up-to-date guidance available at that time.

b. California red-legged frogs will be captured by hand, dipnet, or other USFWS-approved methodology, transported, and relocated to nearby suitable habitat outside of the work area and released as soon as practicable the same day of capture per the relocation plan. Holding/transporting containers and dipnets will be thoroughly cleaned, disinfected, and rinsed with fresh water prior to use within construction areas. USFWS will be notified within 24 hours of all capture, handling, and relocation efforts. USFWS-approved biologists will wear clean, new disposable surgical style (latex, nitrile, etc.) gloves and/or ensure that their hands are free of soaps, oils, creams, lotions, repellents, or solvents of any sort while capturing and relocating individuals. To avoid transferring disease or pathogens in handling of the amphibians, USFWS-approved biologists will follow the Declining Amphibian Populations Task Force's "Code of Practice" or the most up to date, agency-accepted guidance.

c. If an injured California red-legged frog is encountered and the USFWS-approved biologist determines the injury is minor or healing and the frog is likely to survive, the frog will be released immediately, consistent with the preapproved relocation plan as described above. The frog will be monitored until it is determined that it is not imperiled by predators or other dangers.

d. If the USFWS-approved biologist determines that the frog has major or serious injuries because of activities at the work site, the USFWS-approved biologist, or designee, will immediately take it to a USFWS-approved facility. If taken into captivity, the individual will not be released into the wild unless it has been kept in quarantine and the release is authorized by USFWS. DWR will bear any costs associated with the care or treatment of such injured frogs. The circumstances of the injury, the procedure followed, and the final disposition of the injured animal will be documented in a written incident report. Notification to USFWS of an injured or dead California red-legged frog in the project area will be reported within 24 hours and will include details such as whether or not its condition resulted from activities related to the proposed project. In addition, the USFWS-approved biologist will follow up with USFWS in writing within 2 calendar days of the finding. Written notification to USFWS will include the following information: the species, number of animals taken or injured, sex (if known), date, time, location of the incident or of the finding of a dead or injured animal, how the individual was taken, photographs of the specific animal, the names of the persons who observed the take or found the animal, and any other pertinent information. Dead specimens will be preserved, as appropriate, and held in a secure location until instructions are received from USFWS regarding the disposition of the specimen.

18. Work within suitable aquatic habitats will not begin until the habitat is dry or has been adequately surveyed and dewatered. Aquatic habitats that must be dewatered will be surveyed for California red-legged frogs prior to dewatering. Dewatering pumps will be screened with wire mesh not larger than 5 millimeters to prevent larvae from entering the

pump. The biological monitor will be present during dewatering. Any California red-legged frogs found will be relocated per the relocation plan.

Mitigation Measure BIO-24b: Compensate for Impacts on California Red-Legged Frog Habitat Connectivity

All Project Alternatives

To mitigate for impacts on California red-legged frog habitat connectivity resulting from the construction of the access roads and rail spur leading to the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the construction of a new crossing on Mountain House Creek, a widened section of Byron Highway crossing over an unnamed channel near the new Lindemann Road interchange (Alternative 5), and a widened section of Mountain House Road over two unnamed creeks, DWR will design and construct crossings (i.e., culverts or bridges) on Brushy Creek, Italian Slough, Mountain House Creek, and the unnamed channels crossing Byron Highway and Mountain House Road that meet the following performance standards.

1. Completely span suitable California red-legged frog aquatic habitat.
2. Maintain natural channel substrates, or similar materials, at road and rail spur crossings over California red-legged frog habitat.
3. Size the constructed crossings to include upland habitat on at least one side of each channel that is above the bank full width to allow for terrestrial movement and refugia from bank full flows.

New and widened road segments will be designed and constructed on the new access road to Bethany Reservoir, Byron Highway, Mountain House Road, Grant Line Road, and Lindemann Road with the following features:

4. New and widened access road segments will avoid installing curbs, to the extent practicable. If curbs must be installed, curbs will be designed with sloping sides less than 30 degrees (Clevenger and Huijser 2011:156) to allow amphibian movement across the road.
5. New and widened access road segments will avoid installing median barriers (i.e., k-rails), to the extent practicable. If median barriers cannot be avoided due to public safety concerns, barriers will be outfitted with small openings at ground level to allow amphibian passage.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands and other waters as well as habitat for special-status species at the I-5 ponds and on Bouldin Island, and tidal wetland habitat restoration and channel margin enhancement locations (Appendix 3F, Section 3F.4.3.4.2) under the project’s CMP would not affect modeled habitat for California red-legged frog because these activities are outside of the known range of the species.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of existing habitat and the potential for injury or mortality of California red-legged frog if these activities take place in areas of suitable upland habitat for the species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas would not likely include habitat for California red-legged frog and therefore the species would not likely be affected. Site-specific analyses are not provided because locations of potential site protection instruments are not currently known.

The impact on California red-legged frog from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance and the use of heavy equipment that would have the potential to result in loss of modeled California red-legged frog habitat or result in injury, mortality, and disruption of normal behaviors of California red-legged frog adults, larvae, or eggs from ground disturbance, noise, vibration, or inadvertent discharge of construction-related sediment or fluids such as fuels, oils, and cement. The mitigation measures with potential to result in impacts on California red-legged frog are similar to those discussed under Impact BIO-22: *Impacts of the Project on California Tiger Salamander*. The impacts of habitat loss, ground disturbance, noise, visual disturbance, and exposure to sediment or hazardous materials on California red-legged frog would be reduced through the CMP and environmental commitments as detailed under Impact BIO-22. Impacts on California red-legged frog resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to California red-legged frog impacts of the project alternatives.

The impacts of habitat loss, ground disturbance, noise, visual disturbance, and exposure to sediment or hazardous materials on California red-legged frog would be reduced through the CMP and environmental commitments as detailed under Impact BIO-22. In addition, Mitigation Measure BIO-24a: *Avoid and Minimize Impacts on California Red-Legged Frog* would require species-specific measures to reduce these impacts. Therefore, impacts on California red-legged frog from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on California red-legged frog from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion from less than significant with mitigation.

Impact BIO-25: Impacts of the Project on Western Pond Turtle

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for western pond turtle are presented in the species account in Appendix 13B, Section 13B.50, *Western Pond Turtle*.

All Project Alternatives

Construction

The construction of all the project alternatives would result in the permanent and temporary loss of western pond turtle modeled habitat from project related grading and excavation (Table 13-62). The loss of habitat would primarily occur as a result of the levee improvement work (Alternatives 1, 2a, 2b, and 2c), Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), new roads and road improvements (all alternatives), and the intake construction (all alternatives) (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat relative to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-62. Impacts on Modeled Habitat for Western Pond Turtle by Alternative

Alternative	Permanent Impacts—Aquatic (acres) [a]	Permanent Impacts—Upland (acres) [a]	Temporary Impacts—Aquatic (acres)	Temporary Impacts—Upland (acres)	Total (acres)
1	95.65	388.65	34.71	109.01	628.02
2a	92.06	448.94	41.08	124.89	706.97
2b	81.69	349.13	39.92	121.21	591.95
2c	86.97	367.86	40.89	123.53	619.25
3	79.68	131.65	25.55	75.11	311.99
4a	84.36	207.88	25.77	76.72	394.73
4b	71.61	107.78	24.59	73.05	277.03
4c	77.08	126.79	25.57	75.35	304.79
5	33.76	109.56	16.45	48.34	208.11

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities associated with project facilities for all alternatives could result in the injury and mortality of western pond turtle if they are occupying aquatic or upland habitat in work areas during activities such as grading, excavation, vegetation removal, and the use of construction-related vehicles. Western pond turtle could also be trapped in open trenches or other excavations and become vulnerable to predation. Construction activities could also result in the exposure of western pond turtle to construction-related fluids, such as fuels, oils, and cement, which could result in the injury and mortality of eggs, hatchlings, and adults. Construction noise and vibration could also disrupt normal behaviors and result in increased energy expenditures and predation risk. The use of tunnel boring machines during construction would potentially cause groundborne vibration in the immediate vicinity of tunnel construction areas. However, because of the depth at which the tunnel would be constructed, and because the deep soil cover over the tunnel would effectively dampen and absorb propagated energy from the tunnel crown and the tunnel floor, no significant noise and vibration effects from the operation of the tunnel boring machine on western pond turtle are anticipated (Chapter 24, Section 24.4.3.2). Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic and upland habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

Six CNDDB occurrences of western pond turtle would overlap with the project alternatives (California Department of Fish and Wildlife 2020a). The emergency spillway on the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) overlaps with an occurrence (#143) at the northern end of Clifton Court Forebay. The levee and road improvements on Bouldin Island associated with the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) overlap with three occurrences (#164, #187, and #247) along the existing levees and along SR 12. SCADA improvements along SR 12 for all alternatives overlap with an occurrence (#68). Road improvements for all alternatives and RTM construction and a shaft for Alternative 5 overlap with an occurrence (#451).

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of western pond turtle. Geotechnical investigations that would occur in the West Tracy Fault Study area and over the tunnel alignment footprints, which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on modeled habitat (Appendix 13C). The Bethany Fault Study investigations would not affect modeled western pond turtle habitat. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of western pond turtle, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for*

Biological Resources (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic and upland habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

Operations

All project alternatives have the potential for operational impacts on western pond turtle from vehicles and from changes to water quality. Western pond turtles moving across access roads could be struck by vehicles resulting in injury and mortality. Trips on any given access roads to DWR facilities would be relatively infrequent but do pose a risk to the species where roads occur between aquatic and upland habitats.

Changes in water operations under all project alternatives have the potential to exacerbate bioaccumulation of methylmercury in western pond turtle. Although the magnitude of methylmercury bioaccumulation differs among species, largemouth bass was used as a surrogate species for analysis of impacts from changes in operations of the water conveyance facilities because they are good indicators of mercury contamination in aquatic foodwebs throughout the Delta (Wood et al. 2010: 67) and would reflect changes in methylmercury bioavailability due to the project (Appendix 9H, *Mercury*). The modeled effects of mercury concentrations from changes in water operations on largemouth bass did not differ substantially from existing conditions; therefore, these results also indicate western pond turtle mercury exposure would not measurably increase as a result of project operations.

Microcystin toxins originate in aquatic systems and can be transported through foodwebs through consumption (Moy et al. 2016:A) and can affect western pond turtle if they forage in aquatic habitats with conditions that promote formation of cyanobacterial harmful algal blooms (CHABs). Operation of all project alternatives is not expected to substantially change the five factors that could create conditions more conducive to CHAB formation (i.e., temperature, residence time, nutrients, water velocities and associated turbulence and mixing, and water clarity and associated irradiance) relative to existing conditions upstream of the Delta, within the Delta, or in Suisun Marsh, Suisun Bay, or San Francisco Bay (Chapter 9, *Water Quality*). The water quality modeling results show a potential for increased residence time in some locations and months within the central Delta, namely Discovery Bay where there are already very long residence times, which could contribute to increased *Microcystis* bloom size in some years at these locations if the remaining four environmental factors are also at levels conducive to forming CHABs. Nevertheless, based on known *Microcystis* dynamics in the Delta, a small increase of residence time at Discovery Bay would not cause *Microcystis* blooms to substantially increase in size or last substantially longer, relative to existing conditions. Because the project alternatives, through their effects on the five factors potentially associated with CHABs in the Delta, are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystin or any other cyanotoxins in the Delta that could cause a substantial adverse impact on western pond turtle, relative to existing conditions.

Current use and legacy pesticides have the potential to bioaccumulate in the food items of western pond turtle. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows, and would not result in land-use changes that would increase use of pesticides in habitats used by western pond turtles, relative to existing conditions. Therefore, the project alternatives would not substantially reduce prey populations or increase pesticide exposure to western pond turtle.

Changes in water operations under all project alternatives has the potential to exacerbate bioaccumulation of selenium in western pond turtle. Modeled selenium concentrations in fish tissue, used as a surrogate, were below the level of concern and did not differ substantially from existing conditions under all alternatives (Appendix 9J, *Selenium*), which suggests that selenium exposure to western pond turtles would also not change. Therefore, the project alternatives are not anticipated to substantially increase the risk of selenium contamination in western pond turtle.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on western pond turtle. Maintenance activities across all facilities that could affect western pond turtles include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, and could result in the injury, mortality, and disruption of normal behaviors of western pond turtle if these activities occur adjacent to aquatic habitat or suitable upland habitat.

CEQA Conclusion—All Project Alternatives

The construction, operation, and maintenance of all project alternatives would result in impacts on western pond turtle through the permanent and temporary loss of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors. For all project alternatives, changes in water operations would not be expected to result in a measurable increase in mercury or selenium bioavailability or pesticide or microcystin exposure to western pond turtle.

The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors of western pond turtle from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments, however, the permanent loss of habitat from the construction of the alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction, operations, and maintenance on western pond turtle would be significant. Implementation of the CMP would offset the loss of western pond turtle habitat through the creation and protection of suitable aquatic habitat, which would include freshwater emergent wetland and open water habitat, and upland habitat, which would include grassland and riparian, on Bouldin Island and at the I-5 ponds (Appendix 3F, Sections 3F.4.1.3 and 3F.4.1.4). Future channel margin enhancement and tidal wetland habitat (Appendix 3F, Section 3F.4.3) would also provide habitat for western pond turtle. These actions described in the CMP would reduce the habitat loss impact to a less-than-significant level. Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife,* and BIO-25: *Avoid and Minimize Impacts on Western Pond Turtle* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on western pond turtle from the project alternatives would be less than significant with mitigation because these aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by avoiding construction and maintenance activities in and adjacent to habitat to the extent possible; timing construction activities, installing exclusion fencing, conducting preconstruction surveys, and other protective measures to avoid and minimize the potential for injury and mortality; and by putting in place traffic control measures at DWR facilities during operations to minimize the potential for vehicle strikes.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of western pond turtle habitat through creation and protection of suitable aquatic habitat, which would include freshwater emergent wetland and open water habitat, and upland habitat, which would include grassland and riparian, on Bouldin Island and at the I-5 ponds (Appendix 3F, Sections 3F.4.1.3 and 3F.4.1.4). Future channel margin enhancement and tidal wetland habitat (Appendix 3F, Section 3F.4.3) would also provide habitat for western pond turtle.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Measure BIO-25: Avoid and Minimize Impacts on Western Pond Turtle

All Project Alternatives

The following measures for western pond turtle will only be required for project construction occurring within or adjacent to suitable habitat as identified from the habitat modeling and by planning level assessments conducted once access to the project footprint is available. A qualified biologist will conduct a field evaluation of suitable upland or aquatic habitat for western pond turtles for all project activities that occur within modeled habitat.

If the project does not fully avoid effects on suitable habitat, the following measures will be required.

1. No more than 14 days prior to the start of construction activities in a given area, exclusion fencing will be installed between the work area and adjacent suitable aquatic habitat. Where openings need to be maintained, such as on the levee road, fencing will be installed to direct turtles away from the work area to the extent practicable (e.g., fencing will flare out and turn back toward the river and adjacent riparian). Fencing will be installed prior to the start of the nesting season (March) and remain in place for the duration of construction. Fencing may be moved or reconfigured to facilitate construction. The biological monitor and construction manager will be responsible for checking the exclusion fencing around the work areas each day of construction to ensure that they are intact and upright. Repairs to the exclusion fence will be made within 24 hours of discovery of damage. Where

construction access is necessary, gates will be installed in the exclusion fence and fencing will direct animals away from the work area to the extent practicable (e.g., fencing will flare out and turn back toward suitable habitat).

2. Preconstruction surveys will be conducted by a qualified biologist immediately prior to the initiation of any ground-disturbing activities or vegetation clearing, including exclusion fence installation, in areas identified as having suitable western pond turtle habitat. If there is a lapse in construction in a work area for 7 days or more, these surveys will be repeated before activities resume.

3. The qualified biologist will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of western pond turtle. If a turtle is observed, the qualified biologist will implement the following species observation and handling protocol. Only qualified biologists will participate in activities associated with the capture, handling, and monitoring of western pond turtles. If a turtle is encountered in a construction area, activities within the vicinity of the individual will cease immediately, and the construction manager and qualified biologist will be notified. The turtle will be allowed to leave the area of its own volition, and work may resume when it is no longer in harm's way. All personnel on-site will be notified of the finding and at no time will work occur in the vicinity of the turtle without a qualified biologist present. If the turtle does not move out of the area on its own, and it is determined by the qualified biologist that relocating the turtle is necessary, relocation will be done in coordination with CDFW. Any handling of turtles will be done by a biologist with a valid memorandum of understanding from CDFW authorizing the capture and relocation of turtles and as determined during coordination with CDFW. Biologists will wear clean, new disposable surgical style (nitrile, etc.) gloves while handling and relocating individuals.

4. If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than 5 millimeters to prevent juvenile pond turtle and other aquatic species from entering the pump system. Any turtles found in the dewatered area will be relocated in coordination with CDFW to the nearest aquatic habitat by a biologist authorized to relocate turtles.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands and other waters as well as habitat for special-status species at the I-5 ponds and on Bouldin Island under the project's CMP would affect modeled habitat for western pond turtle (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish/restore habitats. The CMP could also affect modeled habitat through tidal wetland habitat restoration and channel margin enhancement because potential areas identified generally overlap with modeled habitat (Appendix 3F, Section 3F.4.3.4.2).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which are not habitats for western pond turtle; therefore, there would not likely be any effects on this species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain habitat for western pond turtle and management activities could affect this habitat and result in the disruption of normal behaviors, injury, and mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure that there is no significant loss in habitat or habitat value by adjusting the overall commitment (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to a less-than-significant level. These activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts to a less-than-significant level by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic and upland habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

Creation and enhancement of wetlands and other waters under the CMP have the potential to exacerbate bioaccumulation of methylmercury in western pond turtle by creating newly inundated wetlands which can produce the biogeochemical conditions to methylate mercury existing in Delta soils. Because Bouldin Island and the I-5 ponds sites consist of existing managed and agricultural wetlands and ponds, wetland creation and enhancement are not expected to increase mercury methylation, relative to existing conditions. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2, *Monitoring*) would include mercury monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased mercury methylation, relative to existing conditions. Mitigation Measure WQ-6: *Develop and Implement a Mercury Management and Monitoring Plan*, which contains measures to assess the amount of mercury at tidal restoration sites before project development, followed by appropriate design and adaptative management, would minimize the potential for any effects of increased methylmercury exposure due to tidal restoration. Therefore, implementation of the CMP would not be expected to have a significant adverse impact on western pond turtle.

Habitat creation and enhancement under the CMP has the potential to result in conditions that promote CHABs, which could result in impacts on western pond turtle using created and/or enhanced wetland and aquatic habitats. High levels of microcystins in tissues and microcystin poisoning have been documented in other turtle species using other aquatic habitats (Chen et al. 2009:3317) and could affect western pond turtle if they forage in areas with conditions that promote CHABs. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include CHAB monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased CHAB formation, relative to existing conditions. As discussed in Chapter 9, *Water Quality,* tidal habitat creation is not expected to cause substantial additional *Microcystis* production. Therefore, implementation of the CMP would not result in increased CHAB formation that could cause substantial adverse impacts on western pond turtle, relative to existing conditions.

Herbicides would be applied at CMP restoration sites to remove nonnative vegetation for site preparation and to support establishment of new plantings. Natural habitats contribute fewer pesticides to receiving waters than agricultural areas where pesticides are applied. Any newly created wetlands or enhanced natural habitat could also filter stormwater to remove solids and either improve or have no effect on pesticide concentrations in discharges to receiving waters, relative to existing conditions. As such, restoration areas are expected to somewhat reduce, rather than increase, runoff of pesticides in adjacent waterbodies. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides would be applied in such a manner as to prevent primary or secondary poisoning of western pond turtles.

Wetland creation and enhancement may provide habitat for western pond turtle, which could increase the risk of selenium toxicity to the species. It is difficult to determine whether the effects of potential increases in selenium bioavailability associated with restoration activities under the CMP would lead to adverse effects. Potential effects of increased selenium exposure are likely low for western pond turtle because modeled concentrations in fish tissue and bird eggs under existing conditions in the Delta were below levels of concern (Appendix 9J), which suggests selenium concentrations in western pond turtles are similarly low and existing selenium concentrations are low in the Sacramento River watershed (Central Valley Regional Water Quality Control Board 1988:14). Analysis included in Chapter 9 for Impact WQ-10 found that compensatory mitigation would not result in a measurable increase in selenium concentrations or selenium bioavailability.

The impact on western pond turtle from the project alternatives with the CMP would be less than significant with mitigation.

Mitigation Measure WQ-6, Develop and Implement a Mercury Management and Monitoring Plan

See description of Mitigation Measure WQ-6 under Impact WQ-6 in Chapter 9.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance and the use of heavy equipment, pile driving, or pesticides that would have the potential to result in loss of modeled western pond turtle habitat or result in injury, mortality, and disruption of normal behaviors of western pond turtle adults, hatchlings, or eggs from ground disturbance, noise, vibration, or inadvertent discharge of construction-related fluids such as fuels, oils, and cement in aquatic and upland habitat. Impacts on western pond turtle resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to western pond turtle impacts of the project alternatives.

However, the impacts of habitat loss, ground disturbance, noise, vibration, and exposure to hazardous materials on western pond turtle would be reduced through the CMP, Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-14: *Construction Best Management Practices for Biological Resources*, and Mitigation Measure BIO-25: *Avoid and Minimize Impacts on Western Pond Turtle*. Therefore, impacts on western pond turtle from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on western pond turtle from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-26: Impacts of the Project on Coast Horned Lizard

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for coast horned lizard are presented in the species account in Appendix 13B, Section 13B.51, *Coast Horned Lizard*.

All Project Alternatives

Construction

The construction of all the project alternatives would result in the permanent and temporary loss of coast horned lizard modeled habitat. The loss of modeled habitat would primarily occur as a result of the levee improvement work, new roads and road improvements, and the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment (Table 13-63). Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-63. Impacts on Modeled Habitat for Coast Horned Lizard by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	241.00	46.67	287.67
2a	257.10	53.22	310.32
2b	232.22	51.84	284.06
2c	234.34	53.17	287.51
3	32.43	14.51	46.94
4a	55.36	14.57	69.93
4b	30.48	13.17	43.65
4c	32.59	14.52	47.11

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
5	19.50	20.07	39.57

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities for all project alternatives could result in the injury, mortality, and disruption of feeding, breeding, and dispersal of coast horned lizard. These effects could result from project grading, excavation, the use of construction-related vehicles, and exposure of coast horned lizards to construction-related fluids, such as fuels, oils, and cement. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

There are no CNDDB (California Department of Fish and Wildlife 2020a) occurrences of coast horned lizard in locations that would be permanently or temporarily affected by project construction for any of the alternatives. The nearest occurrence is outside of the study area, approximately 2 miles west of the project road improvements on Byron Highway.

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of coast horned lizard. Geotechnical investigations that would occur in the West Tracy Fault Study area and over the tunnel alignment footprints, which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on habitat (Appendix 13C). The Bethany Fault Study investigations would not affect modeled coast horned lizard habitat. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of coast horned lizard, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

Operations

All project alternatives have the potential for impacts on coast horned lizard from vehicle traffic on access roads during operations at project facilities. Coast horned lizards could in particular be struck by vehicle traffic on access roads to the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex (Alternative 5) because the likelihood of the species occurring in these areas is greater than other portions of the project area; there are several occurrences for the species 2 to 5 miles west of the study area (California Department of Fish and Wildlife 2020a).

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on coast horned lizard. Maintenance activities across all facilities that could affect coast horned lizard include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, and could result in the injury, mortality, and disruption of normal behaviors (i.e., foraging, breeding, and dispersal) of coast horned lizard. Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would include annual embankment repair and quarterly animal burrow filling, which could also result in the injury, mortality, and disruption of normal behaviors if coast horned lizards are present in these areas.

CEQA Conclusion—All Project Alternatives

The construction, operation, and maintenance of all project alternatives would result in impacts on coast horned lizard through the permanent and temporary loss of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors.

The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors of coast horned lizard from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments, however, the permanent loss of habitat from the construction of the alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction, operations, and maintenance on coast horned lizard would be significant. Implementation of the CMP would offset the loss of coast horned lizard habitat by creating and protecting grasslands on Bouldin Island (Appendix 3F, Section 3F.3.3.2) and through the protection of upland grasslands as part of California red-legged frog and California tiger salamander mitigation (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3), which could contain suitable habitat for coast horned lizard. Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities,* BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife,* and BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on coast horned lizard from the project alternatives would be less than significant with mitigation because these aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by avoiding construction and maintenance activities in and adjacent to habitat to the extent possible; timing construction activities, conducting preconstruction surveys, and other protective measures to avoid and minimize the potential for injury and mortality; and by putting in place traffic control measures at DWR facilities during operations to minimize the potential for vehicle strikes.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of coast horned lizard habitat by creating and protecting grasslands on Bouldin Island (Appendix 3F, Section 3F.3.3.2) and through the protection of upland grasslands as part of California red-legged frog and California tiger salamander mitigation, which would involve purchasing conservation credits at a USFWS- and CDFW-approved conservation bank (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3), which could contain suitable habitat for coat horned lizard. Though these mitigation areas would be specifically targeting suitable habitat for California red-legged frog and California tiger salamander, they would mostly likely occur within the range of coast horned lizard and could generally provide suitable upland habitat for the species.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Measure BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles

All Project Alternatives

The following measures will be required to avoid and minimize impacts on special-status reptiles.

1. During project implementation and prior to project construction, DWR will direct a qualified biologist to conduct a habitat assessment in modeled habitat for coast horned lizard, Northern California legless lizard, California glossy snake, and San Joaquin coachwhip to confirm these areas contain suitable habitat for the species as defined in the species accounts in Appendix 13B.
2. Where suitable habitat exists, the qualified biologist will conduct a preconstruction survey for special-status reptiles immediately prior to the start of vegetation clearing or ground-disturbing activities. If there is a lapse in construction in a work area for 7 days or more, these surveys will be repeated before activities resume.
3. If special-status reptiles are found in work areas, the biologist will first attempt to allow these species to move out of harm’s way on their own, but if conditions do not allow this,

individuals will be captured by the biologist and relocated to the nearest suitable habitat outside of the work area, as determined in consultation with CDFW.

4. Vehicles that are parked near suitable habitat for these species overnight or for more than 1 hour during the day, shall be inspected to ensure no reptiles have taken refuge beneath the tires prior to moving the vehicles.

5. To the extent practicable, work in areas with suitable habitat should not be conducted during periods of cold and hot temperatures (below 67 degrees Fahrenheit [°F] and above 100°F), because these species would generally be relatively inactive during these periods and could be taking cover in loose soil, in burrows or crevices, or under structures such as rocks or logs. This will reduce the likelihood of special-status reptiles being injured or killed by ground-disturbing activities.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>Compensatory Mitigation</u>

The creation and enhancement of wetlands and other waters, as well as habitat for special-status species on Bouldin Island and the I-5 ponds under the project's CMP, would affect modeled habitat for coast horned lizard (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats. The CMP could also impact modeled habitat for coast horned lizard through tidal wetland habitat restoration and channel margin enhancement because potential areas identified generally overlap with modeled habitat (Appendix 3F, Section 3F.4.3.4.2).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of coast horned lizard habitat and the potential for injury or mortality of this species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain grasslands suitable for coast horned lizard and management activities could affect this habitat and result in the disruption of normal behaviors, injury, and mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure that there is no significant loss in habitat or habitat value by adjusting the overall commitment (Appendix 3F, Section 3F.1, Section

3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and, therefore, reduce any habitat losses associated with the CMP to a less-than-significant level. These activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); and Mitigation Measure BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles* would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented; and (4) avoiding construction activities in and adjacent to habitat to the extent possible, timing construction activities, conducting preconstruction surveys, and other protective measures to avoid and minimize the potential for injury and mortality, where applicable.

The impact on coast horned lizard from the project alternatives with the CMP would be less than significant with mitigation.

<u>*Other Mitigation Measures*</u>

Some mitigation measures would involve ground disturbance and the use of heavy equipment that would have the potential to result in loss of modeled coast horned lizard habitat or result in injury, mortality, and disruption of feeding, breeding, and dispersal of coast horned lizard from ground disturbance or inadvertent discharge of construction-related fluids such as fuels, oils, and cement. Impacts on coast horned lizard resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to coast horned lizard impacts of the project alternatives.

However, the impacts of habitat loss, ground disturbance and exposure to hazardous materials on coast horned lizard would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; EC-14: *Construction Best Management Practices for Biological Resources*; and Mitigation Measure BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles*. Therefore, impacts on coast horned lizard from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on coast horned lizard from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-27: Impacts of the Project on Northern California Legless Lizard

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for Northern California legless lizard are presented in the species account in Appendix 13B, Section 13B.52, *Northern California Legless Lizard*.

All Project Alternatives

Construction

The construction of all the project alternatives would result in the permanent and temporary loss of Northern California legless lizard modeled habitat. The loss of habitat would primarily occur as a result of the levee improvement work, new roads and road improvements, and the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment (Table 13-64). Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-64. Impacts on Modeled Habitat for California Legless Lizard by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	236.80	41.91	278.71
2a	250.28	47.54	297.82
2b, 2c	230.84	47.54	278.38
3, 4b, 4c	29.09	8.76	37.85
4a	48.53	8.76	57.29
5	16.16	14.93	31.09

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities for all project alternatives could result in the injury, mortality, and disruption of feeding, breeding, and dispersal of Northern California legless lizard. These effects could result from project grading, excavation, the use of construction-related vehicles, and exposure of Northern California legless lizards to construction-related fluids, such as fuels, oils, and cement. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

There are no CNDDB occurrences of Northern California legless lizard in locations that would be permanently or temporarily affected by project construction for any of the alternatives (California Department of Fish and Wildlife 2020a). The nearest occurrence is approximately 5 miles northwest of the Southern Forebay (California Department of Fish and Wildlife 2020a).

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of Northern California legless lizard. Geotechnical investigations that would occur in the West Tracy Fault Study area and over the tunnel alignment footprints, which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on habitat (Appendix 13C). The Bethany Fault Study investigations would not affect modeled Northern California legless lizard habitat. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of Northern California legless lizard, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable

Operations

All project alternatives have the potential for impacts on Northern California legless lizard from vehicle traffic on access roads during operations at project facilities. California legless lizards could in particular be struck by vehicle traffic on access roads to the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex (Alternative 5) because these areas are further inside the range of the species and closer to CNDDB occurrences of the species to the northwest and southwest (California Department of Fish and Wildlife 2020a).

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on Northern California legless lizard. Maintenance activities across all facilities that could affect coast horned lizard include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, and could result in the injury, mortality, and disruption of normal behaviors (i.e., foraging, breeding, and dispersal) of Northern California legless lizard. Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would include annual embankment repair and quarterly animal burrow filling, which could also result in the injury, mortality, and disruption of normal behaviors if individuals are present in these areas.

CEQA Conclusion—All Project Alternatives

The construction, operation, and maintenance of all project alternatives would result in impacts on Northern California legless lizard through the permanent and temporary loss of modeled habitat, habitat fragmentation, and the potential for injury, mortality, and the disruption of normal behaviors.

The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors of Northern California legless lizard from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments, however, the permanent loss of habitat from the construction of the alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction, operations, and maintenance would be significant. Implementation of the CMP would offset the loss of Northern California legless lizard habitat by creating and protecting grasslands on Bouldin Island (Appendix 3F, Section 3F.3.3.2) and through the protection of upland grasslands as part of California red-legged frog and California tiger salamander mitigation (Appendix 3B, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3), which could contain suitable habitat for Northern California legless lizard. Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife,* and BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on Northern California legless lizard from the project alternatives would be less than significant with mitigation because these aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by avoiding construction and maintenance activities in and adjacent to habitat to the extent possible; timing construction activities, installing exclusion fencing, conducting preconstruction surveys, and other protective measures to avoid and minimize the potential for injury and mortality; and by putting in place traffic control measures at DWR facilities during operations to minimize the potential for vehicle strikes.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of Northern California legless lizard habitat by creating and protecting grasslands on Bouldin Island (Appendix 3F, Section 3F.3.3.2) and through the protection of upland grasslands as part of California red-legged frog and California tiger salamander mitigation, which would involve purchasing conservation credits at a USFWS- and CDFW-approved conservation bank (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3), which could contain suitable habitat for Northern California legless lizard. Though these mitigation areas would be specifically targeting suitable habitat for California red-legged frog and California tiger salamander, they would mostly likely occur within the range of Northern California legless lizard and could generally provide suitable upland habitat for the species.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Measure BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles

See description of Mitigation Measure BIO-26 under Impact BIO-26.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5 *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands and other waters as well as habitat for special-status species under the project's CMP on Bouldin Island would affect modeled habitat for Northern California legless lizard (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats.

The creation and enhancement of wetlands and other waters as well as habitat for special-status species at the I-5 ponds, and tidal wetland habitat restoration and channel margin enhancement locations (Appendix 3F, Section 3F.4.3.4.2) under the project's CMP would not affect modeled habitat for Northern California legless lizard because these activities are outside of the known range of the species.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which are not habitats for California legless lizard; therefore, there would not likely be any effects on this species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain habitat for the species and management activities could affect this habitat and result in the disruption of normal behaviors, injury, and mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure that there is no significant loss in habitat or habitat value by adjusting the overall commitment (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and, therefore, reduce any habitat losses associated with the CMP to a less-than-significant level. These activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); and Mitigation Measure BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles* would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented; and by avoiding construction activities in and adjacent to habitat to the extent possible, timing construction activities, conducting preconstruction surveys, and other protective measures to avoid and minimize the potential for injury and mortality, where applicable.

The impact on Northern California legless lizard from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance and the use of heavy equipment that would have the potential to result in loss of modeled Northern California legless lizard habitat or result in injury, mortality, and disruption of feeding, breeding, and dispersal of Northern California legless lizard from ground disturbance, movement of construction vehicles, or inadvertent discharge of construction-related fluids such as fuels, oils, and cement. Impacts on Northern California legless lizard resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to Northern California legless lizard impacts of the project alternatives.

However, the impacts of habitat loss, ground disturbance, noise, vibration, and exposure to hazardous materials on Northern California legless lizard would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-14: *Construction Best Management Practices for Biological Resources*; and Mitigation Measure BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles*. Therefore, impacts on Northern California legless lizard from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on Northern California legless lizard from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-28: Impacts of the Project on California Glossy Snake

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for California glossy snake are presented in the species account in Appendix 13B, Section 13B.53, *California Glossy Snake*.

All Project Alternatives

Construction

Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would not affect modeled habitat for California glossy snake. Alternative 5 would result in temporary impacts on modeled habitat from geotechnical investigations over the Bethany Reservoir Discharge Structure (Table 13-65). Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-65. Impacts on Modeled Habitat for California Glossy Snake by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	0.00	0.00	0.00
5	0.00	0.05	0.05

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

The construction of the SCADA line to the Banks Pumping Plant under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c is within 0.3 mile of modeled habitat, and although unlikely, it could possibly affect California glossy snake if individuals are in this area during construction. Alternative 5 could result in the potential injury, mortality, and disruption of normal behaviors of California glossy snakes if they are occupying modeled habitat adjacent to Bethany Reservoir Discharge Structure and the associated access road and power transmission line. These potential impacts would result from grading, excavation, the movement of construction vehicles in these areas, and accidental spills of construction-related fluids, such as fuels, oils, and cement. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

There are no CNDDB occurrences within the footprints of any of the alternatives. The nearest occurrence is more than 7 miles northwest of the nearest project infrastructure, which is the SCADA line near Brentwood (California Department of Fish and Wildlife 2020a).

Field investigations for Alternative 5 would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b). and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of California glossy snake. Geotechnical investigations associated with the tunnel for the Bethany Reservoir Aqueduct (Alternative 5), which include CPTs and soil borings, would result in temporary impacts on modeled habitat (Appendix 13C). Utility potholing would also occur within the footprints for the Bethany Reservoir Aqueduct and the Bethany Reservoir Discharge Structure and would temporarily affect habitats. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints, but could still result in the potential for injury, mortality, and the disruption of normal behaviors of California glossy snake, as discussed above for conveyance facility construction. All other geotechnical investigations, including the West Tracy Fault Study and the Bethany Fault Study investigations, would occur outside of the limits of modeled habitat for the species in the study area. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

<u>Operations</u>

Alternative 5 has the potential for impacts on California glossy snake during operations from vehicle traffic that occurs at night (the species is nocturnal) on the access road leading to the Bethany Reservoir Discharge Structure, which could result in the injury, mortality, and disruption of normal behaviors.

<u>Maintenance</u>

The maintenance of the Bethany Reservoir Discharge Structure and associated access road, which would include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, could result in the injury, mortality, and disruption of normal behaviors of California glossy snake; however, the potential for this impact would be low because the species is nocturnal.

CEQA Conclusion—All Project Alternatives

Construction of all project alternatives and the operations and maintenance under Alternative 5 would result in impacts on California glossy snake through the temporary disturbance of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors.

The temporary disturbances to habitat, the potential impacts of injury, mortality, and the disruption of normal behaviors from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments the potential for injury, mortality, and disruption of normal behaviors from construction of all alternatives and operations and maintenance under Alternative 5 would be significant. Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological*

Resources from Maintenance Activities, BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife*, and BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on California glossy snake from the project alternatives would be less than significant with mitigation because these aforementioned measures would reduce direct effects on the species, including habitat disturbance, by avoiding construction and maintenance activities in and adjacent to habitat to the extent possible; timing construction activities, conducting preconstruction surveys, and other protective measures to avoid and minimize the potential for injury and mortality; and by putting in place traffic control measures at DWR facilities during operations to minimize the potential for vehicle strikes.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP that DWR would implement (see Impact BIO-1 for a summary discussion of the CMP) would not specifically mitigate for California glossy snake habitat; however, DWR's protection of upland habitat associated with California red-legged frog and California tiger salamander mitigation (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3), could contain suitable habitat for California glossy snake. Though these mitigation areas would be specifically targeting suitable habitat for California red-legged frog and California tiger salamander, they would mostly likely occur within the range of California glossy snake and could generally provide suitable upland habitat for the species.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Measure BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles

See description of Mitigation Measure BIO-26 under Impact BIO-26.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands and other waters as well as habitat for special-status species under the project's CMP would not affect modeled habitat for California glossy snake because the restoration activities at the I-5 ponds and on Bouldin Island, as well as the potential locations of tidal restoration and channel margin enhancement, are outside of the known range of the species.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which are not habitats for California glossy snake; therefore, there would not likely be any effects on this species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas would not likely be within the range of the species and therefore no effects are anticipated. Site-specific analyses are not provided because locations of potential protection instruments are not currently known. The impact on California glossy snake from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance and the use of heavy equipment that would have the potential to result in loss of modeled California glossy snake habitat or result in injury, mortality, and disruption of normal behaviors of California glossy snake from ground disturbance, movement of construction vehicles, or inadvertent discharge of construction-related fluids such as fuels, oils, and cement. Impacts on California glossy snake resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to California glossy snake impacts of the project alternatives.

However, the impacts of habitat loss, ground disturbance, and exposure to hazardous materials on California glossy snake would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-14: *Construction Best Management Practices for Biological Resources*; and Mitigation Measure BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles*. Therefore, impacts on California glossy snake from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on California glossy snake from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-29: Impacts of the Project on San Joaquin Coachwhip

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1, and information on the species life history and habitat suitability model for San Joaquin coachwhip are presented in the species account in Appendix 13B, Section 13B.54, *San Joaquin Coachwhip*.

All Project Alternatives

Construction

The construction of the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex (Alternative 5) would result in the permanent and temporary loss of San Joaquin coachwhip modeled habitat. Construction-related grading and excavation would result in the permanent and temporary loss of San Joaquin coachwhip habitat (Table 13-66). Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-66. Impacts on Modeled Habitat for San Joaquin Coachwhip by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1, 2b, 2c, 3, 4b, 4c	87.27	15.12	102.39
2a, 4a	164.59	16.63	181.22
5	50.12	20.71	70.83

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities associated with the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and Bethany Complex (Alternatives 5) could result in the injury, mortality, and disruption of normal behaviors of San Joaquin coachwhip if individuals are moving on the surface or occupying mammal burrows during activities such as grading, excavation, soil compaction, and the use of construction-related vehicles. San Joaquin coachwhip could also be trapped in open trenches or other excavations and become vulnerable to predation. Construction activities could also result in the exposure of San Joaquin coachwhip to construction-related fluids, such as fuels, oils, and cement, which could result in injury or mortality. Construction noise and vibration could also disrupt normal behaviors and result in increased energy expenditures, predation risk, and potential for injury or mortality from nearby construction if these activities result in individuals leaving cover. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans,* EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; by (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

There are no occurrences for San Joaquin coachwhip in the study area and the nearest occurrence is approximately 5 miles west of Bethany Reservoir (California Department of Fish and Wildlife 2020a).

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta

Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of San Joaquin coachwhip. Geotechnical investigations that would occur in the West Tracy Fault Study area, the tunnels linking the Southern Forebay to the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), the tunnel from the intakes to the Bethany Complex, and the tunnel for the Bethany Reservoir Aqueduct (Alternative 5), which include test trenches, CPTs, and soil borings, would result in temporary impacts on habitat (Appendix 13C). The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1 day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of San Joaquin coachwhip, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

__Operations__

All project alternatives have the potential for impacts on San Joaquin coachwhip from vehicle traffic on access roads during operations at project facilities. San Joaquin coachwhip could in particular be struck by vehicle traffic on access roads to the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex (Alternative 5)

__Maintenance__

The maintenance of the Southern Complex on Byron Tract and west of Byron Highway (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex (Alternative 5) could result in impacts on San Joaquin coachwhip.

Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would include annual embankment repair, repaving of access roads every 15 years, quarterly animal burrow filling, quarterly weed management (e.g., mechanical removal and herbicide application), and semiannual general and ground maintenance (e.g., mowing, vegetation trimming), and daily or weekly inspections by vehicle, and could result in the injury and mortality of San Joaquin coachwhip occupying burrows or moving through these areas during these activities.

Maintenance activities at the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), which would include semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application) and daily or weekly inspections by vehicle, could result in the injury and mortality of San Joaquin coachwhip. These impacts would occur if San Joaquin coachwhip is occupying burrows in areas where vegetation management takes place or if they are moving through these areas.

Maintenance activities at the Bethany Complex (Alternative 5), which would include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, could result in the injury, mortality, and disruption of normal behaviors of San Joaquin coachwhip if they are occupying burrows in areas where vegetation management takes place or if they are moving through these areas.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of all project alternatives would result in impacts on San Joaquin coachwhip through the permanent and temporary loss of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors.

The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors of San Joaquin coachwhip from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments, however, the permanent loss of habitat from construction of the project alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction, operations, and maintenance on San Joaquin coachwhip would be significant. Implementation of the CMP would offset the loss of San Joaquin coachwhip habitat through the protection of upland grasslands as part of California red-legged frog and California tiger salamander mitigation (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3), which would overlap with the range of the species and could contain suitable habitat for San Joaquin coachwhip. Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife*, and BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on San Joaquin coachwhip from the project alternatives would be less than significant with mitigation because these aforementioned measures would replace lost habitat with habitat potentially suitable and reduce direct effects on the species, including habitat disturbance, by avoiding construction and maintenance activities in and adjacent to habitat to the extent possible; timing construction activities, installing exclusion fencing, conducting preconstruction surveys, and other protective measures to avoid and minimize the potential for injury and mortality; and by putting in place traffic control measures at DWR facilities during operations to minimize the potential for vehicle strikes.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP that DWR would implement (see Impact BIO-1 for a summary discussion of the CMP) would not specifically mitigate for San Joaquin coachwhip habitat; however, DWR's protection of upland habitat associated with California red-legged frog and California tiger salamander mitigation (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3), would overlap with the range of the species and could contain suitable habitat for San Joaquin coachwhip.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Measure BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles

See description of Mitigation Measure BIO-26 under Impact BIO-26.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands and other waters as well as habitat for special-status species under the project's CMP would not affect modeled habitat for San Joaquin coachwhip because the restoration activities at the I-5 ponds and on Bouldin Island, as well as the potential locations of tidal restoration and channel margin enhancement, are outside of the known range of the species.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which are not habitats for San Joaquin coachwhip; therefore, there would not likely be any effects on this species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas would not likely include habitat for

San Joaquin coachwhip and therefore would not likely be affected. Site-specific analyses are not provided because locations of potential site protection instruments are not currently known.

The impact on San Joaquin coachwhip from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance and the use of heavy equipment that would have the potential to result in loss of modeled San Joaquin coachwhip habitat or result in injury, mortality, and disruption of normal behaviors of San Joaquin coachwhip from ground disturbance, movement of construction vehicles, noise, vibration, or inadvertent discharge of construction-related fluids such as fuels, oils, and cement. Impacts on San Joaquin coachwhip resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to San Joaquin coachwhip impacts of the project alternatives.

However, the impacts of habitat loss, ground disturbance, noise, vibration, and exposure to hazardous materials on San Joaquin coachwhip would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-14: *Construction Best Management Practices for Biological Resources*; and Mitigation Measure BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles*. Therefore, impacts on San Joaquin coachwhip from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on San Joaquin coachwhip from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-30: Impacts of the Project on Giant Garter Snake

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for giant garter snake are presented in the species account in Appendix 13B, Section 13B.55, *Giant Garter Snake*.

All Project Alternatives

Construction

The construction of all the project alternatives would result in the permanent and temporary loss of giant garter snake modeled habitat as a result of construction-related grading, excavation, and filling of aquatic habitat (Table 13-67). The loss of habitat would primarily occur as a result of the levee improvement work under all alternatives (permanent aquatic and upland), the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, permanent aquatic), new roads and road improvements (all alternatives, permanent and temporary aquatic and upland), and the intake construction (all alternatives, permanent aquatic and upland) (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany alternative (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-67. Impacts on Modeled Habitat for Giant Garter Snake by Alternative

Alternative	Permanent Impacts—Aquatic (acres) [a]	Permanent Impacts—Upland (acres) [a]	Temporary Impacts—Aquatic (acres)	Temporary Impacts—Upland (acres)	Total (acres)
1	27.94	316.62	16.65	92.75	453.96
2a	26.29	322.67	19.85	103.85	472.66
2b	22.06	290.17	18.93	101.42	432.58
2c	24.07	304.86	19.66	103.11	451.70
3	16.86	80.84	15.92	57.63	171.25
4a	18.59	98.00	16.12	58.52	191.23
4b	14.60	65.51	15.19	56.08	151.38
4c	16.40	80.19	15.92	57.77	170.28
5	9.37	65.27	12.02	33.84	120.50

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities associated with all project alternatives could result in the injury, mortality, and disruption of normal behaviors of giant garter snake if they are moving on the surface or occupying mammal burrows or other subsurface refugia during activities such as grading, excavation, and soil compaction, in particular if conducted during the species inactive season (generally October 1 to April 15). Construction vehicle traffic during the active season (generally April 16 to September 31) could also result in similar impacts. Giant garter snake could also be trapped in open trenches or other excavations and become vulnerable to predation. Construction activities could also result in the exposure of giant garter snake to construction-related fluids, such as fuels, oils, and cement, which could result in injury and mortality. Construction noise and vibration could also disrupt normal behaviors and result in increased energy expenditures. The use of tunnel boring machines during construction would potentially cause groundborne vibration in the immediate vicinity of tunnel construction areas. However, because of the depth at which the tunnel would be constructed, and because the deep soil cover over the tunnel would effectively dampen and absorb propagated energy from the tunnel crown and the tunnel floor, no significant noise and vibration effects from the operation of the tunnel boring machine on giant garter snake are anticipated (Chapter 24, Section 24.4.3.2, *Impacts of the Project Alternatives Related to Noise and Vibration*). Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic and upland habitat; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

The project alternatives together overlap with three CNDDB occurrences. All alternatives have an overhead transmission line that would be installed on existing poles along Franklin Road that overlap with an occurrence (#52) from 1976 (California Department of Fish and Wildlife 2020a). Work related to the installation of this new line would be done from the existing right-of-way and would not disturb any habitat. All of the project alternatives have infrastructure that overlaps with an occurrence (#49) north and south of SR 12 just west of I-5 that spans a period from 1974 to 2010 (California Department of Fish and Wildlife 2020a). All of the project alternatives have a SCADA line that would be placed within the SR 12 right-of-way in this area where there is no habitat and Alternatives 1, 2a, 2b, and 2c would include road widening on SR 12 and an underground power line that would affect modeled habitat for the species in this area. Alternatives 3, 4a, 4b, 4c, and 5 have an overhead SCADA line that would be installed on existing poles along Fyffe Avenue west of Stockton that overlaps with an occurrence (#351) from 1880. All work would be done from the existing right-of-way and there is no modeled habitat in this area.

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of giant garter snake. Geotechnical investigations that would occur in the West Tracy Fault Study area and over the tunnel alignment footprints, which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on modeled habitat (Appendix 13C). The Bethany Fault Study investigations would not affect modeled giant garter snake habitat. The following field investigations would occur within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of giant garter snake, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the viability of nearby aquatic and upland habitat; (3) by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable; and (4) limiting construction vehicle traffic to a maximum speed limit of 15 miles per hour on unpaved, non-public construction access roads.

__Operations__

All project alternatives have the potential for operational impacts on giant garter snake from vehicle strikes and from changes to water quality.

Giant garter snakes moving across access roads could be struck by vehicles, resulting in injury or mortality. Trips on any given access roads to DWR facilities would be relatively infrequent but do pose a risk to the species where aquatic habitat occurs nearby, generally within 200 feet.

Changes in water operations under all project alternatives have the potential to exacerbate bioaccumulation of methylmercury in giant garter snakes. Although the magnitude of methylmercury bioaccumulation differs among species and foodwebs, largemouth bass was used as a surrogate species for analysis of impacts from changes in operations of the water conveyance facilities because they are good indicators of mercury contamination in aquatic foodwebs throughout the Delta (Wood et al. 2010: 67) and would reflect changes in methylmercury bioavailability due to the project (Appendix 9H, *Mercury*). The modeled effects of mercury concentrations from changes in water operations on largemouth bass did not differ substantially from existing conditions; therefore, these results also indicate giant garter snake methylmercury exposure would not measurably increase as a result of project operations.

Microcystin toxins originate in aquatic systems and can be transported through foodwebs through consumption (Moy et al. 2016:A) and can affect giant garter snake if they forage in aquatic habitats with conditions that promote CHABs. Operation of all project alternatives is not expected to substantially change the five factors that could create conditions more conducive to CHAB formation (i.e., temperature, residence time, nutrients, water velocities and associated turbulence and mixing, and water clarity and associated irradiance) relative to existing conditions within the Delta (Chapter 9, *Water Quality*). The water quality modeling results show a potential for increased residence time in some locations and months within the central Delta, namely Discovery Bay where there are already very long residence times, which could contribute to increased *Microcystis* bloom size in some years at these locations if the remaining four environmental factors are also at levels conducive to forming CHABs. Nevertheless, based on known *Microcystis* dynamics in the Delta, a small increase of residence time at Discovery Bay would not cause *Microcystis* blooms to substantially increase in size or last substantially longer, relative to existing conditions. Because the project alternatives, through their effects on the five factors potentially associated with CHABs in the Delta, are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystin or any other cyanotoxins in the Delta that could cause a substantial adverse impact on giant garter snake, relative to existing conditions.

Current use and legacy pesticides have the potential to bioaccumulate in the food items of giant garter snake. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows, and would not result in land-use changes that would increase use of pesticides in habitats used by giant garter snakes, relative to existing conditions. Therefore, the project alternatives would not substantially reduce prey populations or increase pesticide exposure to giant garter snake.

Changes in water operations under all project alternatives have the potential to exacerbate bioaccumulation of selenium in giant garter snake. Modeled selenium concentrations in largemouth bass tissue, used as a surrogate, were below the level of concern and did not differ substantially from existing conditions under all alternatives (Appendix 9J), which suggests that selenium exposure to giant garter snake would also not change. Therefore, the project alternatives are not anticipated to substantially increase the risk of selenium contamination in giant garter snake.

<u>*Maintenance*</u>

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on giant garter snake. Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would annual embankment repair, quarterly animal burrow filling, and quarterly weed management (e.g., mechanical removal and herbicide application) that could affect giant garter snake. Maintenance activities across all facilities that could affect giant garter snake include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle. These maintenance activities and could result in the injury, mortality, and disruption of normal behaviors of giant garter snake if these activities occur adjacent to aquatic or upland habitat.

CEQA Conclusion—All Project Alternatives

The construction, operation, and maintenance of all project alternatives would result in impacts on giant garter snake through the permanent and temporary loss of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors.

For all project alternatives, changes in water operations would not be expected to result in a measurable increase in mercury or selenium bioavailability or pesticide or microcystin exposure to giant garter snake.

The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors of giant garter snake from project construction activities would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments, however, the permanent loss of habitat from the construction of the project alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction, operations, and maintenance would be significant. Implementation of the CMP would create and protect giant garter snake aquatic and upland habitat (Appendix 3F, Section 3F.4.1.4.3 and Attachment 3F.1, Table 3F.1-3, CMP-15: *Giant Garter Snake Habitat*), which would reduce the habitat loss impact to less than significant. Mitigation Measures, BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife,* and BIO-30: *Avoid and Minimize Impacts on Giant Garter Snake* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on giant garter snake from the project alternatives would be less than significant with mitigation because these aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by avoiding construction and maintenance activities in and adjacent to habitat to the extent possible; timing construction activities, installing exclusion fencing, conducting preconstruction surveys, and other protective measures to avoid and minimize the potential for injury and mortality; and by putting in place traffic control measures at DWR facilities during operations to minimize the potential for vehicle strikes.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of giant garter snake habitat by creating and protecting giant garter snake aquatic and upland habitat (Appendix 3F, Section 3F.4.1.4.3 and Attachment 3F.1, Table 3F.1-3, CMP-15: *Giant Garter Snake Habitat*). The CMP would ensure that wetland habitat is designed specifically for giant garter snake needs, including aquatic habitat with appropriate ponding and emergent vegetation, and suitable upland habitat. Future channel margin enhancement and tidal wetland habitat (Appendix 3F, Section 3F.4.3) would also provide potential habitat for giant garter snake.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Measure BIO-30: Avoid and Minimize Impacts on Giant Garter Snake

All Project Alternatives

The following measures for giant garter snake will only be required for construction and restoration activities occurring within suitable habitat as identified from the habitat modeling and by additional assessments conducted during the planning for work in a given area.

During project implementation and prior to project construction, DWR, in agreement with CDFW and USFWS, will perform the following measures.

1. When each site is available for surveys, a USFWS- and CDFW-approved biologist, will then delineate giant garter snake habitat at each project site, based on an agreed upon definition of suitable habitat, including both aquatic and upland habitat.
2. Once habitat has been delineated, the biologist may use giant garter snake surveys performed using a method approved by USFWS to determine presence of the species on the project site to enable further determination of compensatory mitigation requirements.
3. For sites where such surveys are performed, the surveys will conform to established protocols for giant garter snake surveys and all occurrence data gathered will be reported to the CNDDB and USFWS to add to the understanding of populations and occurrences for the species in the Delta.
4. To the greatest extent possible, identified and delineated habitat will be completely avoided.

If the construction or restoration activity does not fully avoid effects on suitable habitat, the following measures will be implemented.

5. Initiate construction and clear suitable habitat in the summer months, between May 1 and October 1, and avoid giant garter snake habitat during periods of brumation (between October 1 and May 1). Suitability of aquatic and upland habitat characteristics will be determined by the biologist consistent with the description of suitable habitat defined in

Appendix 13B, Section 13B.55. Once a construction site has been cleared and exclusionary fencing is in place, work within the cleared area can occur between October 1 and May 1.

6. To the extent practicable, conduct all activities within paved roads, farm roads, road shoulders, and similarly disturbed and compacted areas; confine ground disturbance and habitat removal to the minimal area necessary to facilitate construction activities.

7. At least 15 days prior to any ground-disturbing activities, DWR will prepare and submit a relocation plan for USFWS's and CDFW's written approval. The relocation plan will contain the name(s) of the biologist(s) to relocate giant garter snakes, the method of relocation (if different than described), a map, and a description of the proposed release site(s) within 300 feet of the work area or at a distance otherwise agreed to by USFWS and CDFW, and written permission from the landowner to use their land as a relocation site.

8. The perimeter of construction sites (except for work sites within areas of open water, like the Sacramento River) within or adjacent to giant garter snake habitat will be fenced with exclusion fencing by no more than 14 days prior to the start of construction activities (e.g., staging, vegetation removal, grading) in a given area. The construction manager and the biologist will determine where exclusion fencing will be installed to minimize the potential for giant garter snake to enter the construction work area, including consideration of nearby vegetation that could facilitate giant garter snake entering the exclusion area. The placement of exclusion fencing will be determined, in part, by the locations of suitable habitat for the species. A conceptual fencing plan will be submitted to USFWS and CDFW prior to the start of construction and the exclusion fencing will be shown on the final construction plans. DWR will include the exclusion fence specifications including installation and maintenance criteria in the bid solicitation package special provisions. The exclusion fencing will remain in place for the duration of construction and will be regularly inspected and fully maintained. The biological monitor and construction manager will be responsible for checking the exclusion fencing around the work areas each day of construction to ensure that they are intact and upright. This will be especially critical during times of inclement weather that can damage the fencing. Repairs to the exclusion fence will be made within 24 hours of discovery of a breach. Where construction access is necessary, gates will be installed in the exclusion fence and fencing will direct animals away from the work area to the extent practicable (e.g., fencing will flare out and turn back toward suitable habitat).

9. Immediately prior to the initiation of any vegetation clearing, ground-disturbing activities, and exclusion fence installation, the USFWS- and CDFW-approved biologist will survey suitable aquatic and upland habitat in the entire work site for the presence of giant garter snakes. If there is a lapse in construction in a work area for 7 days or more, these surveys will be repeated before activities resume.

10. If exclusionary fencing is found to be compromised, a survey of the exclusion fencing and the area inside the fencing will be conducted immediately preceding construction activity that occurs in delineated giant garter snake habitat or in advance of any activity that may result in take of the species. The biologist will search along exclusionary fences, in pipes, and beneath vehicles before they are moved.

11. If a giant garter snake is found in the work area, all work will cease in the vicinity of the snake, and the snake will be allowed to move of its own volition out of harm's way. If the snake does not move and it is deemed necessary to relocate the animal to prevent harm, the snake may be captured and relocated to suitable habitat a minimum of 200 feet outside of

the work area in accordance with the relocation plan, prior to resumption of construction activity.

12. Within 24 hours prior to construction activities, and dredging, requiring heavy equipment, a USFWS- and CDFW-approved biologist will survey all the activity area not protected by exclusionary fencing where giant garter snake could be present. This survey of the work area will be repeated if a lapse in construction or dredging activity of 2 weeks or greater occurs during the aestivation period (October 1 to May 1) or if the lapse in construction activity is more than 12 hours during active season (May 1 to October 1). If a giant garter snake is encountered during surveys or construction, cease activities until appropriate corrective measures have been completed, it has been determined that the giant garter snake will not be harmed, or the giant garter snake has left the work area.
13. The USFWS- and CDFW-approved biological monitor will help guide access and construction work around wetlands, active rice fields, and other sensitive habitats capable of supporting giant garter snake to minimize habitat disturbance and risk of injuring or killing giant garter snakes.
14. Store equipment in designated staging area areas at least 200 feet away from giant garter snake aquatic habitat to the extent practicable.
15. Visually check for giant garter snake under any vehicles or equipment that have been idle for more than 1 hour, or parked overnight, prior to moving the vehicles. Check any crevices or cavities in the work area where individuals may be present, including stockpiles that have been left for more than 24 hours where cracks/crevices may have formed.

For activities that will occur during the giant garter snake inactive season (October 2 to April 30) and will last more than 2 weeks, DWR will implement the following additional avoidance and minimization measures.

16. For proposed activities that will occur within suitable aquatic giant garter snake habitat, during the inactive giant garter snake season (October 2–April 30), all aquatic giant garter snake habitat will be dewatered for at least 15 consecutive days prior to excavating or filling the dewatered habitat. Dewatering is necessary because aquatic habitat provides prey and cover for giant garter snake; dewatering serves to remove the attractant and increase the likelihood that giant garter snake will move to other available habitat. Any deviation from this measure will be done in coordination with and with approval of USFWS and CDFW.
17. Following dewatering of aquatic habitat, all potential impact areas that provide suitable aquatic or upland giant garter snake habitat will be surveyed for giant garter snake by the biologist. If giant garter snakes are observed, they will be passively allowed to leave the potential impact area. If the snake does not move of its own accord and it is determined necessary, the snake will be relocated in accordance with the approved relocation plan.
18. Once habitat is deemed free of giant garter snakes, exclusion fencing will be installed around the construction site so no snakes may reenter prior to or during construction.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in

Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>*Compensatory Mitigation*</u>

The creation and enhancement of wetlands and other waters and habitat for special-status species at the I-5 ponds and on Bouldin Island under the project's CMP would affect modeled habitat for giant garter snake (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats. The CMP could also affect modeled habitat through tidal wetland habitat restoration and channel margin enhancement because potential areas identified generally overlap with modeled habitat (Appendix 3F, Section 3F.4.3.4.2).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which are not habitats for giant garter snake; therefore, there would not likely be any effects on this species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain habitat for giant garter snake and management activities could affect this habitat and result in the disruption of normal behaviors, injury, and mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure that there is no significant loss in habitat or habitat value by adjusting the overall commitment (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and, therefore, reduce any habitat losses associated with the CMP to less than significant. These activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); and BIO-30: *Avoid and Minimize Impacts on Giant Garter Snake* would reduce potential impacts on the species by avoiding construction and maintenance activities in and adjacent to habitat to the extent possible and timing construction activities, installing exclusion fencing, conducting preconstruction surveys, and other protective measures to avoid and minimize the potential for injury and mortality.

Creation and enhancement of wetlands and other waters under the CMP have the potential to exacerbate bioaccumulation of methylmercury in giant garter snake by creating newly inundated wetlands. Because Bouldin Island and the I-5 ponds sites consist of existing managed and agricultural wetlands and ponds, wetland creation and enhancement are not expected to increase mercury methylation, relative to existing conditions. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include mercury monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased mercury methylation, relative to existing conditions. Mitigation Measure WQ-6, *Develop and Implement a Mercury Management and Monitoring Plan*, which contains measures to assess the amount of mercury at tidal restoration sites before project development, followed by appropriate design and adaptative management, would minimize the potential for any effects of increased methylmercury exposure due to tidal restoration. Therefore, implementation of the CMP would not be expected to have a significant adverse impact on giant garter snake.

Habitat creation and enhancement under the CMP has the potential to result in conditions that promote CHABs, which could result in impacts on giant garter snakes using created and/or enhanced wetland and aquatic habitats. High levels of microcystins in tissues and microcystin poisoning have been documented in other terrestrial species using aquatic habitats (Chen et al. 2009:3317) and could affect giant garter snake if they forage in areas with conditions that promote CHABs. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include CHAB monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased CHAB formation, relative to existing conditions. As discussed in Chapter 9, *Water Quality,* tidal habitat creation is not expected to cause substantial additional *Microcystis* production. Therefore, implementation of the CMP would not result in increased CHAB formation that could cause substantial adverse impacts on giant garter snake, relative to existing conditions.

Herbicides would be applied at CMP wetland creation and enhancement sites to remove nonnative vegetation for site preparation and to support establishment of new plantings. Natural habitats contribute fewer pesticides to receiving waters than agricultural areas where pesticides are applied. Any newly created wetlands or enhanced natural habitat could also filter stormwater to remove solids and either improve or have no effect on pesticide concentrations in discharges to receiving waters, relative to existing conditions. As such, restoration areas are expected to somewhat reduce, rather than increase, runoff of pesticides in adjacent waterbodies. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides would be applied in such a manner as to prevent primary or secondary poisoning of giant garter snakes.

Creation and enhancement of wetlands are aimed at providing habitat for giant garter snake, which could increase the risk of selenium toxicity to the species. It is difficult to determine whether the effects of potential increases in selenium bioavailability associated with the CMP would lead to adverse effects. Potential effects of increased selenium exposure are likely low for giant garter snakes because they primarily forage on lower-trophic items with less potential to biomagnify selenium, and existing selenium concentrations in the Sacramento River watershed are low (Central Valley Regional Water Quality Control Board 1988:14). Modeled concentrations in largemouth bass tissue, used as a surrogate, under existing conditions in the Delta were below levels of concern (Appendix 9J), which suggests selenium concentrations in giant garter snakes are similarly low. Analysis included in Chapter 9 for Impact WQ-10 found that compensatory mitigation would not result in a measurable increase in selenium concentrations or selenium bioavailability. Furthermore, habitat loss is recognized as the primary threat to the giant garter snake and recovery criteria include providing sufficient high-quality habitat (U.S. Fish and Wildlife Service 2017c:I-12, I-14), so the benefit of increased habitat availability would outweigh the potential risk of a low-level increase in selenium exposure. Therefore, potential increased exposure to selenium resulting from restoration would not be expected to have a significant adverse impact on giant garter snake populations.

The impact on giant garter snake from the project alternatives with the CMP would be less than significant with mitigation.

Mitigation Measure WQ-6, Develop and Implement a Mercury Management and Monitoring Plan

See description of Mitigation Measure WQ-6 under Impact WQ-6 in Chapter 9.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance and the use of heavy equipment, pile driving, or pesticides that would have the potential to result in loss of modeled giant garter snake habitat or result in injury, mortality, and disruption of normal behaviors of giant garter snake from ground disturbance, movement of construction vehicles, noise, vibration, or inadvertent discharge of construction-related fluids such as fuels, oils, and cement. The mitigation measures with potential to result in impacts on giant garter snake are similar to those discussed under Impact BIO-25: *Impacts of the Project on Western Pond Turtle*. Impacts on giant garter snake resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to giant garter snake impacts of the project alternatives.

The impacts of habitat loss, ground disturbance, noise, vibration, and exposure to hazardous materials on giant garter snake would be reduced through the CMP and environmental commitments, as detailed under Impact BIO-25. In addition, Mitigation Measure BIO-30: *Avoid and Minimize Impacts on Giant Garter Snake* would require species-specific measures to reduce these impacts. Therefore, impacts on giant garter snake from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on giant garter snake from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-31: Impacts of the Project on Western Yellow-Billed Cuckoo

The methods for the analysis of effects on western yellow-billed cuckoo appear in Section 13.3.1.1, and information on the species' life history and habitat suitability model are presented in the species account in Appendix 13B, Section 13B.56, *Western Yellow-Billed Cuckoo*.

All Project Alternatives

Construction

The construction of all the project alternatives would result in the permanent and temporary loss of western yellow-billed cuckoo modeled migratory habitat, including potential indirect effects on habitat. The loss of habitat would primarily occur as a result of levee improvements, new roads and road improvements, and construction of the intakes (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on western yellow-billed cuckoo modeled migratory habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment. Acres of permanent and temporary impacts on modeled migratory habitat for western yellow-billed cuckoo are shown in Table 13-68. The losses of western yellow-billed cuckoo modeled migratory habitat would be from vegetation removal in advance of grading and excavation for the construction of project infrastructure. Environmental Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-68. Impacts on Modeled Migratory Habitat for Western Yellow-Billed Cuckoo by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	48.92	12.77	61.69
2a	48.44	14.84	63.28
2b	44.75	13.96	58.71
2c	46.57	14.40	60.97
3	9.34	7.62	16.96
4a	10.46	8.22	18.68
4b	6.77	7.34	14.11
4c	8.59	7.77	16.36
5	9.69	6.80	16.49

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Habitat fragmentation is not expected to affect migratory western yellow-billed cuckoos because modeled migratory habitat is not limited in the study area (Appendix 13B, Section 13B.56, Figure 13B.56-1) and migrating birds can use small habitat patches and easily move from one location to the next during migration. Western yellow-billed cuckoos are not known to nest in the study area, and the riparian habitat patches are not large enough, nor do they have the floodplain function necessary, to support breeding (Laymon and Halterman 1989:274–275; Laymon 1998:57; Greco 2013:711–715); therefore, the project would not affect nesting western yellow-billed cuckoos. However, because there is a known breeding population on the Sacramento River north of the study area (Dettling et al. 2015:7), it is assumed that individuals may migrate through the region.

Construction-related noise and visual disturbances could disrupt foraging behaviors and reduce the functions of migratory habitat for cuckoos. Intake construction would require the use of loud, heavy equipment within the construction site as well as along the access roads to the site. Pile driving would be required for intake construction which would create noise and vibration effects in and adjacent to modeled migratory habitat. While 60 A-weighted decibels (dBA) has been used as the standard noise threshold for birds (California Department of Transportation 2016:87), this standard is generally applied during the nesting season, when birds are more vulnerable to behavioral modifications that can cause nest failure. There is evidence, however, that migrating birds avoid noisy areas during migration (McClure et al. 2013:7). Construction-related night lighting may also have the potential to affect migrating cuckoos. While there is no data on effects of night lighting on the species, studies show that birds of other species are attracted to artificial lights and this may disrupt their behavioral patterns or cause collision-related fatalities (Gauthreaux and Belser 2006:67–86). All lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented such that the immediate surroundings would not be subject to extremes in the levels of light; however, these types of light generate an ambient nighttime luminescence that is visible from a distance (Chapter 18, *Aesthetics*, Impact AES-4: *Create New Sources of Substantial Light or Glare That Would Adversely Affect Daytime or Nighttime Views of the Construction Areas or Permanent Facilities*). Construction activities could expose western yellow-billed cuckoos to dust if present in or adjacent to work areas. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting the species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

No CNDDB (California Department of Fish and Wildlife 2020a) occurrence records of western yellow-billed cuckoo fall within the construction footprint for any of the alternatives. The nearest CNDDB occurrence (occurrence #195) to the project alternatives was recorded along Snodgrass Slough, which is approximately 1.5 miles northeast of a shaft on New Hope Tract for the central alignments (Alternatives 1, 2a, 2b, and 2c) and approximately 2.5 miles northeast of a shaft on New Hope Tract for the eastern alignment (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment (Alternative 5) (California Department of Fish and Wildlife 2020a). This occurrence is presumed to be a migrating individual, as breeding status was not confirmed (California Department of Fish and Wildlife 2020a).

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the disruption of normal behaviors of western yellow-billed cuckoo. Geotechnical investigations associated with the tunnels for all project alternatives, which include CPTs and soil borings, would result in impacts on habitat (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations would not affect modeled habitat for western yellow-billed cuckoo. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the potential for the disruption of normal behaviors of western yellow-billed cuckoo, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting the species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area and pile installation test methods at the north Delta intakes may affect western yellow-billed cuckoos migrating through the study area, as described above under construction-related effects.

Operations

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions (Chapter 24, *Noise and Vibration*, Section 24.4.3.2, *Impacts of the Project Alternatives Related to Noise and Vibration*) and the periodic presence of staff would not be expected to affect migrating western yellow-billed cuckoos. Permanent lighting at project facilities could extend into western yellow-billed cuckoo migratory habitat; however, as stated in Chapter 3, Section 3.4.12, *Fencing and Lighting*, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, and therefore permanent facilities would remain dark the majority of the time at night, which would minimize the potential for this impact.

Power for construction and operation of the conveyance facilities has been designed to use existing power lines and underground conduit to the extent feasible under all project alternatives. Most new project lines would be placed on existing poles and towers and therefore would not substantially alter the existing landscape. New aboveground high-voltage transmission and SCADA lines would be constructed to power the Southern Complex under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c and the Bethany Complex under Alternative 5 (Chapter 3, Figure 3-13 and Figure 3-14), where the landcover in that region is primarily grassland and agriculture with minimal riparian vegetation that would support migrating cuckoos.

The western yellow-billed cuckoo migrates through the study area during periods of relatively high visibility and clear weather conditions, thus reducing collision risk from daily use patterns or seasonal migration flights. In addition, western yellow-billed cuckoo wing shape is characterized by low wing loading and a moderate aspect ratio, making the species moderately maneuverable (Bevanger 1998:69) and able to successfully negotiate around overhead wires that it may encounter and avoid collisions, especially during high-visibility conditions. In addition, the western yellow-billed cuckoo is an uncommon migrant in the study area. Therefore, it is highly unlikely that this species would experience bird strikes at project transmission lines.

Changes in water operations under all project alternatives have the potential to exacerbate bioaccumulation of methylmercury in western yellow-billed cuckoo. Methylmercury can be transported from aquatic to adjacent terrestrial foodwebs through ingestion of aquatic prey items, where it can biomagnify and expose songbirds to high concentrations in large insect prey (Cristol et al. 2008:335). Largemouth bass was used as an indicator species for analysis of impacts from changes in operations from the construction of the water conveyance facilities because they are good indicators of mercury contamination throughout the aquatic foodweb (Wood et al. 2010:67). Modeled effects of mercury concentrations from changes in operations of water conveyance facilities on largemouth bass did not differ substantially from existing conditions (Appendix 9H, *Mercury*). Even though western yellow-billed cuckoos do not use aquatic habitats, the lack of substantial change in aquatic foodweb mercury concentrations indicates that mercury concentrations in adjacent riparian foodwebs would also not increase appreciably. In addition, western yellow-billed cuckoo is present only for a short time during migration, further reducing the risk of mercury bioaccumulation; therefore, these results indicate that bioavailability of methylmercury to western yellow-billed cuckoo would not measurably increase as a result of project operation.

Microcystin toxins originate in aquatic systems and can be transported through foodwebs through consumption (Moy et al. 2016:A). Microcystins have also been found in terrestrial foodwebs, such as spiders and songbirds in riparian habitats, likely through consumption of emergent aquatic insects (Moy et al. 2016:A, E), and can impact western yellow-billed cuckoos if they forage in or near habitats with conditions that promote CHABs. Operation of all project alternatives is not expected to substantially change the five factors that could create conditions more conducive to CHAB formation (i.e., temperature, residence time, nutrients, water velocities and associated turbulence and mixing, and water clarity and associated irradiance) relative to existing conditions upstream of the Delta or within the Delta (Chapter 9, *Water Quality*). The water quality modeling results show a potential for increased residence time in some locations and months within the central Delta, namely Discovery Bay where residence times are already very long, which could contribute to increased *Microcystis* bloom size in some years at these locations if the remaining four environmental factors were also at levels conducive to forming CHABs. Nevertheless, based on known *Microcystis* dynamics in the Delta a small increase of residence time at Discovery Bay would not cause *Microcystis* blooms to substantially increase in size or last substantially longer, relative to existing conditions. Because the project alternatives, through their effects on the five factors potentially associated with CHABs in the Delta, are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystin or any other cyanotoxins in the Delta that could cause a substantial adverse impact on western yellow-billed cuckoo, relative to existing conditions.

Current use and legacy pesticides have the potential to bioaccumulate in the food items of western yellow-billed cuckoo. Impacts of all project alternatives on pesticides in the Delta were analyzed in Chapter 9. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows, and would not result in land-use changes that would increase use of pesticides in or adjacent to habitats used by western yellow-billed cuckoo, relative to existing conditions. Therefore, the project alternatives would not substantially reduce prey availability or increase pesticide exposure to western yellow-billed cuckoo.

Changes in water operations under all project alternatives is not expected to affect western yellow-billed cuckoo habitat, but there is some potential to exacerbate bioaccumulation of selenium in western yellow-billed cuckoo. Modeled selenium concentrations in the eggs of insect-eating birds, such as western yellow-billed cuckoo, were below the level of concern and did not differ substantially from existing conditions under all alternatives (Appendix 9J, *Selenium*). Therefore, the project alternatives are not anticipated to substantially increase the risk of selenium contamination in western yellow-billed cuckoo.

Upstream of the study area, yellow-billed cuckoos primarily use large patches of willow-cottonwood riparian forest along the Sacramento and Feather Rivers for nesting. Preferred nesting habitat conditions for cuckoos are created by continuing habitat succession caused by meandering streams that allow constant erosional and depositional processes (Laymon 1998:272–273; Greco 2013:711–

715). Habitat requirements and modeled migratory habitat are discussed in detail in Appendix 13B, Section 13B.56. Chapter 5, *Surface Water,* details the hydrologic modeling methods (Appendix 5A, *Modeling Technical Appendix,* Section B, *Hydrology and Systems Operations Modeling*) and results (Appendix 5A, Section B, Attachment 3, *CalSim 3 Modeling Results*) with respect to flows within and upstream of the Delta. Based on hydrologic modeling results, all project alternatives (Alternatives 1, 2a, 2b, 3c, 3, 4a, 4b, 4c, and 5) would have similar impact levels and are discussed together. Modeled flows under all project alternatives are not expected to change substantially beyond the existing variation in flows. Thus, the project is not anticipated to alter riparian vegetation or the hydrogeomorphic processes which create western yellow-billed cuckoo breeding habitat upstream of the study area, relative to existing conditions.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in periodic disturbances that may affect western yellow-billed cuckoo. Maintenance activities at the north Delta intakes (all project alternatives) would include semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), annual sediment and debris removal at intakes, and periodic maintenance of the intake gates and associated structures approximately every 1 to 5 years. Maintenance activities at launch, reception, and maintenance shafts along the central alignment (Alternatives 1, 2a, 2b, and 2c), the eastern alignment (Alternatives 3, 4a, 4b, and 4c), and the Bethany Reservoir alignment (Alternative 5) would include similar semiannual general and ground maintenance in addition to daily inspections by vehicle. Existing access roads in the vicinity of the intakes and shafts would be repaved every 15 years. Maintenance activities could reduce the functions of western yellow-billed cuckoo migratory habitat adjacent to work areas if these activities take place during migration (between May 15 and September 1). Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting. Although there may be residual noise effects from maintenance activities extending into western yellow-billed cuckoo habitat, this is not likely to result in a significant impact on western yellow-billed cuckoos because these activities are periodic and migratory habitat is plentiful in the study area; therefore, individuals can readily avoid the disturbance during migration.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives would result in impacts on western yellow-billed cuckoo through the permanent and temporary loss of modeled habitat of a special-status species and the potential for disruption of normal behaviors if individuals are present in the study area. For all project alternatives, changes in water operations would not be expected to result in a measurable increase in mercury or selenium bioavailability or increased pesticide or microcystins affecting western yellow-billed cuckoo, and would not result in changes in upstream flows. The temporary impacts on habitat and the potential impacts of the disruption of normal behavior from project construction, operations, and maintenance would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B); however, even with these commitments, the impacts of the project alternatives on western yellow-billed cuckoo would be significant. The implementation of the CMP would be required to offset the loss of migratory habitat (Appendix 3F, Section 3F.3.3.1 and Attachment 3F.1, Table 3F.1-3, CMP-16: *Western Yellow-Billed Cuckoo Habitat*), which would mitigate the impact associated with habitat loss to less than significant. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18); NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; BIO-2c: *Electrical Power Line Support Placement*; and BIO-31: *Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo* would be required to avoid and minimize the potential for disruption of normal behaviors, and disturbances to habitat. The impacts on western yellow-billed cuckoo from the project alternatives would be less than significant with mitigation because the aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat, noise, and visual disturbances, by providing environmental awareness training to construction personnel, by implementing protective measures during maintenance activities, and species-specific avoidance measures during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) would offset the loss of migratory habitat (Appendix 3F, Section 3F.3.2.3; Appendix 3F, Section 3F.3.3.1 and Attachment 3F.1, Table 3F.1-3, CMP-16: *Western Yellow-Billed Cuckoo Habitat*) by creating riparian habitat on Bouldin Island and at the I-5 ponds, and managing these areas in perpetuity. Channel margin restoration would include riparian plantings on rock benches (Appendix 3F, Section 3F.4.3.3.3) that may provide migratory habitat for western yellow-billed cuckoo.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-31: Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo

All Project Alternatives

The following measures will be required for all construction activities occurring between May 15 through September 1 to avoid and minimize impacts on western yellow-billed cuckoo.

1. Prior to the construction, a noise expert will create a sound level contour map showing the 60 dBA sound level contour specific to the type and location of construction to occur in the area.
2. Two weeks prior to construction, a USFWS- and CDFW-approved biologist will conduct daily surveys, consistent with a USFWS- or CDFW-approved survey protocol (e.g., Halterman et al. 2015:9-42, or more current guidance), in suitable habitat where construction-related noise levels could exceed 60 dBA equivalent sound level (L_{eq}) (1 hour).
3. If a yellow-billed cuckoo is found, construction activities will be limited such that sound will not exceed 60 dBA within 500 feet of the habitat being used until the USFWS- and CDFW-approved biologist has confirmed that the bird has left the area.
4. If surveys find cuckoos in an area where vegetation will be removed, vegetation removal will be conducted when the USFWS- and CDFW-approved biologist has confirmed that cuckoos are not present within 500 feet of vegetation removal activities.
5. Portable and stationary equipment will be located, stored, and maintained as far as possible, with a minimum distance of 500 feet, from suitable western yellow-billed cuckoo habitat.
6. All lights will be screened and directed down toward work activities and away from migratory habitat. A biological monitor will ensure that lights are properly directed at all times during construction.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands, as well as habitat for special-status species under the project's CMP would affect western yellow-billed cuckoo through the permanent and temporary loss of modeled migratory habitat (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or grasslands are located, which do not provide habitat for western yellow-billed cuckoo and therefore there would not likely be any effects on the species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could support suitable migratory habitat for western yellow-billed cuckoo and management activities within occupied habitat could result in the disruption of normal behaviors, injury, or mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of western yellow-billed cuckoo migratory habitat from habitat creation by adjusting the overall commitment of riparian creation (Appendix 3F, Section 3F.1, *Introduction*, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The creation and enhancement activities would also have the potential for the disruption of normal behaviors of individuals if restoration activities take place during migration (between June 15 and September 1), as described above under construction-related effects. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B) and Mitigation Measure BIO-31: *Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo* would mitigate the potential disruption of normal behaviors of individuals to less than significant. These impacts would be less than significant with mitigation because the aforementioned measures would (1) train construction staff on protecting the species, the requirements for avoiding impacts, and the ramifications for not following these measures; (2) minimize dust; (3) implement spill prevention and containment plans that would avoid material spills that could affect habitat; (4) prior to and during implementing restoration and enhancement ground disturbance, establish protective buffers around occupied habitat; and (5) have a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented where applicable.

Creation and enhancement of wetlands under the CMP have the potential to exacerbate bioaccumulation of mercury in western yellow-billed cuckoo by creating newly inundated wetlands which can produce the biogeochemical conditions to methylate mercury existing in Delta soils. Methylmercury can subsequently be transported to adjacent terrestrial foodwebs through ingestion of aquatic insects (Cristol et al. 2008:335). Potential effects of increased methylmercury exposure are likely low for western yellow-billed cuckoo because they migrate through the Delta, spending only a short period of time which reduces the risk of bioaccumulation. Because Bouldin Island and the I-5 ponds sites consist of existing managed and agricultural wetlands and ponds, wetland creation and enhancement are not expected to increase mercury methylation, relative to existing conditions. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2, *Monitoring*) would include mercury monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased mercury methylation, relative to existing conditions. Mitigation Measure WQ-6: *Develop and Implement a Mercury Management and Monitoring Plan* would involve the development of a Mercury Management and Monitoring Plan (MMMP) to guide tidal habitat design. The MMMP would require project-specific assessments of new tidal habitats, integration of design measures to minimize mercury methylation, and site monitoring and reporting, which would further minimize the potential for any effects of increased methylmercury exposure at migratory habitat adjacent to tidal restoration sites. Therefore, potential impact of increased exposure to methylmercury resulting from wetland creation and enhancement on western yellow-billed cuckoo populations would be less than significant with mitigation.

Habitat creation and enhancement under the CMP has the potential to result in conditions that promote CHABs, which could result in impacts on western yellow-billed cuckoo using habitat adjacent to created and/or enhanced wetland and aquatic habitats. Microcystins have been found in terrestrial foodwebs, such as spiders and songbirds in riparian habitats, likely through consumption of emergent aquatic insects (Moy et al. 2016:A, E), and can affect western yellow-billed cuckoos if they forage in or near habitats with conditions that promote *Microcystis* blooms. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include CHAB monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased CHAB formation, relative to existing conditions. As discussed in Chapter 9, tidal habitat creation is not expected to cause substantial additional *Microcystis* production that could be transported to adjacent migratory habitat. Therefore, implementation of the CMP would not result in increased CHAB formation that could cause substantial adverse impacts on western yellow-billed cuckoo, relative to existing conditions.

Herbicides would be applied at CMP creation and enhancement sites to remove nonnative vegetation for site preparation and to support the establishment of new plantings. Natural habitats contribute fewer pesticides to receiving waters than agricultural areas where pesticides are applied. Any newly created wetlands or enhanced natural habitat could also filter stormwater to remove solids and either improve or have no effect on pesticide concentrations in discharges to receiving waters, relative to existing conditions. As such, restoration areas are expected to somewhat reduce, rather than increase, runoff of pesticides into adjacent waterbodies. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides would be applied in such a manner as to prevent primary or secondary poisoning of western yellow-billed cuckoo.

CMP habitat creation and enhancement may result in mobilization of selenium in Delta sediments, which could increase the risk of selenium toxicity to western yellow-billed cuckoo. It is difficult to determine whether the effects of potential increases in selenium bioavailability associated with the CMP would lead to adverse effects. Potential effects of increased selenium exposure are likely low for western yellow-billed cuckoos because they spend only a short period of time migrating through the Delta, which reduces the risk of bioaccumulation. Existing selenium concentrations in the Sacramento River watershed are low (Central Valley Regional Water Quality Control Board 1988:14), and modeled concentrations in insect-eating bird eggs under existing conditions in the Delta were below levels of concern for other bird species (Appendix 9J). Analysis included in Chapter 9 for Impact WQ-10: *Effects on Selenium Resulting from Facility Operations* found that compensatory mitigation would not result in a measurable increase in selenium concentrations or selenium bioavailability. Therefore, the potential impact of increased exposure to selenium resulting from restoration on western yellow-billed cuckoo populations would be less than significant. The impact on western yellow-billed cuckoo from the project alternatives with the CMP would be less than significant with mitigation.

<u>*Other Mitigation Measures*</u>

Some mitigation measures would involve ground disturbance, the use of heavy equipment, pile driving, or pesticides that would have the potential to expose western yellow-billed cuckoo to excessive noise, visual disturbance, dust, and hazardous materials that could cause loss of modeled habitat, disruption of normal behaviors, and injury or mortality. The mitigation measures with potential to result in impacts on western yellow-billed cuckoo are: Mitigation Measures BIO-2: *Electrical Power Line Support Placement*; AG-3: *Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties*; AES-1a: *Install Visual Barriers between Construction Work Areas and Sensitive Receptors*; AES-1c: *Implement Best Management Practices to Implement Project Landscaping Plan;* AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences;* AQUA-1a: *Develop and Implement an Underwater Sound Control and Abatement Plan*; PH-1b: *Develop and Implement a Mosquito Management Plan for Compensatory Mitigation Sites on Bouldin Island and at I-5 Ponds*; CUL-2: *Conduct a Survey of Inaccessible Properties to Assess Eligibility, Determine if These Properties Will Be Adversely Affected by the Project, and Develop Treatment to Resolve or Mitigate Adverse Impacts*; and AQ-9: *Develop and Implement a GHG Reduction Plan to Reduce GHG Emissions from Construction and Net CVP Operational Pumping to Net Zero*. Impacts on western yellow-billed cuckoo resulting from the implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to western yellow-billed cuckoo impacts of the project alternatives.

However, the impacts of habitat loss, ground disturbance, noise, visual disturbance, and exposure to dust or hazardous materials on western yellow-billed cuckoo would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; EC-14: *Construction Best Management Practices for Biological Resources*; and Mitigation Measures NOI-1: *Develop and Implement a Noise Control Plan*; and BIO-31: *Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo*. Therefore, impacts on western yellow-billed cuckoo from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on western yellow-billed cuckoo from the construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-32: Impacts of the Project on California Black Rail

The methods for the analysis of effects on California black rail appear in Section 13.3.1.1, and information on the species' life history and habitat suitability model are presented in the species account in Appendix 13B, Section 13B.57, *California Black Rail*.

All Project Alternatives

<u>*Construction*</u>

The construction of all the project alternatives would result in impacts on modeled habitat for California black rail and the potential for the disruption of normal behaviors, and injury, and mortality during construction. The loss of modeled habitat would primarily occur as a result of levee improvements and new roads and road improvements (Appendix 13C). However, the habitat model overestimates suitable habitat for California black rail and therefore impacts on modeled habitat are also overestimated. Much of the modeled habitat that occurs within the construction footprint for levee and road improvements on Bouldin Island under the central alternatives (Alternatives 1, 2a, 2b, and 2c) and Lower Roberts Island under the eastern alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alternative (Alternative 5) consists of existing levees and levee roads with revetment and sparse grassland vegetation landcover types that do not provide suitable habitat for California black rail; however, some areas of suitable wetland vegetation appear to be present at the base of these levees. Acres of permanent and temporary impacts on modeled habitat for California black rail are shown in Table 13-69. Environmental Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-69. Impacts on Modeled Habitat for California Black Rail by Alternative

Alternative	Permanent Impacts—Delta (acres) [a]	Permanent Impacts—Mid-Channel Island Primary (acres) [a]	Permanent Impacts—Mid-Channel Island Secondary (acres) [a]	Temporary Impacts—Delta (acres)	Temporary Impacts—Mid-Channel Island Primary (acres)	Temporary Impacts—Mid-Channel Island Secondary (acres)	Total (acres)
1	7.66	0.00	0.00	6.38	0.47	0.00	14.51
2a	5.27	0.00	0.00	8.90	0.47	0.00	14.64
2b	4.04	0.00	0.00	7.31	0.47	0.00	11.82
2c	5.27	0.00	0.00	8.63	0.47	0.00	14.37
3, 4c	11.68	0.00	0.00	3.70	0.22	0.00	15.6
4a	11.68	0.00	0.00	3.97	0.22	0.00	15.87
4b	10.46	0.00	0.00	2.38	0.22	0.00	13.06
5	12.09	0.00	0.00	3.39	0.27	0.00	15.75

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Ground disturbance (e.g., grubbing during site preparation) in suitable habitat could crush eggs or kill nestlings in California black rail nests. Construction-generated noise and vibration near active nests could cause adults to abandon eggs or recently hatched young if they perceive such disturbances as a threat. Night lighting may also have the potential to affect the behavior of nesting California black rails. All lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in the levels of light, however, these types of light generate an ambient nighttime luminescence that is visible from a distance. Effects of construction-related light would be greater at the intakes where existing conditions are dark and rural in comparison with the Twin Cities Complex, Southern Complex, and Bethany Complex where there are existing sources of light that may illuminate suitable habitat. Construction activities could result in dust and the discharge of construction-related fluids, which could also affect the species and its habitat if present in or adjacent to work areas. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14:

Construction Best Management Practices for Biological Resources (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting the species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

There are no CNDDB (California Department of Fish and Wildlife 2020a) or Delta Habitat Conservation and Conveyance Program (California Department of Water Resources 2011) occurrences of California black rail that overlap with permanent or temporary construction areas for any of the project alternatives. However, there are numerous California black rail occurrences on mid-channel islands throughout the Delta south of SR 12 (California Department of Fish and Wildlife 2020a; California Department of Water Resources 2011). The tunnel would be constructed under suitable mid-channel island habitat with recorded occurrences under the central (Alternatives 1, 2a, 2b, and 2c), eastern (Alternatives 3, 4a, 4b, and 4c), and Bethany Reservoir (Alternative 5) alignments. The use of tunnel boring machines during construction would potentially cause groundborne vibration in the immediate vicinity of tunnel construction areas. However, because of the depth at which the tunnel would be constructed, and because the deep soil cover over the tunnel would effectively dampen and absorb propagated energy from the tunnel crown and the tunnel floor, no significant noise and vibration effects from the operation of the tunnel boring machine on California black rail are anticipated (Chapter 24, Section 24.4.3.2).

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of California black rail. Geotechnical investigations that would occur in the West Tracy Fault Study area, and over the tunnel alignment footprints which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on modeled habitat (Appendix 13C). The Bethany Fault Study investigations would not affect modeled habitat for California black rail. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the potential for injury, mortality, and disruption of normal behaviors of California black rail, as discussed above for conveyance facility construction. Environmental Commitments EC-1: Conduct Worker Awareness Training; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting the species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area and pile installation test methods at the north Delta intakes may also cause disturbance to California black rail, as described above under construction-related effects.

<u>Operations</u>

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions (Chapter 24, Section 24.4.3.2) and the periodic presence of staff and vehicle traffic would not be expected in the vicinity of suitable black rail habitat. Permanent facility lighting associated with the shafts on Bouldin Island and Mandeville Island under the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) and the shaft on Lower Roberts Island under the eastern alignment (Alternatives 3, 4a, 4b, and 4c) and Bethany Reservoir alignment (Alternative 5) could extend into California black rail habitat; however, as stated in Chapter 3, Section 3.4.12, *Fencing and Lighting*, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, and therefore permanent facilities would remain dark the majority of the time at night, which would minimize the potential for this impact.

Power for construction and operation of the conveyance facilities has been designed to use existing power lines and underground conduit to the extent feasible, under all project alternatives. Most new project lines would be placed on existing poles and towers and therefore would not substantially alter the existing landscape. New aboveground high-voltage transmission and SCADA lines, however, would be constructed to power the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and Bethany Complex under Alternative 5 (Chapter 3, Figure 3-13 and Figure 3-14). California black rail are nonmigratory and genetic and isotopic work suggests that although individuals are capable of long-distance dispersal, movement between California black rail populations is infrequent (Hall and Beissinger 2017:216). Although there are some patches of modeled habitat that may support California black rail in the vicinity of the new aboveground high-voltage lines, California black rail typically perform only very short, low flights (Girard et al. 2010:2410), therefore, it is highly unlikely that this species would experience bird strikes at project transmission lines. Transmission line poles and towers provide perching substrate for raptors, which are predators of California black rail. Because of the limited area over which poles would be installed relative to the amount of California black rail habitat in the Delta, it is assumed that any increase in predation risk on California black rail from an increase in raptor perching opportunities would be negligible.

Changes in water operations under all project alternatives are not expected to exacerbate bioaccumulation of methylmercury in California black rail. In general, the highest mercury methylation rates are associated with high tidal marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008:15), which are primary black rail habitat. Largemouth bass was used as an indicator species for analysis of impacts from changes in operations from the construction of the water conveyance facilities because bass are good indicators of mercury contamination throughout the aquatic foodweb (Wood et al. 2010:67). Modeled effects of mercury concentrations from changes in operations of water conveyance facilities on largemouth bass did not differ substantially from existing conditions (Appendix 9H). Even though black rails do not consume largemouth bass and do not use aquatic habitats, methylmercury can be transported to terrestrial foodwebs (Cristol et al. 2008:335), so the lack of substantial change in aquatic foodweb mercury concentrations indicates that methylmercury transported to tidal marsh foodwebs would also not increase appreciably; therefore, these results indicate that bioavailability of methylmercury to black rail would not measurably increase as a result of project operation.

Microcystin toxins originate in aquatic systems and can be transported through foodwebs through consumption (Moy et al. 2016:A). Operation of all project alternatives is not expected to substantially change the five factors that could create conditions more conducive to CHAB formation (i.e., temperature, residence time, nutrients, water velocities and associated turbulence and mixing, and water clarity and associated irradiance) relative to existing conditions upstream of the Delta, within the Delta, or in Suisun Marsh, Suisun Bay, or San Francisco Bay (Chapter 9). The water quality modeling results show a potential for increased residence time in some locations and months within the central Delta, namely Discovery Bay where residence times are already very long, which could contribute to increased *Microcystis* bloom size in some years at these locations if the remaining four environmental factors were also at levels conducive to forming CHABs. Nevertheless, based on known *Microcystis* dynamics in the Delta a small increase of residence time at Discovery Bay would not cause *Microcystis* blooms to substantially increase in size or last substantially longer, relative to existing conditions. Because the project alternatives, through their effects on the five factors potentially associated with CHABs in the Delta, are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystin or any other cyanotoxins in the Delta that could cause a substantial adverse impact on California black rail, relative to existing conditions.

Current use and legacy pesticides have the potential to bioaccumulate in the prey items of birds such as California black rail. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows, relative to existing conditions (Chapter 9). Therefore, the project alternatives would not substantially reduce invertebrate prey populations or increase pesticide exposure to California black rail. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides used during maintenance activities would be applied in such a manner as to prevent primary or secondary poisoning of special-status species.

Because black rail is an obligate wetland species, it may be at risk of selenium toxicity. Modeled selenium concentrations in eggs of invertebrate-eating birds, such as black rail, were below the level of concern, and did not differ substantially from existing conditions under all alternatives (Appendix 9J). Therefore, the project alternatives are not anticipated to substantially increase the risk of selenium contamination in California black rail.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in periodic disturbances that could affect California black rail. Maintenance activities include vegetation management, levee and structure repair, and regrading of roads, which could reduce the functions of habitat in or adjacent to work areas. If these activities take place during the breeding season (February 1 through August 31) they could disrupt foraging and nesting behaviors and result in potential injury and mortality of individuals. Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting. Noise effects from maintenance activities could negatively affect California black rail if they were to nest in the vicinity of water conveyance facilities. Noise from semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application) and daily inspection by vehicle of the shafts on Bouldin Island and Mandeville Island under the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) and the shaft on Lower Roberts Island under the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alternative (Alternative 5) could cause minor disturbances to California black rail if present in the vicinity these activities. Levee and access road repair and regrading in the vicinity of occupied habitat would cause similar disturbances under all project alternatives, but it is highly unlikely that these activities would result in the direct loss of California black rail habitat.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives would result in impacts on California black rail through the permanent and temporary loss of modeled habitat, potential injury or mortality, and the potential for disruption of normal behaviors. For all project alternatives, changes in water operations would not be expected to result in a measurable increase in mercury or selenium bioavailability or increased pesticide or microcystins affecting California black rail. The temporary loss of habitat of injury, mortality, and the disruption of normal behaviors from project construction, operations, and maintenance would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B); however, even with these commitments, the impacts of the project alternatives on California black rail would be significant. The implementation of the CMP would be required to offset the loss of habitat (Appendix 3F, Section 3F.3.2.3, *Emergent Wetland, Seasonal Wetlands, Valley/Foothill Riparian, and Other Nontidal Waters*; Appendix 3F, Section 3F.4.3, *Tidal Habitat Mitigation Framework* and Attachment 3F.1, Table 3F.1-3, CMP-17: *California Black Rail Habitat*), which would mitigate the impact associated with habitat loss to less than significant. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18); NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; BIO-2c: *Electrical Power Line Support Placement*; and BIO-32: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail* would be required to minimize disturbances to habitat and avoid take, as defined under Section 86 of the California Fish and Game Code. The impacts on California black rail from the project alternatives would be less than significant with mitigation because the aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat, noise, and visual disturbances, by providing environmental awareness training to construction personnel, by implementing protective measures during maintenance activities, and species-specific avoidance measures during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) would offset the loss of California black rail habitat (Appendix 3F, Section 3F.3.2.3, *Emergent Wetland, Seasonal*

Wetlands, Valley/Foothill Riparian, and Other Nontidal Waters; Appendix 3F, Section 3F.4.3, *Tidal Habitat Mitigation Framework* and Attachment 3F.1, Table 3F.1-3, CMP-17: *California Black Rail Habitat*) by creating or restoring tidal emergent wetland habitat riparian habitat and managing these areas in perpetuity.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-32: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail

All Project Alternatives

Preconstruction surveys for California black rail will be required by DWR to be conducted 1 year prior to construction and the year of construction where potentially suitable habitat for this species occurs within 500 feet of work areas and where access is available. Potentially suitable habitat includes tidal and nontidal seasonal or perennial wetlands at least 2 acres in size with any kind of vegetation types consistent with California black rail use in the Delta (as determined by field evaluations conducted by a CDFW-approved biologist with experience surveying for black rail) over 10 inches high, whether or not the patch in question was mapped as modeled habitat. A minimum of four surveys will be conducted between February 1 and April 15, with at least 10 days between surveys. Because California black rail are most active between 2 hours before and 3 hours after sunrise, surveys will start at sunrise and continue no later than 9:30 a.m. These surveys will involve the following protocols (based on Evens et al. 1991), or other CDFW-approved survey methodologies that may be developed using new information and best-available science and will be conducted by biologists with the qualifications stipulated in the CDFW-approved methodologies.

1. Listening stations will be established at 300-foot intervals throughout potential California black rail habitat that will be affected by construction or CMP restoration activities. Listening stations will be placed along roads, trails, and levees to avoid trampling wetland

vegetation. Listening stations will be located a maximum of 10 meters from suitable habitat where access is available.

2. Surveys at each station will consist of a biologist listening passively for 1 minute, then broadcasting prerecorded black rail vocalizations: 1 minute of “grr” calls followed by 0.5 minute of “ki-ki-doo” calls. The CDFW-approved biologist will then listen for another 3.5 minutes for a total of 6 minutes per station. Once a California black rail response is detected, the biologist will cease broadcasting immediately.

3. A global positioning system (GPS) receiver and compass will be used to identify survey stations, angles to call locations, and call locations and distances from listening stations. The California black rail call type, location, distance from listening station, and time will be recorded.

The project will be implemented in a manner that will not result in take of California black rail as defined by Section 86 of the California Fish and Game Code. If California black rail is present in the immediate construction area, the following measures will be required.

4. To avoid the loss of individual California black rails, activities within 500 feet of potential habitat will not occur within 2 hours before or after extreme high tides (6.5 feet or above, as measured at the Golden Gate Bridge), to the extent feasible. During high tide, protective cover for California black rail is sometimes limited, and disturbance from project activities could prevent individual rails from reaching available cover.

5. To avoid the loss of individual California black rails, activities within 500 feet of tidal marsh areas and managed wetlands will be avoided during the rail breeding season (February 1 through August 31), unless surveys are conducted to determine that no rails are present within the 500-foot buffer.

6. If breeding California black rail is determined to be present, activities will not occur within 500 feet of an identified calling center (or a smaller distance if approved by CDFW). If the intervening distance between the rail calling center and any activity area is greater than 200 feet and across a major slough channel or substantial barrier (e.g., constructed noise barrier) it may proceed at that location within the breeding season.

7. If construction activities require removal of potential California black rail habitat, whether or not rails have been detected there, vegetation will be removed during the nonbreeding season (September 1 through January 31). Vegetation removal will be completed carefully using hand tools or vegetation removal equipment that is approved by a CDFW-approved biologist. The CDFW-approved biologist will search vegetation immediately in front of the removal tools or equipment and will stop removal if rails are detected. Vegetation removal will resume when the California black rail leaves the area.

8. If the construction footprint is within 500 feet of a known calling center, noise reduction structures such as temporary noise-reducing walls, will be installed at the edge of construction footprint, as determined by an on-site CDFW-approved biologist. Noise-causing construction will be initiated during the nonbreeding season (September 1 through January 31), where feasible, so that California black rails can acclimate to noise and activity prior to nesting.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands as well as habitat for special-status species under the project's CMP would affect modeled habitat for California black rail (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats on Bouldin Island and the I-5 ponds. Though no specific locations for channel margin enhancement and tidal wetland habitat creation have been identified, potential areas include the lower Yolo Bypass and Cache Slough complex. The activities to create these habitat types would generally include for channel margin enhancement the removal of existing riprap, modification of the existing channel margin with heavy equipment, and placement of large woody debris on the channel margin. For tidal restoration, activities would include grading, creation of setback levees, planting, and breaching of existing levees (Appendix 3F, Section 3F.4.3).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or grasslands are located, which do not provide habitat for California black rail and therefore there would not likely be any effects on the species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could support suitable habitat for California black rail and management activities within occupied habitat could result in the disruption of normal behaviors, injury, or mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of California black rail habitat from habitat creation by adjusting the overall commitment of tidal emergent wetland creation or restoration (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-3, CMP-0: *General Design Guidelines*) and therefore mitigate any habitat losses associated with the CMP to less than significant. The creation and enhancement activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals if restoration activities occur during the rail breeding season (February 1 through August 31). Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B) and Mitigation Measure BIO-32: *Conduct Preconstruction Surveys and*

Implement Protective Measures to Avoid Disturbance of California Black Rail would minimize disturbances to habitat and to avoid take of California black rail, as defined by Section 86 of the California Fish and Game Code. These impacts would be less than significant with mitigation because the aforementioned measures would (1) train construction staff on protecting the species, the requirements for avoiding impacts, and the ramifications for not following these measures; (2) minimize dust; (3) implement spill prevention and containment plans that would avoid material spills that could affect habitat; (4) prior to and during implementing restoration and enhancement ground disturbance, establish protective buffers around occupied habitat; and (5) have a biological monitor present that would ensure that non-disturbance buffers are intact and protective measures are being implemented where applicable.

Creation and enhancement of wetlands and tidal habitat restoration under the CMP that would create California black rail habitat could provide biogeochemical conditions for methylation of mercury in the newly inundated soils. There is potential for increased exposure of foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of mercury available in the soils and the biogeochemical conditions. Because Bouldin Island and the I-5 ponds sites consist of existing managed and agricultural wetlands and ponds, wetland creation and enhancement are not expected to increase mercury methylation, relative to existing conditions. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include mercury monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased mercury methylation, relative to existing conditions. Mitigation Measure WQ-6: *Develop and Implement a Mercury Management and Monitoring Plan,* which contains measures to assess the amount of mercury at tidal restoration sites before project development, followed by appropriate design, monitoring, and adaptation management, would minimize the potential for effects of increased methylmercury exposure due to tidal restoration. Therefore, implementation of the CMP would not be expected to have a significant adverse impact on California black rail.

Habitat creation and enhancement under the CMP has the potential to result in conditions that promote CHABs. Microcystin toxins originate in aquatic systems and can be transported through foodwebs through consumption (Moy et al. 2016:A) which could result in impacts on California black rail using created and/or enhanced wetland and tidal marsh habitats with conditions that promote CHABs. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include CHAB monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased CHAB formation, relative to existing conditions. As discussed in Chapter 9, tidal habitat creation is not expected to cause substantial additional *Microcystis* production. Therefore, implementation of the CMP would not result in increased CHAB formation that could cause substantial adverse impacts on California black rail, relative to existing conditions.

Wetland creation and enhancement could result in increased exposure of California black rail to selenium. Modeled selenium concentrations in insect-eating bird eggs were well below the level of concern, existing selenium concentrations in the Sacramento River watershed are low (Central Valley Regional Water Quality Control Board 1988:14), and potential selenium exposure to individuals using these restored sites would be similar to the existing tidal marshes in the Delta, therefore, restoration activities would not be expected to adversely affect the California black rail population. Analysis included in Chapter 9 for Impact WQ-10: *Effects on Selenium Resulting from Facility Operations* found that compensatory mitigation would not result in a measurable increase in selenium concentrations or selenium bioavailability. Furthermore, California black rail populations are threatened by habitat loss (Evens et al. 1991:963), so increased availability of habitat would outweigh the potential for low-level increases in selenium exposure. Therefore, potential increased exposure to selenium resulting from restoration would not be expected to have a significant adverse impact on California black rail populations. The impact on California black rail from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, the use of heavy equipment, pile driving, or pesticides that would have the potential to expose California black rail to excessive noise, visual disturbance, dust, and hazardous materials that could cause loss of modeled habitat, disruption of normal behaviors, and injury or mortality. The mitigation measures with potential to result in impacts on California black rail are similar to those discussed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. Impacts on California black rail resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to California black rail impacts of the project alternatives.

The impacts of habitat loss, noise, visual disturbance, and exposure to dust or hazardous materials on California black rail would be reduced through the CMP, environmental commitments, and Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan* as detailed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-32: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail* would require species-specific measures to reduce these impacts. Therefore, impacts on California black rail from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on California black rail from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-33: Impacts of the Project on Greater Sandhill Crane and Lesser Sandhill Crane

The methods for the analysis of effects on greater sandhill crane and lesser sandhill crane appear in Section 13.3.1.1, and information on the life histories and habitat suitability models are presented in the following species accounts in Appendix 13B: Section 13B.58, *Greater Sandhill Crane*, and Section 13B.59, *Lesser Sandhill Crane*.

All Project Alternatives

Construction

The construction of all project alternatives would affect known roost sites and modeled foraging habitat for greater and lesser sandhill crane. Effects from construction activities would include the permanent and temporary loss of habitat and potential disturbance of roosting and foraging behaviors. Sandhill cranes show strong site fidelity to their roost sites and associated foraging habitat (Ivey et al. 2014a:2); however, there is sufficient habitat in the sandhill crane winter use area such that the permanent and temporary loss of habitat and potential disturbance of roosting and foraging behaviors caused by the project is not expected to lead to take of greater sandhill crane, as defined by Section 86 of the California Fish and Game Code or injury or mortality of lesser sandhill crane.

There would be no permanent or temporary impacts on known permanent roost sites under the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c). Permanent and temporary impacts on greater and lesser sandhill crane known temporary roost sites under the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would occur on Bouldin Island from the placement of RTM site with associated RTM conveyor and handling facilities, from levee and road improvements along the perimeter of the island, and from geotechnical activities (described further in the discussion on field investigations).

Under the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c), and the Bethany Reservoir alignment alternative (Alternative 5), there would be no permanent impacts on known permanent roost sites; however temporary impacts on known permanent roost sites would occur from geotechnical activities. Permanent and temporary impacts on known temporary roost sites under the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c), and the Bethany Reservoir alignment alternative (Alternative 5), would occur from access road construction and work areas for underground SCADA and power lines on Lower Roberts Island.

Greater and lesser sandhill crane modeled foraging habitat would be lost from the construction of the intakes and the Twin Cities Complex (all alternatives). Under the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c), the loss of greater and lesser sandhill crane foraging habitat would result from the construction of shafts located on New Hope Tract, Staten Island, Bouldin Island, Mandeville Island, and Bacon Island. Staten Island is an important wintering area for sandhill cranes and regularly hosts a high density of greater and lesser sandhill cranes, particularly early in the winter season (Ivey et al. 2014b:9). Interested parties provided information that was used to identify a suitable location for the tunnel shaft on Staten Island (under Alternatives 1, 2a, 2b, and 2c) in a previously disturbed location adjacent to a road and powerline on the northern portion of the island (Delta Conveyance Design and Construction Authority 2022d:4).

The loss of both greater and lesser sandhill crane foraging habitat under the eastern alignment alternatives (Alternatives 3, 4a, 4b and 4c) and the Bethany Reservoir alignment alternative (Alternative 5) would result from the construction of shafts located on New Hope Tract, Canal Tract, Terminous Tract, King Island, Lower Roberts Island, and Upper Jones Tract (both the eastern alignment and Bethany Reservoir alignment locations on Upper Jones Tract). Additional impacts on modeled foraging habitat for the lesser sandhill crane subspecies would result from the construction of the Southern Complex and associated new SCADA lines (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c; Appendix 13C).

In order to avoid disrupting daily flight patterns for sandhill cranes, helicopters would not be used to string power or SCADA in the project area located north of SR 4 (Delta Conveyance Design and Construction Authority 2022c).

The tunnels for all alternatives would be constructed under known roost sites and modeled foraging habitat for sandhill cranes. The use of tunnel boring machines during construction would potentially cause groundborne vibration in the immediate vicinity of tunnel construction areas. However, because of the depth at which the tunnel would be constructed, and because the deep soil cover over the tunnel would effectively dampen and absorb propagated energy from the tunnel crown and the tunnel floor, no significant noise and vibration effects from the operation of the tunnel boring machine on sandhill cranes are anticipated (Chapter 24, Section 24.4.3.2).

Acres of permanent and temporary impacts on modeled roosting and foraging habitat for greater and lesser sandhill crane are shown in Table 13-70 and Table 13-71, respectively. Environmental

Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas at the Twin Cities Complex, intakes, tunnel shafts, and other temporary work areas (both greater and lesser sandhill crane, all alternatives) in addition to the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) for lesser sandhill crane are restored (Appendix 3B).

Table 13-70. Impacts on Modeled Habitat for Greater Sandhill Crane by Alternative

Alternative	Permanent Impacts—Permanent Roost (acres) [a]	Permanent Impacts—Temporary Roost (acres) [a]	Permanent Impacts—Foraging (acres) [a]	Temporary Impacts—Permanent Roost (acres)	Temporary Impacts—Temporary Roost (acres)	Temporary Impacts—Foraging (acres)	Total (acres)
1	0.00	314.47	1,087.86	0.00	29.42	164.18	1,595.93
2a	0.00	353.34	1,229.83	0.00	31.87	190.01	1,805.05
2b	0.00	237.27	850.58	0.00	32.05	184.77	1,304.67
2c	0.00	282.19	972.79	0.00	32.01	191.59	1,478.58
3	0.00	2.66	1,074.13	1.46	5.79	116.69	1,200.73
4a	0.00	2.66	1,276.94	1.46	5.79	116.53	1,403.38
4b	0.00	2.66	786.63	1.46	5.79	111.21	907.75
4c	0.00	2.66	955.36	1.46	5.79	118.04	1,083.31
5	0.00	3.65	1,339.78	1.46	4.40	78.37	1,427.66

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Table 13-71. Impacts on Modeled Habitat for Lesser Sandhill Crane by Alternative

Alternative	Permanent Impacts—Permanent Roost (acres) [a]	Permanent Impacts—Temporary Roost (acres) [a]	Permanent Impacts—Foraging (acres) [a]	Temporary Impacts—Permanent Roost (acres)	Temporary Impacts—Temporary Roost (acres)	Temporary Impacts—Foraging (acres)	Total (acres)
1	0.00	314.47	1,502.64	0.00	29.42	170.82	1,702.88
2a	0.00	353.34	1,643.66	0.00	31.87	197.80	2,226.67
2b	0.00	237.27	1,263.41	0.00	32.05	191.27	1,724.00
2c	0.00	282.19	1,386.63	0.00	32.01	199.10	1,899.93
3	0.00	2.66	1,530.62	1.46	5.79	127.94	1,668.47
4a	0.00	2.66	1,756.04	1.46	5.79	127.94	1,893.89
4b	0.00	2.66	1,212.64	1.46	5.79	121.59	1,344.14
4c	0.00	2.66	1,399.43	1.46	5.79	129.34	1,538.68
5	0.00	3.65	1,350.21	1.46	4.40	83.99	1,443.71

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities would not be expected to injure or kill sandhill crane individuals. If a bird is present in a region where construction activities are occurring, the bird would be expected to avoid the slow-moving or stationary equipment and move to other areas, as they would move away from any other trucks or farm equipment that could be present within or adjacent to agricultural habitats under existing conditions.

Field investigations would be conducted prior and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the disruption of normal behaviors of greater and lesser sandhill cranes. Geotechnical investigations associated with the tunnels for all project alternatives, which include CPTs and soil borings, would result in impacts on habitat (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations would not affect modeled habitat for greater or lesser sandhill cranes. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the potential for the disruption of normal behaviors of sandhill cranes, as discussed above for conveyance facility construction. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area and pile installation test methods at the north Delta intakes could affect greater and lesser sandhill cranes if those activities were conducted when cranes are present in the study area, as described below under *Noise and Visual Disturbances within Greater and Lesser Sandhill Crane Modeled Habitat*. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) implementing spill prevention and containment plans, (2) implementing work windows for in-water pile installation test methods, and (3) having a biological monitor present to implement any additional protective mitigation measures.

Noise and Visual Disturbance within Greater and Lesser Sandhill Crane Modeled Habitat

Construction of the water conveyance facilities would require the use of heavy equipment (see Table 24-6 in Chapter 24) over prolonged periods, and would generate noise, require nighttime lighting, and create visual disturbances. Construction activities conducted during the sandhill crane wintering season (September 15 through March 15) could cause sandhill cranes roosting or foraging in the vicinity of work areas to flush, if they perceive such activities as a threat. While sandhill cranes are known to habituate to a certain degree to increased levels of background noise when the noise level is relatively constant such as highway traffic (Dwyer and Tanner 1992:29), less is known about the ability of sandhill cranes to habituate to intermittent noise such as that associated with the operation of heavy equipment (e.g., pile drivers, construction cranes, compressors, heavy trucks).

Hazing techniques are regularly employed in North America to prevent sandhill cranes from causing significant crop damage or colliding with aircrafts (Barzin and Ballinger 2017:1). Hazing techniques such as propane cannons and pyrotechnics have been reported to lose their effectiveness as deterrents once individuals are no longer naïve to the auditory disturbance, particularly in high-value habitat (Barzin and Ballinger 2017:5–6), suggesting that cranes can habituate to extreme and sporadic sounds. Disturbance from waterfowl hunting can reduce habitat availability to sandhill cranes (Ivey et al. 2014a:27; Ivey et al. 2014c:16–17) and cranes have been observed to avoid roost sites once opening day of hunting season has begun (Ivey et al. 2014c:16). Sandhill cranes are present in the study area during the waterfowl hunting season (approximately October 23 through January 31), and hunting occurs throughout the study area on Bouldin Island, Little Mandeville Island, private duck clubs, Stone Lakes NWR within 1 mile of known roost sites, and from public waterways throughout the Delta. Cranes are therefore exposed to irregular, explosive sound from shotguns under existing conditions (a 12-gauge shotgun blast is approximately 165 dB) and respond to those disturbances throughout the winter season.

Because the effects of project-related noise and other disturbances on sandhill cranes likely depend on multiple factors including habitat characteristics and disturbances under existing conditions, and because the duration and nature of construction activities is relatively novel within the study area, it is assumed that noise from the construction of water conveyance facilities could temporarily displace sandhill crane use of habitat in the vicinity of project activities. The potential noise effects on known roost sites and modeled foraging habitat were analyzed to quantify potential acres of affected habitat. The methods for the analysis are described in Section 13.3.1.2, *Evaluation of Construction Activities*. In most of the study area, the noise analysis was conducted based on the assumption that there would be direct line of sight from sandhill crane habitat areas to the construction site, and, therefore, provides a conservative estimate of effects. However, in many areas, existing levees would partially or completely block the line of sight and would function as effective noise barriers, substantially reducing noise transmission. The elevation of the S. P. Cut levee was incorporated into the sound level contours to develop a more accurate estimate of noise in the vicinity of the Stone Lakes NWR. Although USFWS uses 60 dBA as a significance threshold for other special-status bird species (County of San Diego 2021:2.4-3; Ldn Consulting Inc. 2014:13; California Department of Fish and Wildlife 2013:2), in the absence of data indicating the species-specific effect that noise levels above baseline would have on sandhill crane, and in the absence of a quantifiable baseline effect of periodic noise from hunting under existing conditions, noise levels were assessed above both 60 dBA and 50 dBA. Predicted acres of sandhill crane modeled habitat affected by increased noise levels from project construction (Tables 13G-1 through Table 13G-8) and figures depicting the overlay of the sound level contours on modeled foraging and known roosts sites (Figure 13G-1a through Figure 13G-12b) are shown in Appendix 13G, *Construction Sound Level Impacts on Sandhill Cranes*.

Medium-Term Pile Driving. Noise levels from pile driving using either impact or vibratory methods are typically higher than noise levels from heavy construction equipment. The conceptual design limits the use of impact pile driving at the construction sites where possible. Installation of piles using vibratory methods produces noticeably lower noise levels than when an impact hammer is used. Pile driving would be used for several project components including intake cofferdams, control structures, and bridges. For each component, pile driving would be conducted only during daytime hours between 7:00 a.m. and 7:00 p.m., and would occur intermittently on a temporary basis, ceasing once the corresponding phase of construction is complete. Field investigations would also include minimal pile driving under the pile drive test program.

At the north Delta intakes, in-water pile driving required for the construction of cofferdams would be restricted to occur between June 15 and October 31, and therefore could overlap with up to 1.5 months of the year when cranes are present in the study area (September 15 through March 15). A temporary embankment would be built around the intake work sites prior to pile driving, which would reduce the noise effects on surrounding habitat. Vibratory pile driving would also be used to install sheet piles for electrical service buildings at a central location within the river side embankment of the intake sedimentation basins. It is estimated that these piles would take a total of about 2 hours of driving time to install at each intake. Foundation piers for the intake structures would be installed over a period of 18 months. Potential impacts from medium-term pile driving and heavy construction (combined) are presented in Appendix 13G, Table 13G-1 and Table 13G-2 (all alternatives), Figure 13G-1a and Figure 13G-1b (Alternative 2a), Figure 13G-5a and Figure 13G-5b (Alternative 4a), and Figure 13G-9a and Figure 13G-9b (Alternative 5).

Short-Term Pile Driving. Additional pile driving would be required on a temporary basis for construction of new bridges for project access roads and rails, and modifications to existing bridges. The total number of days required for pile installation at bridges would vary between 4 and 45 days (Chapter 24, Appendix 24F, *Pile Driving Specifications for New Bridges on Haul Routes*). Some impact driving may be required for installing permanent bridge supports, though vibratory and cast-in-drilled-hole techniques would be used wherever possible. Bridge construction or reconstruction within the vicinity of greater and lesser sandhill crane habitat would occur at the Hood-Franklin bridge over Snodgrass Slough (all alternatives, Appendix 13G, Figure 13G-4a, Figure 13G-8a, and Figure 13G-12a), over a drainage canal for Intake A (Alternatives 2a [Appendix 13G, Figure 13G-4a] and 4a [Appendix 13G, Figure 13G-8a] only), the SR 12 bridge over Little Potato Slough, the SR 12 bridge over West Terminous Drive, and a new bridge over SR 12 to access Bouldin Island (Alternatives 1, 2a, 2b, and 2c; Appendix 13G, Figure 13G-4a), a new bridge overpass in Holt over the BNSF tracks and EBMUD Mokelumne Aqueducts (Alternatives 1, 2a, 2b, and 2c; Appendix 13G, Figure 13G-4b), a new bridge between Mandeville and Bacon Island over Connection Sough (Alternatives 1, 2a, 2b, and 2c; Appendix 13G, Figure 13G-4b), and several new bridges for access to Lower Roberts Island including one at Burns Cutoff for the Lower Robert's Rail Spur Connection (Alternatives 3, 4a, 4b, 4c, and 5; Appendix 13G, Figure 13G-8b). In-water pile driving at these bridges would also occur between June 15 and October 31, and therefore could overlap with up to 1.5 months of the year when cranes are present in the study area (September 15 through March 15). Construction of the emergency spillway and outlet structure of the Southern Forebay and the California Aqueduct Control Structure (Alternative 2a and Alternative 4a) and the Bethany Reservoir Discharge Structure (Alternative 5) would require the installation of sheet piles using vibratory methods but this would not affect habitat for greater sandhill crane or lesser sandhill crane (Appendix 13G, Figures 13G-4b, 13G-8b, and 13G-12b). Potential acres of impact from short-term pile driving are presented in Appendix 13G, Table 13G-7 and Table 13G-8. Specifications of pile driving for new bridges and bridge widenings to accommodate new access roads are provided in Appendix 24F.

Heavy Construction. Standard heavy equipment would be used to construct the intake components over an estimated 12 years (all alternatives, Appendix 13G, Tables 13G-3 and 13G-4; Figures 13G-2a, 13G-6a, and 13G-10a). Construction of the Twin Cities Complex (all alternatives; Appendix 13G, Figures 13G-2a, 13G-6a, and 13G-10a), New Hope Tract Maintenance Shaft, Staten Island Maintenance Shaft, Bouldin Island Launch/Reception Shaft, Mandeville Island Maintenance Shaft, and Bacon Island Reception Shaft (Alternatives 1, 2a, 2b, and 2c; Appendix 13G, Figures 13G-2a and 13G-2b), New Hope Tract Maintenance Shaft, Canal Ranch Tract Maintenance Shaft, Terminous Tract Reception Shaft, King Island Maintenance Shaft, Lower Roberts Island Launch/Reception Shaft, and Upper Jones Tract Maintenance Shaft (Alternatives 3, 4a, 4b, 4c, and 5; Appendix 13G, Figures 13G-6a, 13G-6b, 13G-10a, 13G-10b) would also occur within or adjacent to greater and lesser sandhill crane habitat and would occur over 12-year period. Work at these shaft locations would be conducted during daytime hours (7:00 a.m. to 7:00 p.m.) with the exception of 24-hour tremie concrete pours described above that would need to occur continuously for up to 1 month duration depending on the site (up to 1 month for each intake, accounting for nonconsecutive pours, and up to 1 week for each shaft site, accounting for nonconsecutive pours). The sound level contours for long-term construction include the modeled noise from the haul trucks that would travel along the intake haul road along the western toe of the abandoned railroad embankment adjacent to Stone Lakes NWR (all alternatives; Appendix 13G, Figures 13G-2a, 13G-6a, 13G-10a).

Linear Construction Features. Construction of roads, utilities, and associated work areas under all alternatives would occur for approximately one week in duration at a given location (Appendix 13G, Table 13G-5 and Table 13G-6 [all alternatives] and Figures 13G-3a, 13G-3b [Alternative 2a], Figures 13G-7a and 13G-7b [Alternative 4a], and Figures 13G-11a and 13G-11b [Alternative 5]). Helicopters would not be used to install conductor line within greater sandhill crane foraging habitat. However, helicopters would be used to install a conductor line near the Southern Complex, which could overlap with suitable lesser sandhill crane foraging habitat. It would generally take less than 15 minutes to string conductor line along each structure, and generally helicopters would not be within any given line mile for more than 3 hours, however the use of helicopters during the winter crane use season (September 15 through March 15) in occupied lesser sandhill crane habitat could affect lesser sandhill crane use of the sites during construction.

Evening and nighttime construction activities would require the use of bright lights. All lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in the levels of light, however, these types of light generate an ambient nighttime luminescence that is visible from a distance. Effects of construction-related light would be greater at the intakes where existing conditions are dark and rural in comparison with the Twin Cities Complex where there are existing sources of light that may illuminate suitable habitat. Nighttime construction could also result in headlights flashing into roost sites when construction vehicles are turning onto or off construction access routes. Direct light from automobile headlights has been observed to cause roosting cranes to flush and it is thought that they may avoid roosting in areas where lighting is bright. However, cranes exhibit high roost site fidelity (Ivey et al. 2014a:2) and, in some cases, may still use artificially lit sites due to this loyalty.

DWR has designed the project to minimize lighting and visual effects from traffic to reduce disturbance to sandhill cranes in the vicinity of Stone Lakes NWR. Project-related traffic on Hood-Franklin Road would be limited to shuttles bringing construction employees to and from the intake construction areas and the park and ride lot. For approximately 3 weeks, concrete pours would occur for 24 hours per day at the intakes and tunnel shafts and nighttime truck traffic would be required to transport concrete during this period. All construction truck traffic to serve the intake locations would occur along Lambert Road and a new intake haul road which would be constructed at ground level along the western toe of the abandoned railroad embankment. The abandoned railroad embankment rises approximately 20 feet above ground level and would serve to reduce light from nighttime truck traffic extending into roosting and foraging habitat within the Stone Lakes NWR. As described in Environmental Commitment EC-8: *On-Road Haul Trucks*, DWR would consider the use of electric or hybrid-electric vehicles over diesel counterparts to the extent that they become commercially available, earn a track record for reliability in real-world construction conditions, and become cost effective.

RTM movement, drying, and testing from the tunnel launch shaft sites would occur 20 hours per day Monday through Friday and 10 hours on Saturdays. This would involve RTM being removed from the tunnel through the launch shafts and transported by conveyor, truck, or rail to handling and storage facilities near launch shaft sites. Therefore, the use of bright lights may be needed to illuminate loading and offloading areas, which could affect crane use of adjacent habitat or roosting behavior.

The general presence and movement of humans, vehicles, and other equipment could disturb sandhill cranes within the vicinity of work areas. Some studies have shown that, while sandhill cranes do show a response to low levels of human presence (Wilkins et al. 2017:263), it does not appear to be a substantial response in many cases (Eldred 2009:35), and some degree of habituation does occur over time. The increase in project-related human presence and visual disturbance would be correlated with the intensity of construction activity in the work area, and along roadways where construction-related traffic would occur. Increased noise and lighting are directly linked to these activities and therefore it is not possible to clearly distinguish between additional disturbance effects from increased human presence and visual disturbance and other construction-related noise and lighting effects.

Operations

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions. Periodic vehicle traffic would not be expected to be greater than similar disturbance under existing conditions within sandhill crane habitat (e.g., recreational vehicles, farm equipment). Permanent lighting at project facilities under all project alternatives could extend into suitable habitat for greater and lesser sandhill cranes; however, as stated in Chapter 3, Section 3.4.12, *Fencing and Lighting*, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, which would minimize the potential for this impact.

Changes in water operations under all project alternatives would not exacerbate bioaccumulation of methylmercury in greater sandhill crane and lesser sandhill crane. Largemouth bass was used as an indicator species for analysis of impacts from changes in operations from the construction of the water conveyance facilities because they are good indicators of mercury contamination throughout the aquatic foodweb (Wood et al. 2010:67; Appendix 9H). Although the magnitude of methylmercury bioaccumulation differs among species and foodwebs, methylmercury can be transported to terrestrial foodwebs through consumption of aquatic prey (Cristol et al. 2008:335), therefore changes in aquatic foodweb methylmercury concentrations are assumed to result in changes in adjacent terrestrial foodwebs. Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate species likely overestimate the effects on greater sandhill crane and lesser sandhill crane because of their position in the foodweb. The modeled effects of mercury concentrations from changes in water operations on largemouth bass did not differ substantially from existing conditions; therefore, results also indicate greater sandhill crane and lesser sandhill crane tissue concentrations would not measurably increase as a result of project operations.

Current use and legacy pesticides would not be expected to bioaccumulate in the food items of sandhill cranes. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows and would not result in land-use changes that would increase use of pesticides, relative to existing conditions. Therefore, the project alternatives would not substantially reduce invertebrate prey populations or increase pesticide exposure to sandhill cranes. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides used during maintenance activities would be applied in such a manner as to prevent primary or secondary poisoning of special-status species.

Microcystin toxins originate in aquatic systems and can be transported through foodwebs through consumption (Moy et al. 2016:A) and can affect greater sandhill and lesser sandhill crane if they forage near aquatic habitats with conditions that promote formation of CHABs. Operation of all project alternatives is not expected to substantially change the five factors that could create conditions more conducive to CHAB formation (i.e., temperature, residence time, nutrients, water velocities and associated turbulence and mixing, and water clarity and associated irradiance) relative to existing conditions within the Delta (Chapter 9, *Water Quality*). The water quality modeling results show a potential for increased residence time in some locations and months within the central Delta, namely Discovery Bay where residence times are already very long, which could contribute to increased *Microcystis* bloom size in some years at these locations if the remaining four environmental factors were also at levels conducive to forming CHABs. Nevertheless, based on known *Microcystis* dynamics in the Delta a small increase of residence time at Discovery Bay would not cause *Microcystis* blooms to substantially increase in size or last substantially longer, relative to existing conditions. Because the project alternatives, through their effects on the five factors potentially associated with CHABs in the Delta, are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystin or any other cyanotoxins in the Delta that could cause a substantial adverse impact on greater sandhill crane or lesser sandhill crane, relative to existing conditions.

Changes in selenium concentrations were analyzed in Chapter 9, and it was determined that, relative to existing conditions, water conveyance facilities would not result in substantial, long-term increases in selenium concentrations in water in the Delta under any alternative. Modeled selenium concentrations in eggs of invertebrate-eating birds, were below the level of concern and did not differ substantially from existing conditions under all alternatives (Appendix 9J). Therefore, the project alternatives are not anticipated to substantially increase the risk of selenium contamination in greater sandhill crane or lesser sandhill crane.

Sandhill cranes are known to be susceptible to collision with aboveground wires (Bevanger 1998:68; Wright et al. 2009:2; Murphy et al. 2016a:480; Hays et al. 2021:1440; Dwyer et al. 2019:1). Sandhill cranes fly frequently between roost and foraging areas during the day, after which they settle down at traditional roost sites for the night. Because most greater sandhill crane movement in the Delta occurs within approximately 1.2 miles from their primary roost sites (Ivey et al. 2015:523), the proximity of aboveground lines to known roost sites is a key issue in evaluating collision risk (Morkill and Anderson 1990:8; Hays et al. 2021:1445). Delta wintering cranes are also regularly exposed to dense fog, which limits visibility and increases mortality risk from collision with power lines. While overall movement may decrease during foggy conditions, greater sandhill cranes are known to fly in the fog, increasing their susceptibility to collision with overhead wires. In addition, this species flies in flocks moving several times a day between feeding and roosting areas. Flocking behavior increases collision risk compared to non-flocking species because of decreased visibility for birds flying at the rear of the flock (Murphy et al. 2009:18; Jenkins et al. 2010:10; Avian Power Line Interaction Committee 2012:37; Murphy et al. 2016b:315). Lastly, the crane's large body size, with high wing loading/low aspect ratio, limits maneuverability, making cranes vulnerable to collision relative to more agile species (Avian Power Line Interaction Committee 2012:37). In addition to collision as a result of daytime travel between roosts and foraging areas, cranes may experience nighttime mortality when flushed from their roosts (e.g., by coyotes), further contributing to an increased risk of collision when power lines are located near roost sites. Migration flight could cause limited risks for cranes. Cranes arrive in the Delta region beginning in September, where they reside until late February to early March, when they begin their northward migration back to the breeding grounds. Migration flights usually begin after mid-morning, when thermals develop, and finish before or just after sunset. During migration, birds fly at altitudes of up to 4,600 meters, with most flights between 150 and 760 meters (Gerber et al. 2020), far above the height of proposed power lines. Cranes are exposed to collision risk during takeoff and landing associated with migration.

The project has been designed to avoid death or injury of greater sandhill crane (or any other actions defined as “take” as defined by Section 86 of the California Fish and Game Code). To the maximum extent feasible, existing power lines and underground conduit would be used under all project alternatives. In order to avoid impacts on habitat, the project would not install new overhead power lines or SCADA routes in sensitive areas for greater sandhill crane. Additionally, due to these same concerns, helicopters would not be used to string power or SCADA in the project area located north of SR 4 (Delta Conveyance Design and Construction Authority 2022c:4).

Most greater sandhill crane movement in the Delta occurs within approximately 1.2 miles of their primary roost sites (Ivey et al. 2015:523) and Brown et al. (1987:131) found that no sandhill crane collisions occurred where distances from power lines to bird-use areas were greater than or equal to 1 mile (Avian Power Line Interaction Committee 2012:50). All proposed new aboveground towers and associated SCADA and transmission lines would be located at least 3 miles or more from the nearest known greater sandhill crane roost site under all alternatives. New aboveground lines north of SR 4 would be limited to one overhead 20-meter transmission line along SR 12 that would be required to connect a new substation to the existing overhead transmission lines to provide service to Bouldin Island under the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c; Chapter 3, Figure 3-13) and one overhead 20-meter transmission line on Lower Roberts Island that would be required to connect a new substation to the existing overhead transmission lines under the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment (Alternative 5). These short segments of aboveground lines are at least 3 miles from the nearest known greater sandhill crane roost site (Appendix 13B, Section 13B.58, Figure 13B.58-1), greater than twice the average foraging distance of greater sandhill cranes (Ivey et al. 2015:523). Lesser sandhill cranes travel further distances and have larger home-range sizes than greater sandhill cranes (Ivey et al. 2015:525). These short segments of new project lines are also at least 3 miles from the nearest known lesser sandhill crane roost site (Appendix 13B, Section 13B.59, Figure 13B.59-1), which is the average distance of lesser sandhill crane movement from their primary roost sites in the Delta (Ivey et al. 2015:523). New aboveground high-voltage transmission and SCADA lines that would be constructed to serve the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c; see Chapter 3, Figure 3-13 and Figure 3-14) between Brentwood and Discovery Bay are also greater than 3 miles from the nearest known greater or lesser sandhill crane roost site and therefore similarly avoid the area within the average foraging distance for either sandhill crane subspecies.

Under all project alternatives, aboveground SCADA lines would be placed on existing poles or towers from Franklin Boulevard to Freeport Boulevard and from the Sacramento River to Scribner Road just east of Clarksburg. Replacement aboveground transmission lines on existing poles would be needed from the Franklin Substation, along Franklin Boulevard to Lambert Road. From the intersection of Lambert Road and Franklin Boulevard, these transmission lines would be extended underground to the Lambert batch plant, the intakes, and the Twin Cities Complex (Chapter 3, Figure 3-13 and Figure 3-14). Replacement aboveground transmission lines along Franklin Road would be placed at the same vertical height as the existing lines on the opposite side of the tower. Replacement aboveground transmission and SCADA lines located within 1.2 miles of known roost sites, in the absence of mitigation, could increase the potential for collision for greater sandhill cranes (within 3 miles of known roost sites for lesser sandhill cranes; Ivey et al. 2015:523) if they were not constructed within the same vertical prism as the existing lines. This potential for collision, in the absence of mitigation, could also be exacerbated by construction-related effects (e.g., flushing caused by noise disturbance), especially in low-visibility conditions.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives would result in periodic disturbances that could affect roosting and foraging sandhill cranes. Maintenance activities across all facilities that could affect sandhill cranes (all project alternatives) include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle. Noise and visual disturbances from these maintenance activities at the intakes and shaft sites could disturb greater and sandhill cranes roosting or foraging in the vicinity of work areas if activities are conducted between October and mid-March (when cranes are present in the study area). However, as described above under construction-related effects, there is insufficient data to assess the effects that of maintenance noise levels would have on sandhill crane behavior, relative to existing conditions. Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives could result in impacts on greater sandhill crane and lesser sandhill crane through the permanent and temporary loss of known roost sites and modeled foraging habitat and the potential disruption of normal behaviors. The temporary loss of habitat and potential impacts of the disruption of normal behaviors from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); however, even with these commitments, the loss of habitat from the construction of the project alternatives, and the potential for the disruption of normal behaviors from construction, operations, and maintenance activities on greater sandhill crane and lesser sandhill crane would be significant. The implementation of the CMP would be required to offset the loss of roosting and foraging habitat by creating roosting and foraging habitat and protecting agricultural foraging habitat for sandhill cranes (Appendix 3F, Attachment 3F.1, Table 3F1-3, CMP-18a: *Sandhill Crane Roosting Habitat,* and CMP-18b: *Sandhill Crane Foraging Habitat*), which would reduce the impact associated with habitat loss to less than significant. Because the greater sandhill crane is listed as "fully protected" under the California Fish and Game Code Section 3511, activities that would result in "take" as defined by Section 86 of the Fish and Game Code (i.e., "to hunt, pursue, catch, capture, or kill, or attempt to" undertake these activities) are prohibited. The project alternatives have been designed to avoid any activities that would result in actions considered "take" of greater sandhill crane. The project alternatives would use existing power lines or underground conduit to the extent possible for the purpose of avoiding potential injury or direct mortality of the greater sandhill crane and all new aboveground lines would be located outside of the roost sites or foraging habitat for greater sandhill crane. Mitigation Measure BIO-2c: *Electrical Power Line Support Placement,* which requires that project lines installed on existing poles or towers be placed in the same vertical prism as existing lines where feasible, and that all project lines within 3 miles of greater sandhill crane roost sites be fitted with bird flight diverters that are visible under all conditions and based on APLIC or more current guidance (Avian Power Line Interaction Committee 2006, 2012), would minimize any additional potential collisions of greater or lesser sandhill cranes from project alternatives. Mitigation Measures NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18); and BIO-33: *Avoid and Minimize Disturbance of Sandhill Cranes* would mitigate the impacts on greater sandhill crane and lesser sandhill crane to a less-than-significant level. Therefore, the impacts on greater sandhill crane and lesser sandhill crane from the project alternatives would be less than significant with mitigation because these measures would compensate for lost habitat and reduce direct effects on these species by implementing protective measures during maintenance activities, which would include assessing work areas for habitat and conducting surveys where appropriate and delaying maintenance activities (either by season or time of day) where feasible; by designing lighting that avoids spillover into habitat; by reducing noise impacts through the implementation of time of day restrictions on construction and noise attenuating measures where feasible; and by avoiding and minimizing disturbance of roosting and foraging cranes by conducting surveys, conducting work outside of the winter crane season (September 15 through March 15) to the extent feasible when they are present in the study area, and by establishing roosting and foraging habitat to compensate for disturbance and displacement of sandhill cranes during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) would offset the loss of greater sandhill crane and lesser sandhill crane roosting habitat by creating roosting habitat on Bouldin Island or in suitable lands that provide connectivity between Stone Lakes NWR and Cosumnes River Preserve, and managing these areas in perpetuity (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*). The CMP would also offset the loss of greater and lesser sandhill crane foraging habitat by protecting high- to very high-value foraging habitat for greater sandhill crane, with at least 80% maintained in very high-value types (corn and rice) in any given year. This foraging habitat would be within 2 miles of known roost sites for both subspecies and would be managed in perpetuity (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-18b: *Sandhill Crane Foraging Habitat*). Foraging habitat protected for Swainson's hawk (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-19b: *Swainson's Hawk Foraging Habitat*) would also benefit lesser sandhill crane.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-33: Avoid and Minimize Disturbance of Sandhill Cranes

All Project Alternatives

Construction will be avoided during the sandhill crane wintering season (September 15 through March 15) to the extent feasible. In addition, the following measures will be implemented to avoid and minimize impacts on greater and lesser sandhill crane and to avoid take of greater sandhill crane as defined by Section 86 of the California Fish and Game Code.

1. Preconstruction Surveys
   a. Preconstruction surveys will be conducted to evaluate the use of sandhill crane modeled habitat by a qualified biologist familiar with sandhill crane biology and experienced with sandhill crane survey techniques. Preconstruction surveys will be conducted for sandhill crane temporary (cultivated lands) and permanent (managed wetlands) roost sites (Ivey et al. 2014a:6) within 0.75 mile of the construction area boundary where access is available. Surveys will be conducted during the winter prior to project implementation, over multiple days within the survey area by a qualified biologist with experience observing the species. DWR will coordinate with CDFW and Refuge biologists prior to conducting sandhill crane preconstruction surveys.
   b. Prior to construction, a noise expert will create a sound level contour map showing the 50 dBA sound level contour specific to the type and location of construction to occur in the area and existing noise barriers such as levees or embankments. The sandhill crane survey data will be used with GIS-based methods to evaluate habitat loss, the acres of habitat affected by the 50 dB sound level contour, to identify lands in fulfillment of minimization requirements, and to determine the total affected and compensatory habitat required, at the time of project footprint finalization. The sandhill crane foraging habitat model may be updated using agricultural land-use data or a combination of land-use and survey data to allow for avoidance and minimization requirements to be quantified using up-to-date information.
2. Timing

a. Construction of some project facilities such as access roads and underground transmission lines may be scheduled so that they occur outside of the crane wintering season (September 15 through March 15). The construction activities with a high potential to disturb cranes, such as pile driving, that need to occur for only limited time periods will be scheduled for periods outside the sandhill crane wintering season (September 15 through March 15) to the extent feasible.

b. Helicopter surveys to identify buried groundwater and natural gas wells throughout the project area and pile installation test methods at the north Delta intakes will be conducted outside of the sandhill crane wintering season (September 15 through March 15). Pile installation test methods will include noise monitoring to test the site-specific effectiveness of noise minimization measures (e.g., shrouds around the hammer as described below), to determine which measures will be feasible and effective to implement during pile installation.

c. Other field investigations including test trenches, CPTs, soil borings, ERT, groundwater testing, monument installation, pilot studies for settlement, agronomic testing, and utility potholing will not be conducted within known permanent and temporary roost sites during the sandhill crane wintering season (September 15 through March 15).

d. To the extent feasible, construction within habitat that is known to be occupied based on preconstruction surveys and cannot be completed prior to commencement of the wintering season, will be started at a minimum, 14 days before September 15 or 14 days after March 15, such that no new sources of noise or other major disturbance that could affect sandhill cranes will be introduced after the sandhill cranes arrive at their wintering grounds.

3. Minimize Effects on Sandhill Crane Foraging and Roosting Habitat Resulting from Water Conveyance Facilities Construction

DWR will implement the following measures to minimize effects on sandhill crane resulting from implementation of the final design of the water conveyance facilities.

a. Foraging Habitat

i. The final design of the conveyance facilities will avoid construction-related loss of sandhill crane foraging habitat to the extent feasible.

ii. Avoid pile driving and general construction-related combined noise effects on foraging habitat to the extent feasible. DWR will avoid the area of crane foraging habitat to be affected during the day (from 1 hour after sunrise to 1 hour before sunset) by construction noise exceeding 50 dBA L_{eq} (1 hour), where feasible.[1] Prior to construction, a noise expert will create a sound level contour map showing the 50 dBA sound level contour specific to the type and location of construction to occur in the area and existing noise barriers such as levees or embankments. DWR will use shrouds or noise blankets to reduce noise from impact hammers or vibratory pile drivers at the intake work sites, which have been shown to reduce pile hammer noise by 8 to 23 dBA (Teachout and Cushman 2005:8; Washington State Department of Transportation 2018:7.15). Artificial noise barriers may be installed to decrease noise levels at foraging habitat below

[1] 50 decibels averaged over a 1-hour period.

50 dBA L_{eq} (1 hour). However, the visual effects of noise barriers on sandhill cranes are unknown; therefore, all other options to reduce noise (e.g., installation of shrouds at pile driving locations at the intakes and other construction sites) will be implemented before installing noise barriers in close proximity to crane habitat. As described above, test piles constructed under field investigations and sound level surveys will determine site-specific considerations and feasibility for implementation of these measures.

iii. Enhance foraging habitat to avoid loss of foraging values that could otherwise result from unavoidable noise-related effects. DWR will enhance 0.1 acre of foraging habitat for each acre of foraging habitat to be indirectly affected within the 50 dBA L_{eq} (1 hour) construction sound level contour during the wintering season (September 1 through March 15). The enhanced foraging habitat will be established one crane wintering season (September 1 through March 15) prior to construction and will be maintained until the activities causing the indirect noise effect is completed. The enhanced habitat will consist of corn fields that will not be harvested and will be managed to maximize food availability to sandhill cranes (e.g., corn stalks will be knocked down or mulched to make grain available to foraging cranes). A management plan for the enhanced habitat will be completed prior to establishing the habitat, in coordination with a qualified biologist with experience managing sandhill crane habitat on cultivated lands, or experience directing such management. The enhanced habitat will be located outside the construction-related 50 dBA L_{eq} (1 hour) sound level contour and within 1 mile of the affected habitat.

b. <u>Roosting Habitat</u>

i. If a sandhill crane roost site is located within 0.75 mile of the construction area boundary, then to the extent feasible, nighttime (1 hour before sunset to 1 hour after sunrise) project activities will be relocated to maintain a 0.75-mile non-disturbance buffer. If this is not practicable, the following measures will be implemented to avoid and minimize effects on roosting sandhill cranes.

ii. DWR will avoid permanent impacts resulting in direct loss of roost sites. This can be accomplished by siting activities outside identified crane roost sites or by relocating the roost site if it consists of cultivated lands (roost sites that consist of wetlands rather than cultivated lands will not be subject to relocation). A cultivated land roost site can be relocated by not flooding the site where the impact will occur during years when construction will occur and by establishing a new roost site equal or greater in size at a new location away from the disturbance (outside the 50 dBA L_{eq} [1 hour] pile driving and general construction sound level contour) but within 1 mile of the affected roost site. The relocated roost site will be established 1 year prior to construction activities affecting the original roost site. A qualified biologist familiar with crane biology will design the new roost site and direct implementation of the roost site establishment. Potential sites will be identified and surveyed prior to establishment. Relocated roost sites will be maintained until construction is complete in the affected region. Prior to construction, a noise expert will create a sound level contour map showing the 50 dBA sound level contour specific to the type and location of construction to occur in the area and existing noise barriers such as levees or embankments.

iii. Avoid pile driving and general construction-related noise effects on known permanent and temporary roost sites as described below. Activities within 0.75 mile of known roost sites will reduce pile driving and general construction noise during nighttime hours (from 1 hour before sunset to 1 hour after sunrise) such that pile-driving and general construction noise levels do not exceed a combined 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent roost sites during periods when the roost sites are available (flooded). This can be accomplished by limiting construction activities that could result in pile-driving and general construction noise levels above 50 dBA L_{eq} (1 hour) at the roost site to day time only (from 1 hour after sunrise to 1 hour before sunset); siting nighttime project activities to ensure that pile-driving and general construction noise levels do not exceed a combined 50 dBA L_{eq} (1 hour) at the roost site; relocating cultivated land or wetland roost sites as described above; and/or installing noise barriers between roost sites within the 50 dBA L_{eq} (1 hour) contour and the pile-driving and general construction noise source areas, such that construction noise levels at the roost site do not exceed 50 dBA L_{eq} (1 hour). The installation of noise barriers will be used only if the first three options cannot be implemented to the extent that noise levels do not exceed 50 dBA L_{eq} (1 hour) at the roost site. As described above, DWR will use shrouds or noise blankets to reduce noise from impact hammers or vibratory pile drivers at the intake work sites, which have been shown to reduce pile hammer noise by 8 to 23 dBA (Teachout and Cushman 2005; Washington State Department of Transportation 2018:7.15). All other options to reduce noise (e.g., installation of shrouds at pile driving locations at the intakes and other construction sites) will be implemented before installing noise barriers in close proximity to crane habitat. As described above, test piles constructed under field investigations and sound level surveys will determine site-specific considerations and feasibility for implementation of these measures.

iv. If the roost site to be indirectly affected within the 50 dBA L_{eq} (1 hour) pile-driving and general construction combined sound level contour is a wetland roost site (natural wetlands) rather than flooded cultivated lands, then the existing wetland roost site will not be removed. A new, cultivated land roost site will be temporarily established at a new location away from the disturbance (outside the 50 dBA L_{eq} (1 hour) sound level contour) but within 1 mile of the affected site, at a ratio of 1 acre created for each acre of temporary or permanent roost site within the pile-driving and general construction 50 dBA L_{eq} (1 hour) sound level contour. The new roost site will be established prior to commencement of the wintering season that occurs prior to construction activities potentially affecting the original roost site and will be maintained until the activities creating the indirect disturbance are completed. A qualified biologist familiar with crane biology will design the new roost site and direct implementation of the roost site establishment.

4. Measures to Avoid and Minimize Potential Effects from Lighting and Visual Disturbance

DWR has designed the project to minimize lighting and visual effects from traffic to reduce disturbance to sandhill cranes in the vicinity of Stone Lakes NWR. Project-related traffic on Hood-Franklin Road would be limited to shuttles bringing construction employees to and from the intake construction areas and the park and ride lot. In areas within 0.75 miles of known sandhill crane roost sites, DWR will implement the following measures to avoid and minimize potential lighting and visual effects that could result from construction or operation and maintenance.

a. Route nighttime truck traffic to reduce headlight impacts in roosting habitat where feasible.

b. Require trucks traveling along the intake haul road to move continuously and not idle or stop along the haul road adjacent to Stone Lakes NWR.

c. Install light barriers, where there are no existing barriers, to block the line of sight between the nearest roosting areas and the primary nighttime construction light source areas.

d. Screen all construction-related lights and direct them down toward work activities and away from the night sky and nearby roost sites. A biological monitor will ensure that lights are properly directed at all times during construction.

e. Minimize the use of construction equipment greater than 50 feet in height to the extent feasible in light of project schedule and cost and logistical considerations.

5. <u>Measures to Minimize Effects to Sandhill Cranes on Staten Island</u>

Because of the density of greater sandhill cranes wintering on Staten Island and the importance of Staten Island to the existing population of the greater sandhill crane in the study area facilities will be placed to minimize disturbance to sandhill cranes at this site. Interested parties provided information used to identify the placement of the tunnel shaft on Staten Island (under Alternatives 1, 2a, 2b, and 2c) at a location at the northern portion of Staten Island in a previously disturbed area adjacent to a road and powerline (Delta Conveyance Design and Construction Authority 2022d:4). DWR will ensure that project-related construction will not result in a net decrease in crane use on Staten Island as determined by deriving greater sandhill crane use days for the entire winter period.[2] This standard will be achieved through some combination of the following (and including the above required avoidance and minimization measures).

a. Minimize noise, lighting, and visual disturbances during construction (see measures described above).

b. Minimize construction activity during the crane wintering season (September 15 through March 15) to the extent feasible.

c. Provide supplemental feeding/foraging habitat enhancement as described above under *Minimize Effects on Sandhill Crane Foraging and Roosting Habitat Resulting from Water Conveyance Facilities Construction*.

d. Maintain flooding and irrigation capacity. DWR will work with land managers to stage construction activities on Staten Island such that they do not disrupt flooding and

[2] Expected loss of crane use will be estimated by using data on crane use days/acre by habitat type on Staten Island from past studies and future monitoring before construction begins (using averages among available years). These will be used to predict the number of lost crane use days within the footprint of the habitat loss and within the 50 dBA L_{eq} (1 hour) pile-driving and general construction sound level contour. Preproject crane surveys will provide additional data on crane use day densities per habitat type to improve the prediction. Use day densities will be used to guide decisions regarding crop habitat needed to be maintained on Staten Island to maintain this performance standard during construction.

irrigation to the extent that greater sandhill crane habitat will be reduced during the crane wintering season.

Prior to construction on Staten Island, the qualified biologist will coordinate with DWR to develop a strategy for achieving no net decrease in crane use on Staten Island using a combination of the measures described above, and prepare a plan based on the final construction design on Staten Island that includes all avoidance and minimization measures necessary for achieving no net decrease in crane use on Staten Island. This plan will be subject to review and approval by the wildlife agencies prior to its implementation. All avoidance and minimization measures will be in place, consistent with the plan, prior to project construction on Staten Island.

6. <u>Bouldin Island Minimization Measures</u>

Because of the regular use of temporary roost sites (cultivated lands) on Bouldin Island by sandhill cranes, DWR will place conveyance facilities and RTM to minimize disturbance to sandhill cranes at this site to the extent feasible. Interested parties provided information used to minimize impacts on habitat for special-status species on Bouldin Island and to prioritize placement of facilities and RTM along the southern, western, and northeastern portions of the island based on physical conditions and biological resources. DWR will implement some combination of the following (and including the above required avoidance and minimization measures).

a. Provide supplemental feeding/foraging habitat enhancement as described above under *Minimize Effects on Sandhill Crane Foraging and Roosting Habitat Resulting from Water Conveyance Facilities Construction*.

b. Maintain flooding and irrigation capacity. DWR will work with land managers to stage construction activities on Bouldin Island such that they do not disrupt flooding and irrigation to the extent that sandhill crane habitat will be reduced during the crane wintering season.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>Compensatory Mitigation</u>

The creation and enhancement of wetlands and other waters as well as habitat for special-status species under the project's CMP would affect known temporary roost sites and modeled foraging habitat for greater and lesser sandhill cranes (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats. Noise or visual disturbance from construction activities associated with the CMP could also cause sandhill cranes to flush if activities are conducted during the crane winter use season when cranes are present in the Delta (September 15 through March 15).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or grasslands are located, and could result in the temporary disturbances of sandhill cranes if activities are conducted during the crane winter use season when cranes are present in the Delta (September 15 through March 15). Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Conversion and management of agricultural lands would provide foraging habitat of equal or greater habitat value for greater and lesser sandhill cranes and would maintain these lands in non-permanent crop types in perpetuity. Crop rotations, and related management activities would be conducted under a similar disturbance regime that greater and lesser sandhill crane would encounter under existing conditions but could result in temporary disturbances of sandhill cranes if activities are conducted during the crane winter use season when cranes are present in the Delta (September 15 through March 15). Grassland enhancement activities could also create temporary disturbances of greater and lesser sandhill cranes. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

Creation and enhancement of wetlands under the CMP that would create sandhill crane habitat could provide biogeochemical conditions for methylation of mercury in the newly inundated soils. There is potential for increased exposure of the foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of mercury available in the soils and the biogeochemical conditions which has the potential to exacerbate bioaccumulation of mercury in greater sandhill crane and lesser sandhill crane. Potential effects of increased mercury exposure are likely low for sandhill cranes because they primarily forage on lower-trophic items with less potential to biomagnify mercury such as waste grains and, to a lesser extent, invertebrates associated with cultivated crops. Because Bouldin Island and the I-5 ponds sites consist of existing managed and agricultural wetlands and ponds, wetland creation and enhancement are not expected to increase mercury methylation, relative to existing conditions. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include mercury monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased mercury methylation, relative to existing conditions. Therefore, potential increased exposure to methylmercury resulting from restoration would not be expected to adversely affect greater sandhill crane and lesser sandhill crane populations.

Herbicides would be applied at CMP sites to remove nonnative vegetation for site preparation and to support establishment of new plantings. Natural habitats contribute fewer pesticides to receiving waters than agricultural areas where pesticides are applied. Any newly created wetlands or enhanced natural habitat could also filter stormwater to remove solids and either improve or have no effect on pesticide concentrations in discharges to receiving waters, relative to existing conditions. As such, restoration areas are expected to somewhat reduce, rather than increase, runoff of pesticides into adjacent waterbodies. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides would be applied in such a manner as to prevent primary or secondary poisoning of special-status species.

Implementation of habitat creation and enhancement under the CMP has the potential to result in conditions that promote CHABs, which could result in impacts on greater sandhill crane and lesser sandhill crane using created and/or enhanced wetland and aquatic habitats. High levels of microcystins in tissues and microcystin poisoning have been documented in other wetland bird species (Chen et al. 2009:3317) and could affect sandhill cranes if they forage in areas with conditions that promote CHABs. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include CHAB monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased CHAB formation, relative to existing conditions. Therefore, the CMP would not result in increased CHAB formation that could cause substantial adverse impacts on greater sandhill crane and lesser sandhill crane, relative to existing conditions.

Wetland creation and enhancement may provide habitat for sandhill cranes, which could increase the risk of selenium toxicity to the species. It is difficult to determine whether the effects of potential increases in selenium bioavailability associated with restoration activities under the CMP would lead to adverse effects on sandhill cranes. Potential effects of increased selenium exposure are likely low for sandhill cranes because they primarily forage on lower-trophic items with less potential to biomagnify selenium such as waste grains and, to a lesser extent, invertebrates associated with cultivated crops, and existing selenium concentrations in the Sacramento River watershed are low (Central Valley Regional Water Quality Control Board 1988:14). Toxicity thresholds have not been established for sandhill cranes; however, modeled concentrations in insect-eating bird eggs under existing conditions in the Delta were below levels of concern for other bird species (Appendix 9J). Analysis included in Chapter 9 for Impact WQ-10: *Effects on Selenium Resulting from Facility Operations* found that compensatory mitigation would not result in a measurable increase in selenium concentrations or selenium bioavailability. Therefore, potential increased exposure to selenium resulting from restoration would not be expected to adversely affect greater sandhill crane and lesser sandhill crane populations.

The CMP and site-specific permitting approvals would account for any losses of sandhill crane habitat from habitat creation by adjusting the overall commitment of emergent wetland creation or restoration and grassland and cultivated lands protection (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-3, CMP-0*: General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The creation and enhancement activities would also have the potential for the disruption of normal behaviors of sandhill crane. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); and Mitigation Measures NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); and BIO-33: *Avoid and Minimize Disturbance of Sandhill Cranes* would minimize disturbances to habitat and reduce the potential for the disruption of normal behaviors of greater and lesser sandhill cranes to less than significant and avoid take of greater sandhill crane, as defined by Section 86 of the California Fish and Game Code. These impacts would be less than significant because the aforementioned measures would (1) train construction staff on protecting and minimizing disturbance of sandhill cranes, reporting requirements, and the ramifications for not following these measures; (2) implement spill prevention and containment plans that would avoid material spills that could affect suitable habitat; (3) minimize disturbance of noise from construction equipment and implement time of day restrictions on construction; (4) conduct surveys to identify areas of crane use and minimize disturbance; and (5) have a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented where applicable.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, the use of heavy equipment, pile driving, or pesticides that would have the potential to expose greater sandhill crane and lesser sandhill crane to excessive noise, visual disturbance, dust, and hazardous materials that could cause loss of modeled habitat, disruption of normal behaviors, and injury or mortality. The mitigation measures with potential to result in impacts on greater sandhill crane and lesser sandhill crane are similar to those discussed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. Impacts on greater sandhill crane and lesser sandhill crane resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to greater sandhill crane and lesser sandhill crane impacts of the project alternatives.

The impacts of habitat loss, noise, visual disturbance, and exposure to dust or hazardous materials on greater sandhill crane and lesser sandhill crane would be reduced through the CMP, environmental commitments, and Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan* as detailed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-33: *Avoid and Minimize Disturbance of Sandhill Cranes* would require species-specific measures to reduce these impacts. Therefore, impacts on great sandhill crane and lesser sandhill crane from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on greater sandhill crane and lesser sandhill crane from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-34: Impacts of the Project on California Least Tern

The methods for the analysis of effects on California least tern appear in Section 13.3.1.1, and information on the species' life history and habitat suitability model are presented in the species account in Appendix 13B, Section 13B.60, *California Least Tern*.

All Project Alternatives

Construction

The construction of all the project alternatives would affect modeled foraging habitat for California least tern. The loss of foraging habitat would primarily occur as a result of construction of the intakes (all alternatives), and from the construction of the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c; Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would also result in impacts on modeled foraging habitat because of road improvements of an existing bridge, and the construction of a new bridge and roadway between Mandeville Island and Bacon Island. The potential for California least tern to be affected by the loss of modeled foraging habitat as a result of these activities is low because California least terns typically forage within 1 to 2 miles of their nest sites or colonies (Atwood and Minsky 1983:70) and the majority of modeled habitat loss is occurring at distances greater than 2 miles from known nesting locations. The nearest nesting location to the habitat loss is the Sacramento Regional Wastewater Treatment Plant

(Bufferlands) east of I-5, where a single breeding pair was last observed in 2021 (Conard 2018:35; eBird 2021). The Sacramento Regional Wastewater Treatment Plant is located approximately 3 miles east of modeled habitat affected by the construction of Intake A (Alternatives 2a and 4a), 4 miles east of modeled habitat affected by the construction of Intake B (Alternatives 1, 2a, 2c, 3, 4a, 4c, and 5), and 6 miles east of modeled habitat affected by the construction of Intake C (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, 4c, and 5). The next nearest nesting location to the modeled foraging habitat loss is a colony over 20 miles northwest of the new roads and road improvements described above for the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) (California Department of Fish and Wildlife 2020a). Acres of permanent and temporary impacts on modeled habitat for California least tern are shown in Table 13-72.

Table 13-72. Impacts on Modeled Foraging Habitat for California Least Tern by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	41.49	13.17	54.66
2a	54.26	13.17	67.43
2b	37.89	12.92	50.81
2c	40.25	13.17	53.42
3	37.88	5.44	43.32
4a	51.15	5.44	56.59
4b	34.78	5.2	39.98
4c	37.11	5.43	42.54
5	6.97	4.16	11.13

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities that would result in the loss of modeled foraging habitat include in-water construction and pile driving, excavation, and drilling. Construction-related noise and visual disturbances could disrupt foraging behaviors for terns. Pile driving would be required for intake and bridge construction which would create noise and vibration effects in and adjacent to modeled foraging habitat. While 60 dBA has been used as a standard noise threshold for birds (California Department of Transportation 2016:87), this standard is generally applied during the nesting season, when birds are more vulnerable to behavioral modifications that can cause nest failure. All lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in the levels of light, however, these types of light generate an ambient nighttime luminescence that is visible from a distance. Construction activities could result in dust and the discharge of construction-related fluids, which could also affect the species and its habitat if present in or adjacent to work areas. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting the species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat;

and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

Construction activities are not expected to injure or kill California least tern individuals. In addition to the low probability that these areas would be used for foraging by California least tern, the tern is not limited by foraging habitat in the study area. If a bird forages in a region where construction, dredging, or drilling activities are occurring, the bird would be expected to avoid the slow-moving or stationary equipment. This avoidance would not constitute a behavioral modification that would negatively affect the species because individuals would avoid construction equipment as they would any other boat or floating object in the open water that could be present under baseline conditions.

Field investigations would be conducted prior and during construction under all alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on foraging habitat and the disruption of normal behaviors of California least tern. Geotechnical investigations associated with the tunnels for all project alternatives, which include CPTs and soil borings, would result in impacts on habitat (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations would not impact modeled habitat for California least tern. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pile installation test methods at the north Delta intakes, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the disruption of normal behaviors of California least tern, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting the species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area and pile installation test methods at the north Delta intakes may also cause disturbance to California least tern, if present in the study area as described above under construction-related effects.

Operations

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions (Chapter 24, Section 24.4.3.2). Permanent facility lighting could extend into California least tern foraging habitat. However, this is not likely to impair essential behavioral patterns because terns are visual hunters and do not forage at night, and, as stated in Chapter 3, Section 3.4.12, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, which would minimize the potential for this impact.

Power for construction and operation of the conveyance facilities has been designed to use existing power lines and underground conduit to the extent feasible under all project alternatives. Most new project lines would be placed on existing poles and towers and therefore would not substantially alter the existing landscape. New aboveground high-voltage transmission and SCADA lines constructed to power the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and Bethany Complex (Alternative 5) are approximately 14 miles from the nearest nesting colony (California Department of Fish and Wildlife 2020a), and 26 miles south of the Bufferlands nesting location (Conard 2018:35; eBird 2021) and therefore would not pose a collision risk to California least tern (Chapter 3, Figure 3-13 and Figure 3-14). Three aboveground project lines occur within 5 miles of the recorded Bufferlands nesting location (Conard 2018:35; eBird 2021): (1) A SCADA line placed on existing towers along Florin Avenue to Freeport Boulevard and then extending south to Cosumnes River Boulevard, just over 2 miles northwest of the Bufferlands occurrence (2) a SCADA line placed on existing towers to provide power to Intake A, approximately 2.19 miles southwest of the Bufferlands occurrence, and (3) a transmission line placed on existing towers along Franklin Boulevard toward Lambert Road, approximately 4.5 miles south of the Bufferlands occurrence (Chapter 3, Figure 3-13 and Figure 3-14). The existing lines and towers along Florin Avenue and Franklin Boulevard do not pose a collision risk for California least tern because they are not located between the Bufferlands nesting occurrence and modeled foraging habitat and the new project lines at that location would similarly pose no collision risk to the species. The risk of collision with the SCADA line providing power to Intake A is minimal because typical California least tern foraging distance is within 2 miles of their nest sites or colonies (Atwood and Minsky 1983:70). Terns exhibit low wing loading and high aspect-ratio wings and as a result can maneuver relatively quickly around an obstacle such as a transmission line (Bevanger 1998:69). Because of distance of aboveground transmission lines to nesting occurrences, and the species' highly maneuverable flight behavior, it is highly unlikely that California least tern would experience collisions with project transmission lines.

Project activities have the potential to exacerbate the bioaccumulation of mercury in the California least tern. The operational impacts of new flows with project operations were analyzed to assess potential effects on mercury concentration and bioavailability, discussed in detail in Chapter 9. Although the magnitude of methylmercury bioaccumulation differs among species, largemouth bass were used as an indicator species for this analysis because they are good indicators of mercury contamination throughout the aquatic foodweb (Wood et al. 2010:67) and results would be expected to be similar for the California least tern, as least tern consumes fish and is likely to forage at a similar trophic level as largemouth bass. Results indicated that changes in methylmercury levels in water and largemouth bass tissues were insignificant.

California least tern forages on fish in open water habitats of the Delta, where localized environmental conditions may be present to support CHABs. Although microcystin toxicity has not been studied in California least tern, high levels of microcystins have been identified in other piscivorous birds, thus least terns may be at risk of death or reproductive harm due to microcystin toxicity (Chen et al. 2009:3317). Operation of all project alternatives is not expected to substantially change the five factors that could create conditions more conducive to CHAB formation (i.e., temperature, residence time, nutrients, water velocities and associated turbulence and mixing, and water clarity and associated irradiance) relative to existing conditions within the Delta (Chapter 9). The water quality modeling results show a potential for increased residence time in some locations and months within the central Delta, namely Discovery Bay where residence times are already very long, which could contribute to increased *Microcystis* bloom size in some years at these locations if the remaining four environmental factors were also at levels conducive to forming CHABs. Nevertheless, based on known *Microcystis* dynamics in the Delta a small increase of residence time at Discovery Bay would not cause *Microcystis* blooms to substantially increase in size or last substantially longer, relative to existing conditions. Because the project alternatives, through their effects on the five factors potentially associated with CHABs in the Delta, are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystin or any other cyanotoxins in the Delta that could cause a substantial adverse impact on California least tern, relative to existing conditions.

Current use and legacy pesticides have the potential to bioaccumulate in the prey of piscivorous birds such as California least tern. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows and would not result in land-use changes that would increase use of pesticides, relative to existing conditions. Therefore, the project alternatives would not substantially increase pesticide exposure to California least tern. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides used during maintenance activities would be applied in such a manner as to prevent primary or secondary poisoning of California least tern.

Selenium concentrations increase with trophic level and birds that consume prey with high levels of selenium have a higher risk of selenium toxicity (Ackerman and Eagles-Smith 2009:2139), therefore California least tern, which forages on small fish, may be at elevated risk of selenium toxicity. Modeled selenium concentrations in fish tissue and the eggs of fish-eating birds, such as least tern, were below the level of concern for other bird species and did not differ substantially from existing conditions under all alternatives (Appendix 9J). Therefore, the project alternatives are not anticipated to substantially increase the risk of selenium contamination in California least tern. Therefore, the potential of very low-level increase exposure to selenium resulting from the CMP would not be expected to cause a substantial adverse impact on California least tern populations.

Maintenance

Maintenance activities include sediment and debris removal at the intakes and the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), gate recalibration and repairs at the intakes, regrading of access roads, erosion control, embankment repairs, and monitoring of seepage flows. Maintenance-related actions are not expected to injure or kill California least tern individuals because the potential for birds to occur is very low. In addition, if a bird forages in a region where maintenance activities are occurring, the bird would be expected to avoid the slow-moving or stationary equipment. As described above under construction-related effects, this avoidance would not constitute a behavioral modification that would negatively affect the species because individuals would avoid maintenance equipment, and related noise or visual disturbance as they would any other boat or floating object in open water that could be present under baseline conditions.

Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives could result in the disruption of normal behaviors of foraging California least terns from noise or human presence. The project would result in the loss of modeled California least tern foraging habitat; however, that loss would be less than significant because the loss represents a very small percentage of available foraging habitat (0.12% to 0.36%) and because foraging habitat is not considered a limited resource in the study area. Although no mitigation is specifically proposed for California least tern, tidal perennial aquatic habitat would be created or acquired and permanently protected to compensate for project impacts and ensure no significant loss of tidal perennial aquatic habitat functions and values (Appendix 3F, Section 3F.4.3 and Attachment 3F.1, Table 3F.1-2, CMP-1: *Tidal Perennial Aquatic Habitat*), some of which may provide suitable foraging habitat for California least tern. For all project alternatives, changes in water operations would not be expected to result in a measurable increase in mercury or selenium bioavailability or increased pesticide or microcystin exposure to California least tern. The potential impacts of project construction, operations, and maintenance activities would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B); however, even with these commitments, the impacts of the project alternatives on California least tern would be significant. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18), NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; BIO-2c: *Electrical Power Line Support Placement*; and BIO-34: *Avoid California Least Tern Nesting Colonies and Minimize Indirect Effects on Colonies* would be required to avoid and minimize the potential for disruption of normal behaviors, and disturbances to habitat, and to avoid take, as defined under Section 86 of the California Fish and Game Code. The impacts on California least tern from the project alternatives would be less than significant with mitigation because the aforementioned measures would reduce direct effects on the species, including habitat, noise, and visual disturbances, by providing environmental awareness training to construction personnel, by implementing protective measures during maintenance activities, and species-specific avoidance measures for the species during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) does not include specific compensatory mitigation for California least tern. However, the proposed tidal restoration activities (Appendix 3F, Section 3F.4.3.2.2 and Attachment 3F.1, Table 3F.1-2, CMP-1: *Tidal Perennial Aquatic Habitat*) could provide benefits to California least tern as tidal perennial aquatic habitat would be created or acquired and permanently protected to compensate for project impacts and ensure no significant loss of tidal perennial aquatic habitat functions and values (Appendix 3F, Section 3F.4.3 and Attachment 3F.1, Table 3F.1-2, CMP-1: *Tidal Perennial Aquatic Habitat*), some of which may be suitable foraging habitat for the species.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-34: Avoid California Least Tern Nesting Colonies and Minimize Indirect Effects on Colonies

All Project Alternatives

The following measures will be implemented to avoid and minimize impacts on California least tern nesting colonies and to avoid take of California least tern, as defined by Section 86 of the California Fish and Game Code.

1. If suitable nesting habitat for California least tern (flat, unvegetated areas near aquatic foraging habitat) is identified during planning-level surveys the year prior to construction, DWR will require that at least three preconstruction surveys for this species will be conducted in all suitable habitat within 500 feet of the construction footprint during the California least tern nesting season (April 15 to August 15). Surveys will be conducted by a USFWS- and CDFW-approved biologist with experience observing the species and its nests. Construction projects will be designed to avoid loss of California least tern nesting colonies if construction will take place within 500 feet of a California least tern nest during the nesting season (April 15 to August 15 or extended as determined through surveys).
2. A USFWS- and CDFW-approved wildlife biologist will monitor construction activities in the vicinity of the nests to ensure that construction activities do not affect nest success. Reduced buffers may be allowed, through coordination with USFWS and CDFW, if a full-time USFWS- and CDFW-approved biologist is present to monitor the nest and has authority to halt construction if bird behavior indicates continued activities could lead to nest failure. Active nests will be monitored to track progress of nesting activities until the biologist determines that the young have fledged and are capable of independent survival or the nest site is no longer active.

3. Only inspection, research, or monitoring activities may be performed during the least tern breeding season, in occupied least tern nesting habitat, with USFWS and CDFW approval and under the supervision of a USFWS- and CDFW-approved biologist.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

California least tern is not expected to use the habitat creation and enhancement sites on Bouldin Island and the I-5 ponds because they do not provide tidal perennial aquatic habitat. However, the species may forage in aquatic habitat adjacent to tidal habitat creation sites.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or grasslands are located, and therefore would not result in effects on California least tern site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These activities would not result in effects on California least tern. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

Creation and enhancement of wetlands under the CMP have the potential to increase methylmercury bioavailability, as newly wetted areas produce the biogeochemical conditions to methylate mercury existing in Delta soils; although least tern is less likely to use the restoration sites for foraging as they would not provide tidal perennial aquatic habitat. There is potential for increased exposure of foodwebs to methylmercury in these localized areas, with the level of exposure dependent on the amounts of mercury available in the soils and site-specific biogeochemical conditions. Increased methylmercury associated with restoration may affect California least tern via uptake through consumption of prey. Methylmercury concentrations in California least tern eggs are generally lower than for Forster's tern and Caspian tern, and one study found 9% of least terns sampled were at high risk of methylmercury toxicity, indicating that most were at low to moderate risk (Ackerman et al. 2014:13). Mitigation Measure WQ-6: *Develop and Implement a Mercury Management and Monitoring Plan*, which contains measures to assess the amount of mercury at tidal restoration sites before project development, followed by appropriate design, monitoring, and adaptation management, would minimize the potential for any effects of increased methylmercury exposure due to tidal restoration. Therefore, implementation of the CMP would not be expected to have a significant adverse impact on California least tern.

Herbicides would be applied at wetland creation and enhancement sites to remove nonnative vegetation for site preparation and to support establishment of new plantings. Natural habitats contribute fewer pesticides to receiving waters than agricultural areas where pesticides are applied. Any newly created wetlands or enhanced natural habitat could also filter stormwater to remove solids and either improve or have no effect on pesticide concentrations in discharges to receiving waters, relative to existing conditions. As such, restoration areas are expected to somewhat reduce, rather than increase, runoff of pesticides into adjacent waterbodies. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides would be applied in such a manner as to prevent primary or secondary poisoning of California least tern.

Tidal habitat creation under the CMP has the potential to result in conditions that promote CHABs, which could result in impacts on California least tern foraging near created tidal marsh habitats. High levels of microcystins in tissues and microcystin poisoning have been documented in other piscivorous bird species using other aquatic habitats (Chen et al. 2009:3317) and could affect California least tern if they forage in areas with conditions that promote CHABs. As discussed in Chapter 9, tidal habitat creation is not expected to cause substantial additional *Microcystis* production. Therefore, implementation of the CMP would not result in increased CHAB formation that could cause substantial adverse impacts on California least tern, relative to existing conditions.

Tidal restoration may result in mobilization of selenium in Delta sediments, which could increase the risk of selenium toxicity to piscivorous California least tern, although existing selenium concentrations in the Sacramento River watershed are low (Central Valley Regional Water Quality Control Board 1988:14). Toxicity thresholds have not been established for least terns; however, modeled concentrations in piscivorous bird eggs under existing conditions in the Delta were below levels of concern for other bird species (Appendix 9J) and least tern eggs in San Francisco Bay were similarly low (Hothem and Zador 1995:661; Schwarzbach and Adelsbach 2003:23). Analysis included in Chapter 9 for Impact WQ-10: *Effects on Selenium Resulting from Facility Operations* found that compensatory mitigation would not result in a measurable increase in selenium concentrations or selenium bioavailability. Therefore, potential increased exposure to selenium resulting from restoration would not be expected to cause substantial adverse impacts on California least tern populations. The impact on California least tern from the project with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, the use of heavy equipment, or pile driving that would have the potential to expose California least tern to excessive noise and visual disturbance that could cause loss of modeled foraging habitat and disruption of normal behaviors. The mitigation measures with potential to result in impacts on California least tern are similar to those discussed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. Impacts on California least tern resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to California least tern impacts of the project alternatives.

The impacts of noise and visual disturbance on California least tern would be reduced through environmental commitments and Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan* as detailed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-34: *Avoid California Least Tern Nesting Colonies and Minimize*

Indirect Effects on Colonies would require species-specific measures to reduce these impacts. Therefore, impacts on California least tern from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on California least tern from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-35: Impacts of the Project on Cormorants, Herons, and Egrets

The methods for the analysis of effects on nesting colonies/rookeries appear in Section 13.3.1.1, and information on the species' life histories and habitat suitability models are presented in the following species accounts in Appendix 13B: Section 13B.61, *Double-Crested Cormorant*, Section 13B.63, *Great Blue Heron*, Section 13B.64, *Great Egret*, Section 13B.65, *Snowy Egret*, and Section 13B.66, *Black-Crowned Night Heron*.

All Project Alternatives

Construction

The construction of all the project alternatives would affect modeled nesting habitat for cormorants, herons, and egrets. Effects from construction activities would include the permanent and temporary loss of habitat, habitat fragmentation, and the potential for the disruption of normal behaviors, injury, and mortality. The loss of habitat would primarily occur as a result of levee improvements, new roads and road improvements, and construction of the intakes (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment. Acres of permanent and temporary impacts on modeled habitat for cormorant, great blue heron, and great egret rookeries are shown in Table 13-73 and for snowy egret and black-crowned night heron are shown in Table 13-74. Environmental Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-73. Impacts on Modeled Nesting Habitat for Double-Crested Cormorant, Great Blue Heron, and Great Egret by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	19.77	11.20	30.97
2a	20.62	13.38	34.00
2b	14.70	12.42	27.12
2c	17.21	12.90	30.11
3	16.19	9.32	25.51
4a	18.89	9.95	28.84
4b	12.97	9.00	21.97
4c	15.48	9.46	24.94
5	19.19	8.74	27.93

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Table 13-74. Impacts on Modeled Nesting Habitat for Snowy Egret and Black-Crowned Night Heron by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	25.08	16.55	41.63
2a	24.30	20.12	44.42
2b	18.17	18.88	37.05
2c	20.89	19.63	40.52
3	16.46	10.29	26.75
4a	19.15	10.92	30.07
4b	13.02	9.68	22.70
4c	15.75	10.44	26.19
5	19.67	9.59	29.26

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

The losses of habitat and potential for injury and mortality would result from vegetation removal in advance of grading and excavation for the construction of project infrastructure. Vegetation removal or trimming during the breeding season could damage nests and could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Construction-related noise and visual disturbances during the breeding season could disrupt cormorant, heron, or egret rookeries in the vicinity of work areas, which could alter foraging and nesting behaviors or cause nest or entire rookery abandonment. While there is no data on effects of night lighting on these species, studies show that birds of other species are attracted to artificial lights and this may disrupt their behavioral patterns or cause collision-related fatalities (Gauthreaux and Belser 2006:67–86). All lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in the levels of light, however, these types of light generate an ambient nighttime luminescence that is visible from a distance. Effects of construction-related light would be greater at the intakes where existing conditions are dark and rural in comparison with the Twin Cities Complex, Southern Complex, and Bethany Complex where there are existing sources of light that may illuminate suitable habitat. Construction activities could result in dust and the discharge of construction-related fluids, which could also affect these species and their habitat if present in or adjacent to work areas. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting cormorant, heron, or egret rookeries, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

Cormorants, herons, and egrets are highly traditional in their use of nest sites (rookeries), in that they use the same sites year after year. No recorded occurrences of cormorant, heron, or egret rookeries would be permanently or temporarily affected by project construction for any of the alternatives (California Department of Fish and Wildlife 2020a; California Department of Water Resources 2011). However, several rookeries have been recorded within 0.25 mile of construction activities (California Department of Water Resources 2011). Nesting great blue herons and double-crested cormorants have been recorded on an in-channel island (California Department of Water Resources 2011) that is approximately 0.12 mile east of levee improvements and associated roads and work areas on the eastern side of Bouldin Island (Alternatives 1, 2a, 2b, and 2c). A great egret rookery on Lower Roberts Island is approximately 66 feet south of proposed road improvements in support of an RTM storage area under the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5). Nesting black-crowned night herons and great blue herons have also been recorded on Widdows Island and just west of the existing Clifton Court Forebay, approximately 0.25 mile from the proposed Southern Forebay and work areas (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c). Although modeled habitat is present within the construction footprint of the intakes and associated work areas, which would require the use of loud, heavy equipment and pile driving, there are no known cormorant, heron, or egret rookeries within 0.75 mile of the intakes under any alternative.

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of cormorants, herons, and egrets. Geotechnical investigations associated the tunnels for all project alternatives, which include CPTs and soil borings, would result in impacts on modeled habitat for cormorants, herons, and egrets (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations would not affect modeled habitat for cormorants, herons, and egrets. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pile installation test methods at the north Delta intakes, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the potential for injury, mortality, and disruption of normal behaviors of cormorants, herons, and egrets if present in the vicinity, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting cormorant, heron, or egret rookeries, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area and pile installation test methods at the north Delta intakes may also cause disturbance to individuals, as described above under construction-related effects.

Operations

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions (Chapter 24, Section 24.4.3.2). Permanent facility lighting associated with project facilities under all alternatives could extend into suitable habitat for cormorants, herons, and egrets; however, as stated in Chapter 3, Section 3.4.12, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, and therefore permanent facilities would remain dark the majority of the time at night, which would minimize the potential for this impact.

Power for construction and operation of the conveyance facilities has been designed to use existing power lines and underground conduit to the extent feasible under all project alternatives. Most new project lines would be placed on existing poles and towers and therefore would not substantially alter the existing landscape. However, new aboveground high-voltage transmission and SCADA lines would be constructed to power the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and Bethany Complex under Alternative 5 (Chapter 3, Figure 3-13 and Figure 3-14). Waterbirds, particularly great blue herons and great egrets, have a moderate risk of electrocution from power lines because of their height and large wingspan (Avian Power Line Interaction Committee 2006:37). However, the new proposed lines are all transmission towers that have adequate spacing between conductors to substantially reduce electrocution risk. Cormorants, herons, and egrets are not highly maneuverable because of their large wingspan and body shape, making them at a higher risk for collision with project lines, as they are less able to quickly avoid the lines (Avian Power Line Interaction Committee 2012:36-37). Because cormorants, herons, and egrets typically nest in colonies, flights related to nesting behaviors can expose multiple birds to increased collision risk if colonies are in the vicinity of transmission lines. There is minimal nesting habitat surrounding the transmission line that extends between the city of Brentwood and the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) or the transmission lines powering the Bethany Complex (Alternative 5), but there is potential habitat and some potential for collision risk to cormorants, herons, and egrets around the transmission line that would be constructed from the Southern Complex around the east side of Clifton Court Forebay to the existing substation (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c).

Project operations have the potential to exacerbate the bioaccumulation of mercury in cormorants, herons, and egrets. Largemouth bass was used as an indicator species for analysis of impacts from changes in operations from the construction of the water conveyance facilities because they are good indicators of mercury contamination throughout the aquatic foodweb (Wood et al. 2010:67). Modeled effects of mercury concentrations from changes in operations of water conveyance facilities on largemouth bass did not differ substantially from existing conditions (Chapter 9) and results would be expected to be similar for cormorants, as cormorants consume fish and are likely to forage at a similar trophic level as largemouth bass. While herons and egrets forage in several habitats, methylmercury can be transported to other foodwebs via consumption of aquatic prey (Cristol et al. 2008:335), so the lack of substantial change in water column and riverine foodweb mercury concentrations indicates that mercury concentrations in adjacent foodwebs would also not increase appreciably; therefore, these results indicate that mercury tissue concentrations of cormorants, herons, and egrets would not measurably increase as a result of project operation.

Cormorants, herons, and egrets forage on fish and other vertebrate prey in aquatic and terrestrial habitats of the Delta, where localized environmental conditions may be present to support CHABs. High levels of microcystins have been documented in black-crowned night heron and other waterbirds, thus rookery-nesting birds (cormorants, herons, and egrets) may be at risk of death or reproductive harm due to microcystin toxicity (Chen et al. 2009:3317, 3318, 3320). Operation of all project alternatives is not expected to substantially change the five factors that could create conditions more conducive to CHAB formation (i.e., temperature, residence time, nutrients, water velocities and associated turbulence and mixing, and water clarity and associated irradiance) relative to existing conditions within the Delta (Chapter 9). The water quality modeling results show a potential for increased residence time in some locations and months within the central Delta, namely Discovery Bay where residence times are already very long, which could contribute to increased *Microcystis* bloom size in some years at these locations if the remaining four environmental factors were also at levels conducive to forming CHABs. Nevertheless, based on known *Microcystis* dynamics in the Delta a small increase of residence time at Discovery Bay would not cause *Microcystis* blooms to substantially increase in size or last substantially longer, relative to existing conditions. Because the project alternatives, through their effects on the five factors potentially associated with CHABs in the Delta, are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystin or any other cyanotoxins in the Delta that could cause a substantial adverse impact on cormorants, herons, or egrets, relative to existing conditions.

Current use and legacy pesticides have the potential to bioaccumulate in the prey of piscivorous birds such as cormorants, herons, and egrets. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows, and would not result in land-use changes that would increase use of pesticides, relative to existing conditions. Therefore, the project alternatives would not substantially increase pesticide exposure to cormorants, herons, and egrets.

Selenium concentrations increase with trophic level and birds that consume prey with high levels of selenium have a higher risk of selenium toxicity (Ackerman and Eagles-Smith 2009:2139), therefore cormorants, herons, and egrets, which forage on small fish and other vertebrates, may be at elevated risk of selenium toxicity. Modeled selenium concentrations in fish tissue and the eggs of fish-eating birds, were below the level of concern, and did not differ substantially from existing conditions under all alternatives (Appendix 9J). Therefore, the project alternatives are not anticipated to substantially increase the risk of selenium contamination in cormorants, herons, and egrets.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in periodic disturbances that could affect cormorants, herons, and egrets. Maintenance activities at the north Delta intakes (all project alternatives) would include semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), annual sediment and debris removal at intakes, and periodic maintenance of the intake gates and associated structures approximately every 1 to 5 years. Maintenance activities at launch, reception, and maintenance shafts along the central alignment (Alternatives 1, 2a, 2b, and 2c), eastern alignment (Alternatives 3, 4a, 4b, and 4c), and the Bethany Reservoir alignment (Alternative 5) would include similar semiannual general and ground maintenance in addition to daily inspections by vehicle. Existing access roads in the vicinity of the intakes and shafts would be repaved every 15 years, which could cause noise or visual disturbance or cause dust in the vicinity of rookeries if present within the work areas. Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would also include annual embankment repair. Herbicide application could reduce the functions of nesting and habitat and result in direct mortality of individuals if present. Adults and fledged young would be expected to avoid slow-moving maintenance equipment and therefore there would be a low probability of vehicle strikes of nonbreeding birds. If vegetation removal and other maintenance activities take place during the breeding season (February 1 through August 31), they could disrupt foraging and nesting behaviors and result in potential injury and mortality of individuals. Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting. Noise effects from maintenance activities could negatively affect cormorants, herons, and egrets, as described above under construction-related effects.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives would result in impacts on cormorants, herons, and egrets through the permanent and temporary loss of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors. For all project alternatives, changes in water operations would not be expected to result in a measurable increase in mercury or selenium bioavailability or increased pesticide or microcystin exposure to cormorants, herons, and egrets. The temporary impacts on habitat and potential impacts of injury, mortality, or the disruption of normal behaviors from project construction, operations, and maintenance activities would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B); however, even with these commitments, the impacts of the project alternatives on cormorants, herons, and egrets would be significant. The CMP would be required to offset the loss of riparian and emergent wetland habitat (Appendix 3F, Section 3F.3.2.3 and Section 3F.4.3), which would reduce the impact associated with habitat loss to less than significant. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18); NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; BIO-2c: *Electrical Power Line Support Placement*; and BIO-35: *Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries* would be required to avoid and minimize the potential for injury, mortality, or the disruption of normal behaviors and disturbances to habitat. The impacts on cormorants, herons, and egrets from the project alternatives would be less than significant with mitigation because the aforementioned measures would replace lost habitat, reduce direct effects on the species, including habitat, noise, and visual disturbances, by providing environmental awareness training to construction personnel, by implementing protective measures during maintenance activities, and avoidance measures for cormorant, heron, or egret rookeries during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) would offset the loss of riparian and emergent wetland habitat (Appendix 3F, Section 3F.3.2.3) by creating riparian habitat on Bouldin Island and at the I-5 ponds, and by creating or restoring channel margin enhancement and tidal emergent wetlands (Appendix 3F, Section 3F.4.3, *Tidal Habitat Mitigation Framework*) and managing these areas in perpetuity.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-35: Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries

All Project Alternatives

Cormorants, herons, and egrets are highly traditional in their use of nest sites (rookeries), in that they use the same sites year after year. To reduce impacts on rookeries, DWR will implement the following measures prior to construction activities.

1. To the maximum extent feasible, vegetation removal and trimming will be scheduled during the nonbreeding season of birds (September 1 through January 31). Vegetation trimming will not remove known nests. If a rookery needs to be removed, DWR will contact CDFW prior to removal and removal will occur during the nonbreeding season (September 1 through January 31). Preconstruction surveys of previously occupied colonies and all suitable habitat within 500 feet of the project footprint and compensatory mitigation sites will be conducted during the breeding (February 1 through August 31) season by a qualified biologist with experience observing cormorants, herons, and egrets and their nests. If there is a break in construction of 3 calendar days or more, surveys will be conducted prior to restarting construction in the area.

2. To the maximum extent feasible, major construction activities that will occur within 500 feet of an active cormorant, heron, or egret rookery (including ground-nesting cormorants) will be avoided during the breeding season. If feasible, construction activities that will result in the greatest disturbance to an active cormorant, heron, or egret rookery will be deferred until after or as late in the breeding season as feasible. If construction must take place within 500 feet of an active cormorant, heron, or egret rookery during the breeding season, a qualified biologist will monitor construction activities in the vicinity of the nests to ensure that construction activities do not affect nest success. The extent of the buffer will be determined by the qualified wildlife biologist(s) and will be established by taking into consideration the type and extent of the proposed activity occurring near the nest, the duration and timing of the activity, the line of sight between the nest and the disturbance, the sensitivity and the habituation of the birds and raptors to existing conditions, and the dissimilarity of the proposed activity to ambient levels of noise and other disturbances. Reduced buffers may be allowed if a full-time qualified biologist is present to monitor the nest and has authority to expand the buffer or halt construction if bird behavior indicates continued activities could lead to nest failure or if a bird is in the footprint during project activities.
3. Active nests will be monitored to track progress of nesting activities until the biologist determines that the young have fledged and are capable of independent survival or the nest site is no longer active.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands as well as habitat for special-status species under the project's CMP would affect cormorants, herons, and egrets through the permanent and temporary loss of habitat (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats on Bouldin Island and the I-5 ponds. Though no specific locations for channel margin enhancement and tidal wetland habitat creation have been identified, potential areas include the lower Yolo Bypass and Cache Slough complex. The activities to create these habitat types would generally include for channel margin enhancement the removal of existing riprap, modification of the existing channel margin with heavy equipment, and placement of large woody debris on the channel margin. For tidal restoration, activities would include grading, creation of setback levees, planting, and breaching of existing levees (Appendix 3F, Section 3F.4.3).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which do not provide habitat for cormorant, heron, or egret rookeries and therefore there would not likely be any effects on these species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain riparian habitat for cormorant, heron, or egret rookeries and management activities could affect this habitat and result in the disruption of normal behaviors, injury, and mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of nesting habitat from habitat creation by adjusting the overall commitment of riparian creation (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-3, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The creation and enhancement activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals if restoration activities occur during the breeding season (February 1 through August 31), as described above under construction-related effects. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) and Mitigation Measures BIO-35: *Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries* would reduce the potential for injury, mortality, and the disruption of normal behaviors of individuals to less than significant. These impacts would be less than significant with mitigation because the aforementioned measures would (1) train construction staff on the needs of protecting nesting cormorants, herons, and egrets, the requirements for avoiding impacts, and the ramifications for not following these measures; (2) minimize dust; (3) implement spill prevention and containment plans that would avoid material spills that could affect habitat; (4) prior to and during implementing restoration and enhancement ground disturbance, establish protective buffers around occupied habitat; and (5) have a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented where applicable.

Tidal restoration and creation and enhancement of wetlands on Bouldin Island and the I-5 ponds under the CMP have the potential to increase methylmercury bioavailability, as newly wetted areas produce the biogeochemical conditions to methylate mercury existing in Delta soils. There is potential for increased exposure of foodwebs to methylmercury in these localized areas, with the level of exposure dependent on the amounts of mercury available in the soils and site-specific biogeochemical conditions. Increased methylmercury associated with restoration may affect cormorants, herons, and egrets, via uptake through consumption of prey. Schwarzbach and Adelsbach (2003:26) investigated mercury exposure in 15 species of birds inhabiting the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from their fish prey. Because Bouldin Island and the I-5 ponds sites consist of existing managed and agricultural wetlands and ponds, wetland creation and enhancement are not expected to increase mercury methylation, relative to existing conditions. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include mercury monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased mercury methylation, relative to existing conditions. Mitigation Measure WQ-6: *Develop and Implement a Mercury Management and Monitoring Plan*, which contains measures to assess the amount of mercury at tidal restoration sites before project development, followed by appropriate design, monitoring, and adaptation management, would minimize the potential for any effects of increased methylmercury exposure due to tidal restoration. Therefore, implementation of the CMP would not be expected to have a significant adverse impact on cormorants, herons, or egrets.

Herbicides would be applied at CMP creation and enhancement sites to remove nonnative vegetation for site preparation and to support establishment of new plantings. Natural habitats contribute fewer pesticides to receiving waters than agricultural areas where pesticides are applied. Any newly created wetlands or enhanced natural habitat could also filter stormwater to remove solids and either improve or have no effect on pesticide concentrations in discharges to receiving waters, relative to existing conditions. As such, restoration areas are expected to somewhat reduce, rather than increase, runoff of pesticides into adjacent waterbodies. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides would be applied in such a manner as to prevent primary or secondary poisoning of cormorants, herons, and egrets.

Implementation of habitat creation and enhancement under the CMP has the potential to result in conditions that promote CHABs, which could result in impacts on cormorants, herons, and egrets foraging near created or enhanced wetland habitats. High levels of microcystins in tissues and microcystin poisoning have been documented in other piscivorous bird species using other aquatic habitats (Chen et al. 2009: 3317) and could affect cormorants, herons, and egrets if they forage in areas with conditions that promote CHABs. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include CHAB monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased CHAB formation, relative to existing conditions. As discussed in Chapter 9, tidal habitat creation is not expected to cause substantial additional *Microcystis* production. Therefore, the CMP would not result in increased CHAB formation that could cause substantial adverse impacts on cormorants, herons, or egrets, relative to existing conditions.

Selenium concentrations increase with trophic level and birds that consume prey with high levels of selenium have a higher risk of selenium toxicity (Ackerman and Eagles-Smith 2009:2139), therefore cormorants, herons, and egrets, which forage on small fish and other vertebrates, may be at elevated risk of selenium toxicity. Wetland creation and enhancement may result in mobilization of selenium in Delta sediments, which could increase the risk of selenium toxicity to cormorants, herons, and egrets. It is difficult to determine whether the effects of potential increases in selenium bioavailability associated with restoration activities under the CMP would lead to adverse effects on these species. Modeled concentrations in piscivorous bird eggs under existing conditions in the Delta were below levels of concern for other bird species (Appendix 9J) and most double-crested cormorant eggs in San Francisco Bay were similarly low (Ross et al. 2016:31), and existing selenium concentrations in the Sacramento River watershed are low (Central Valley Regional Water Quality Control Board 1988:14); therefore, the risk of impacts due to increased selenium exposure is also low. Analysis included in Chapter 9 for Impact WQ-10: *Effects on Selenium Resulting from Facility Operations* found that compensatory mitigation would not result in a measurable increase in selenium concentrations or selenium bioavailability. Therefore, potential increased exposure to selenium resulting from restoration would not be expected to adversely affect cormorant, heron, and egret populations. The impact on cormorant, heron, and egret rookeries from the project with the CMP would be less than significant with mitigation.

<u>*Other Mitigation Measures*</u>

Some mitigation measures would involve ground disturbance, the use of heavy equipment, pile driving, or pesticides that would have the potential to expose cormorants, herons, and egrets to excessive noise, visual disturbance, dust, and hazardous materials that could cause loss of modeled habitat, disruption of normal behaviors, and injury or mortality. The mitigation measures with potential to result in impacts on cormorants, herons, and egrets are similar to those discussed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. Impacts on cormorants, herons, and egrets resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to cormorants, herons, and egrets impacts of the project alternatives.

The impacts of habitat loss, noise, visual disturbance, and exposure to dust or hazardous materials on cormorants, herons, and egrets would be reduced through the CMP, environmental commitments, and Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan* as detailed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-35: *Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries* would require species-specific measures to reduce these impacts. Therefore, impacts on cormorants, herons, and egrets from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on cormorants, herons, and egrets from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-36: Impacts of the Project on Osprey, White-Tailed Kite, Cooper's Hawk, and Other Nesting Raptors

The methods for the analysis of effects on osprey, white-tailed kite, and Cooper's hawk appear in Section 13.3.1.1. Information on the species' life histories and habitat suitability models are presented in the following species accounts in Appendix 13B: Section 13B.67, *Osprey*, Section 13B.68, *White-Tailed Kite*, and Section 13B.71, *Cooper's Hawk*. The same habitat is also suitable to support other nesting raptors.

All Project Alternatives

<u>*Construction*</u>

The construction of all project alternatives would affect modeled habitat for osprey, white-tailed kite, and Cooper's hawk. Other nesting raptors (e.g., red-tailed hawk, great horned owl) use the same habitat. Effects on nesting raptors would include the permanent and temporary loss of habitat, habitat fragmentation, and the potential for the disruption of normal behaviors, injury, and mortality. The loss of nesting habitat would primarily occur as a result of levee improvements, new roads and road improvements, and construction of the intakes (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment. Acres of permanent and temporary impacts on modeled habitat for osprey, white-tailed kite, and Cooper's hawk are shown in Table 13-75 through Table 13-77. Environmental Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-75. Impacts on Modeled Habitat for Osprey by Alternative

Alternative	Permanent Impacts—Nesting (acres) [a]	Permanent Impacts—Foraging (acres) [a]	Temporary Impacts—Nesting (acres)	Temporary Impacts—Foraging (acres)	Total (acres)
1	16.92	24.56	9.23	13.31	64.02
2a	17.29	25.88	11.38	13.56	68.11
2b	12.24	20.72	10.48	13.02	56.46
2c	14.40	23.18	10.88	13.36	61.82
3	15.21	16.28	8.40	5.47	45.36
4a	17.39	18.14	9.04	5.67	50.24
4b	12.34	12.99	8.15	5.13	38.61
4c	14.50	15.45	8.55	5.47	43.97
5	17.55	8.04	7.82	4.36	37.77

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Table 13-76. Impacts on Modeled Nesting and Foraging Habitat for White-Tailed Kite by Alternative

Alternative	Permanent Impacts—Nesting (acres) [a]	Permanent Impacts—Foraging (acres) [a]	Temporary Impacts—Nesting (acres)	Temporary Impacts—Foraging (acres)	Total (acres)
1	16.92	2,512.40	9.23	262.41	2,800.96
2a	17.29	2,736.74	11.38	280.70	3,046.11
2b	12.24	2,220.93	10.48	277.28	2,520.93
2c	14.40	2,375.77	10.88	282.18	2,683.23
3	15.21	2,448.29	8.40	224.80	2,696.70
4a	17.39	2,706.64	9.04	224.74	2,957.81
4b	12.34	2,141.15	8.15	221.35	2,382.99
4c	14.50	2,317.14	8.55	226.22	2,566.41
5	17.55	1,557.01	7.82	111.76	1,694.14

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Table 13-77. Impacts on Modeled Nesting Habitat for Cooper's Hawk by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	19.77	11.19	30.96
2a	20.62	13.38	34.00

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
2b	14.70	12.41	27.11
2c	17.21	12.89	30.10
3	16.19	9.32	25.51
4a	18.89	9.94	28.83
4b	12.97	8.99	21.96
4c	15.48	9.46	24.94
5	19.19	8.74	27.93

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

The losses of nesting habitat and potential for injury and mortality would result from vegetation removal in advance of grading and excavation for the construction of project infrastructure. Construction activities and removal of suitable nest trees could result in the injury, mortality, or disturbance of raptors, including the incidental loss of fertile eggs or nestlings and nest abandonment. Because white-tailed kite is fully protected, removal of trees with active nests and activities that may result in loss of white-tailed kites is prohibited. There is wide variation in reported distances at which raptors are disturbed by human activities (Pacific Gas and Electric Company 2016:4-4), which makes broad generalizations about disturbance distances difficult. For the purpose of this analysis and based on typical guidance on disturbance distances from CDFW, any raptors nesting within 500 feet of the project footprint could potentially be disturbed by construction noise or vibration, potentially causing nest abandonment. Construction activities are not expected to injure or kill adults and fledged juveniles who are no longer dependent on adults. Night lighting may also have the potential to affect the behavior of nesting raptors or white-tailed kite roost sites, if present in the vicinity of work areas. However, all lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in the levels of light, however, these types of light generate an ambient nighttime luminescence that is visible from a distance. Effects of construction-related light would be greater at the intakes where existing conditions are dark and rural in comparison with the Twin Cities Complex, Southern Complex, and Bethany Complex where there are existing sources of light that may illuminate suitable habitat. Construction activities could result in dust and the discharge of construction-related fluids, which could also affect these species and their habitat if present in or adjacent to work areas. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting nesting raptors, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

The loss of white-tailed kite foraging habitat and foraging habitat for other raptors would primarily occur as a result of construction of the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and from the placement of RTM (all alternatives; Appendix 13C). Lesser impacts on foraging habitat would occur from the construction of the intakes (all alternatives) and the Bethany Complex (Alternative 5). Permanent and temporary foraging habitat loss from the construction of the levee improvements, and new roads or road improvements would remove relatively narrow slivers of grassland and cultivated lands that are less likely to be used by the species. Cooper's hawk typically forage in forests or shrublands with open edge habitats or in urban areas which are not modeled because those features are more detailed than the scale of the landcover mapping. However, impacts on foraging habitat for Cooper's hawk and other nesting raptors would be similar to those described above for Cooper's hawk nesting habitat and some portion of modeled white-tailed kite foraging habitat. The loss of osprey foraging habitat would also occur as a result of construction of the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c; Appendix 13C) and the intakes, new roads, and road improvements associated with bridges (all alternatives; Appendix 13C). Construction activities would not be expected to result in injury or mortality while birds are foraging because raptors are highly mobile and would be expected to avoid direct injury or mortality from slow-moving or stationary construction equipment.

There are no CNDDB occurrences of osprey or Cooper's hawk in the vicinity of project facilities under any alternative (California Department of Fish and Wildlife 2020a). There is one occurrence of white-tailed kite adjacent to a proposed access road associated with the Bethany Complex (Alternative 5) (California Department of Fish and Wildlife 2020a).

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of nesting raptors. Geotechnical investigations associated with the tunnels for all project alternatives, which include CPTs and soil borings, would result in impacts on modeled white-tailed kite and osprey foraging habitat and small amounts of raptor nesting habitat (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations would not affect modeled nesting habitat for Cooper's hawk, osprey, or white-tailed kite, or modeled foraging habitat for osprey, but they would occur within modeled foraging habitat for white-tailed kite and other raptors. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pile installation test methods at the north Delta intakes, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the potential for injury, mortality, and disruption of normal behaviors of raptors if present in the vicinity, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting nesting raptors, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area and pile installation test methods at the north Delta intakes may cause disturbance to nesting raptors.

Operations

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions (Chapter 24, Section 24.4.3.2). Permanent facility lighting associated with project facilities under all alternatives could extend into nesting and foraging habitat; however, as stated in Chapter 3, Section 3.4.12, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, and therefore permanent facilities would remain dark the majority of the time at night, which would minimize the potential for this impact.

Power for construction and operation of the conveyance facilities has been designed to use existing power lines and underground conduit to the extent feasible under all project alternatives. Most new project lines would be placed on existing poles and towers and therefore would not substantially alter the existing landscape. However, new aboveground high-voltage transmission and SCADA lines would be constructed to power the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and Bethany Complex under Alternative 5 (Chapter 3, Figure 3-13 and Figure 3-14). White-tailed kites and other diurnal raptors have highly developed eyesight (Potier et al. 2020:8; Mitkus et al. 2018:1), allowing them to detect small prey. Keen eyesight also allows detection and avoidance of other aerial objects, including aboveground utility lines. Raptors, including white-tailed kite, osprey, and Cooper's hawks have narrow, tapered wings and body sizes that allow efficient soaring flight and highly developed aerial maneuverability (Bevanger 1998:69). Therefore, the general maneuverability and keen eyesight make the risk of collision with power lines low for raptors, relative to other avian species (Slater et al. 2020). Raptors are subject to electrocution from powerlines; however, most electrocutions of raptors occur at low voltage distribution lines because of the small spacing between uninsulated energized components (Slater et al. 2020:198). Large transmission lines such as the proposed project lines pose minimal electrocution risk because of the inherently large spacing required between the electrified components (Slater et al. 2020:198).

Changes in water operations under all project alternatives have the potential to exacerbate bioaccumulation of methylmercury in osprey, white-tailed kite, Cooper's hawk, and other nesting raptors. Methylmercury can be transported from aquatic to adjacent terrestrial foodwebs through ingestion of aquatic prey items, where it can biomagnify and expose terrestrial birds to high concentrations (Cristol et al. 2008:335). Because osprey are piscivorous birds, they are particularly at risk of mercury contamination due to biomagnification of methylmercury. Largemouth bass was used as an indicator species for analysis of impacts from changes in operations from the construction of the water conveyance facilities because they are good indicators of mercury contamination throughout the aquatic foodweb (Wood et al. 2010:67). Modeled effects of mercury concentrations from changes in operations of water conveyance facilities on largemouth bass did not differ substantially from existing conditions (Chapter 9, Appendix 9H); therefore, project operations are not expected to increase methylmercury exposure to osprey, white-tailed kite, Cooper's hawk, and other nesting raptors, relative to existing conditions.

Ospreys forage on fish in open water habitats of the Delta (Polite 2008:1), where localized environmental conditions may be present to support *Microcystis* blooms. Microcystins have also been found in terrestrial foodwebs, likely through consumption of emergent aquatic insects (Moy et al. 2016:A, E), and can affect Cooper's hawk if their prey forage in or near habitats with conditions that promote *Microcystis* blooms. Although microcystin toxicity has not been studied in osprey, white-tailed kite, Cooper's hawk, and other nesting raptors, high levels of microcystins have been identified in other piscivorous birds and riparian songbirds, thus osprey and Cooper's hawk may be at risk of death or reproductive harm due to microcystin toxicity (Chen et al. 2009:3317). Operation of all project alternatives is not expected to substantially change the five factors that could create conditions more conducive to CHAB formation relative to existing conditions within the Delta (Chapter 9). The water quality modeling results show a potential for increased residence time in some locations and months within the central Delta, namely Discovery Bay where residence times are already very long, which could contribute to increased *Microcystis* bloom size in some years at these locations if the remaining four environmental factors were also at levels conducive to forming CHABs. Nevertheless, based on known *Microcystis* dynamics in the Delta a small increase of residence time at Discovery Bay would not cause *Microcystis* blooms to substantially increase in size or last substantially longer, relative to existing conditions. Because the project alternatives, through their effects on the five factors potentially associated with CHABs in the Delta, are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystin or any other cyanotoxins in the Delta that could cause a substantial adverse impact on osprey, white-tailed kite, Cooper's hawk, or other nesting raptors, relative to existing conditions.

Current use and legacy pesticides have the potential to bioaccumulate in the prey of raptors such as osprey, white-tailed kite, and Cooper's hawk. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows, and would not result in land-use changes that would increase use of pesticides, relative to existing conditions (Chapter 9). Therefore, the project alternatives would not substantially increase pesticide exposure to osprey, white-tailed kite, Cooper's hawk, and other nesting raptors.

Selenium concentrations increase with trophic level and birds that consume prey with high levels of selenium have a higher risk of selenium toxicity (Ackerman and Eagles-Smith 2009: 2139); therefore, osprey, white-tailed kite, Cooper's hawk, and other nesting raptors, which forage on fish and small terrestrial vertebrates, may be at elevated risk of selenium toxicity. Modeled selenium concentrations in fish tissue and the eggs of fish-eating birds, such as osprey, were below the level of concern and did not differ substantially from existing conditions under all alternatives (Appendix 9J). Therefore, the project alternatives are not anticipated to substantially increase the risk of selenium contamination in osprey, white-tailed kite, Cooper's hawk, and other nesting raptors.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives would result in periodic disturbances within and adjacent to nesting and foraging habitat for raptors. Maintenance activities at the north Delta intakes (all project alternatives) would include semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), annual sediment and debris removal at intakes, and periodic maintenance of the intake gates and associated structures approximately every 1 to 5 years. Maintenance activities at launch, reception, and maintenance shafts along the central (Alternatives 1, 2a, 2b, and 2c), eastern (Alternatives 3, 4a, 4b, and 4c), and Bethany Reservoir (Alternative 5) alignments would include similar semiannual general and ground maintenance in addition to daily inspections by vehicle. Existing access roads in the vicinity of the intakes and shafts would be repaved every 15 years and noise and visual disturbance from repaving equipment could disturb active nests in the vicinity of the work areas.

Large equipment or cranes required for maintenance of the intakes (all alternatives), Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), or Bethany Complex (Alternative 5) or any vegetation management that involves tree-trimming or tree removal could disrupt nesting behaviors or result in potential injury or mortality of individuals. Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives would result in impacts on special-status and non–special-status raptors through the permanent and temporary loss of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors. For all project alternatives, changes in water operations would not be expected to result in a measurable increase in mercury or selenium bioavailability or increased pesticide or microcystin exposure to osprey, white-tailed kite, Cooper's hawk, and other nesting raptors. The temporary impacts on habitat and potential impacts of injury, mortality, or disruption of normal behaviors from project construction, operations, and maintenance would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B); however, even with these commitments, the impacts of the project alternatives on special-status and non–special-status raptors would be significant. The CMP would be required to offset the loss of nesting and foraging habitat by creating and protecting riparian, tidal emergent wetland, and grassland habitat (Appendix 3F, Sections 3F.3.2.3, 3F.3.2.5, and 3F.3.3.2) on Bouldin Island and the I-5 ponds and by protecting agricultural foraging habitat for sandhill cranes, Swainson's hawk, and tricolored blackbird (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*), and by creating or acquiring and permanently protecting tidal perennial aquatic habitat to ensure no significant loss of tidal perennial aquatic habitat functions and values (Appendix 3F, Section 3F.4.3 and Attachment 3F.1, Table 3F.1-2, CMP-1: *Tidal Perennial Aquatic Habitat*) which would mitigate the loss of special-status and non–special-status nesting raptor nesting and foraging habitat to a less-than-significant level. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18), NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; BIO-2c: *Electrical Power Line Support Placement*; and BIO-36a: *Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors*; and BIO-36b: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite* would be required to minimize disturbance of habitat and avoid take of white-tailed kite, as defined by Section 86 of Fish and Game Code and would avoid and minimize the potential for injury, mortality, or the disruption of normal behaviors and disturbances to habitat for osprey, Cooper's hawk, and other nesting raptors. The impacts on special-status and non–special-status raptors from the project alternatives would be less than significant with mitigation because the aforementioned measures would replace lost habitat, reduce direct effects on the species, including habitat, noise, and visual disturbances, by providing environmental awareness training to construction personnel, by implementing protective measures during maintenance activities, and avoidance measures for raptors during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) would offset the loss of nesting and foraging habitat for white-tailed kite, osprey, Coopers hawk, and other nesting raptors by creating and protecting wetlands, riparian, and grasslands on Bouldin Island and the I-5 ponds (Appendix 3F, Section 3F.3.3), by creating or acquiring and permanently protecting tidal perennial aquatic habitat to ensure no significant loss of tidal perennial aquatic habitat functions and values (Appendix 3F, Section 3F.4.3 and Attachment 3F.1, Table 3F.1-2, CMP-1: *Tidal Perennial Aquatic Habitat*) and through the protection and management of agricultural foraging habitat for sandhill crane, Swainson's hawk, and tricolored blackbird (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-18b: *Sandhill Crane Foraging Habitat,* CMP-19b: *Swainson's Hawk Foraging Habitat,* CMP-22b: *Tricolored Blackbird Foraging Habitat*). The CMP would also compensate for the temporal loss of suitable nest trees for these species (Attachment 3F.1, Table 3F.1-3, CMP-19a: *Swainson's Hawk Nesting Habitat*).

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-36a: Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors

All Project Alternatives

To reduce impacts on nesting birds, DWR will implement the measures listed below prior to construction activities.

1. Timing Restrictions. To the maximum extent feasible, construction activities, vegetation removal, and trimming will be scheduled during the nonbreeding season of birds (September 1 through January 31) to avoid impacts on nesting birds if nesting birds are present. If construction activities, vegetation removal, and trimming cannot be conducted in accordance with this timeframe, surveys for nesting birds and additional protective measures will be implemented as described below.

2. Preconstruction Surveys. A qualified wildlife biologist with knowledge of the relevant species will conduct nesting surveys before the start of construction. A minimum of three separate surveys will be conducted within 30 days prior to construction, with the last survey within 3 days prior to construction. Surveys will be conducted within the project construction and staging areas and all suitable nesting habitat (e.g., trees, shrubs, emergent wetland, grasslands ruderal areas, cultivated lands, human-made structures) within 500 feet of the project construction and staging areas (or an alternative survey distance if described within species-specific USFWS or CDFW protocols or species-specific mitigation measures within this document) to locate any active nest protected by the Migratory Bird Treaty Act. If no active nests are detected during these surveys, no additional measures are required if construction begins within 3 calendar days. An additional survey will be conducted after any construction breaks of 3 calendar days or more. Surveys for nesting bank swallows will be conducted in RTM areas that have been present for at least 1 year, allowing the substrate to stabilize. Surveys of RTM will be conducted prior to RTM removal, during the bank swallow nesting season (April 1 through August 31).

3. No-Disturbance Buffer. If active nests are found in the survey area, no-disturbance buffers will be established around the nest sites to avoid disturbance or destruction of the nest site until the end of the breeding season (approximately September 1) or until a qualified wildlife biologist determines that the young have fledged and moved out of the work area (this date varies by species). Buffer distances vary by species and conservation status (e.g., listed species and fully protected species may warrant larger buffers than non–special-status species) but typically, these buffer distances are between 300 feet and 650 feet for raptors and between 50 feet and 250 feet for other nesting birds. The extent of the buffers will be determined by the qualified wildlife biologist(s) and will be established by taking into consideration they type and extent of the proposed activity occurring near the nest, the duration and timing of the activity, the line of sight between the nest and the disturbance, the sensitivity and the habituation of the birds and raptors to existing conditions, and the dissimilarity of the proposed activity to ambient levels of noise and other disturbances. The qualified wildlife biologist(s) will mark the extent and locations of non-disturbance buffers on maps to present to construction personnel at morning tailboards or will use flagging, fencing, or other suitable physical markers, depending on the species of birds, the size of the buffers, and the construction activities to be conducted in the work area.

4. Nest Monitoring. The qualified wildlife biologist(s) will monitor construction activities in the vicinity of the nests to ensure that construction activities do not affect nest success. Reduced buffers (described above) may be allowed if a full-time qualified biologist is present to monitor the nest. Active nests will be monitored to track progress of nesting activities until the biologist determines that the young have fledged and are capable of independent survival or the nest site is no longer active.

5. Authority of Qualified Wildlife Biologist(s). If, during construction, the qualified wildlife biologist(s) determines that a nesting bird is disturbed by construction activities to the point where continued activities could lead to nest failure, the qualified wildlife biologist(s) will have the authority to immediately stop work. The qualified wildlife biologist(s) will determine additional if protective measures (including increasing the non-disturbance buffer distance) need to be implemented and will continue monitoring the nest until the qualified biologist(s) determine that bird behavior has normalized.

Mitigation Measure BIO-36b: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite

All Project Alternatives

The following measures will be required for activities occurring in suitable white-tailed kite habitat.

1. Preconstruction Surveys. Preconstruction surveys will be conducted by a qualified biologist(s) to identify the presence of potential white-tailed hawk nest trees on within 0.25 mile of project sites, where accessible. Transportation routes along public roads (roads leading to and from work areas) are considered disturbed, and no surveys or monitoring are required for nests along those roadways unless they are within 0.25 mile of work areas. Surveys for nesting white-tailed kites will be conducted, following a protocol approved by CDFW, within 30 days prior to construction to ensure nesting activity is documented prior to the onset of construction activity during the nesting season. White-tailed kite nest in the study area between approximately March 15 and September 15. While many nest sites are traditionally used for multiple years, new nest sites can be established in any year. Therefore, construction activity that is planned after March 15 of any year will require surveys during the year of the construction. If construction is planned before March 15 of any year, surveys will be conducted the year immediately prior to the year of construction. DWR will provide survey results to CDFW by phone or email no less than 5 days prior to commencement of construction activities. The qualified biologist(s) will conduct a second survey of potential nesting trees and active nests and monitor white-tailed kite nests no more than 72 hours prior to construction. If no nesting activity is found, then construction can proceed with no restrictions if construction begins within 3 calendar days. An additional survey will be conducted after any construction breaks of 3 calendar days or more.

2. Timing Restrictions. Where the construction site occurs within 0.25 mile of a white-tailed kite nest, DWR will limit construction activities to outside the white-tailed kite breeding season (March 15 through September 15), to the extent feasible. Where construction activities within 0.25 mile of an active nest cannot feasibly be avoided during the breeding season, DWR will initiate construction prior to egg laying to the greatest extent feasible. This will allow time for white-tailed kites to acclimate to disturbance before eggs are laid. If eggs or young are present in the nest, work will not be permitted to occur until the qualified

biologist(s) determines that white-tailed kites have acclimated to disturbance and exhibit normal nesting behavior.

3. No-Disturbance Buffer. Where construction activities must occur within 0.25 mile of an occupied white-tailed kite nest, DWR will establish a 650-foot-radius (198 meters) non-disturbance buffer (buffer) around each white-tailed kite nest tree and the buffer will remain in place until the end of the breeding season or until the last chick has left the nest. DWR will clearly delineate the buffer with fencing or other conspicuous marking. The qualified biologist(s) will monitor occupied nest trees to track progress of nesting activities (see *White-tailed Kite Nest Monitoring* below). DWR will not conduct any construction activities within the buffer while a nest site is occupied by white-tailed kite during the breeding season. The buffer size may be modified based on the field examination and determination by the qualified biologist(s) of conditions that may minimize disturbance effects, including line of sight, topography, land use, type of disturbance, existing ambient noise and disturbance levels, and other relevant factors, as authorized by CDFW. Entry into the buffer will be granted when the qualified biologist(s) determines that the young have fledged and are capable of independent survival, or the nest has failed, and the nest site is no longer active.

4. White-Tailed Kite Nest Monitoring. Where construction activities must occur within 0.25 mile of an occupied white-tailed kite nest tree, DWR will implement the following monitoring plan.

   a. Five days and three days prior to the initiation of construction at any site where a nest is within 650 feet of construction, the qualified biologist(s) will observe the subject nest(s) for at least 1 hour or until normal nesting behavior can be determined. The qualified biologist(s) will document nesting status and behaviors to compare to nesting status and behaviors after construction begins. The results of preconstruction monitoring will be reported to CDFW within 24 hours of each survey.

   b. Where an occupied white-tailed kite nest tree occurs less than 325 feet (99 meters) from construction, the qualified biologist(s) will observe the nest for at least 4 hours per day during construction to ensure the white-tailed kites are engaged in normal nesting behavior.

   c. Where an occupied white-tailed kite nest tree occurs between 325 to 650 feet (99 to 198 meters) from construction, the qualified biologist(s) will observe the nest for at least 2 hours per day during construction to ensure the white-tailed kites are engaged in normal nesting behavior.

   d. Where an occupied white-tailed kite nest tree occurs between 650 to 1,300 feet (198 to 396 meters) from construction, the qualified biologist(s) will observe the nest once a day during construction to ensure the white-tailed kites are engaged in normal nesting behavior and to check the status of the nest.

5. Disturbance of Occupied Nest Tree. DWR will prohibit physical contact with an active nest tree from the time of egg laying to fledging, unless approved by CDFW. All workers within 650 feet will be out of the line of sight of the occupied white-tailed kite nest tree during breaks or will take breaks more than 650 feet from an occupied nest tree.

6. Authority of Qualified Biologist(s). The project will be implemented in a manner that will not result in take of white-tailed kite, as defined by Section 86 of the California Fish and

Game Code. If during construction, the qualified biologist(s) determines that a nesting white-tailed kite within 0.25 mile of construction is disturbed by construction activities to the point where nest abandonment is likely, the qualified biologist(s) will have the authority to immediately stop work and will immediately notify DWR. A designated representative from DWR will contact CDFW within 24 hours to determine additional protection measures to be implemented. The qualified biologist(s) will:

a. Stop construction until additional protective measures are implemented unless white-tailed kite behavior normalizes on its own. Potential nest abandonment and failure may be indicated if, in the qualified biologist(s)' professional judgment, the white-tailed kite exhibits distress and/or abnormal nesting behavior, such as swooping or stooping at construction equipment or personnel, excessive distress-call vocalization or agitated behavior directed personnel, failure to remain on nest, or failure to deliver prey items.

b. Continue monitoring and ensure additional protective measures remain in place until the qualified biologist(s) determine(s) white-tailed kite behavior has normalized.

c. Determine if additional protective measures are ineffective and stop construction until the additional protective measures are modified.

d. Continue monitoring until determining that white-tailed kite behavior has normalized.

e. The DWR representative or qualified biologist(s) will notify CDFW within 24 hours if nests or nestlings are abandoned and if the nestlings are still alive. The qualified biologist(s) will work with CDFW to determine appropriate actions.

7. Nest Tree Avoidance. DWR will avoid removal of known nest trees to the maximum extent feasible. If a known nest tree must be removed for construction activities, DWR will notify and obtain written approval from CDFW. The notification will include the location of the known nest tree, conditions to offset the loss of the nest tree, and the time of removal, which will generally be October 1 through February 1. DWR will not remove any occupied nest tree until the last young have left the nest, as verified by the qualified biologist(s). DWR will compensate for the temporal loss of known white-tailed kite nest trees using the protocol described for Swainson's Hawk in Appendix 3F, *Compensatory Mitigation* (Attachment 3F.1, Table 3F.1-3, CMP-19a: *Swainson's Hawk Nesting Habitat*).

8. Geotechnical Exploration. DWR will conduct geotechnical exploration outside of the breeding season, to the extent practicable. The qualified biologist(s) will delineate with flagging or other visible markers suitable breeding habitat within the geotechnical exploration site. DWR will restrict geotechnical exploration to areas outside of the delineated breeding habitat. If geotechnical exploration must occur during the breeding season, the qualified biologist(s) will survey the breeding habitat within 0.25 mile for nesting white-tailed kite. DWR will limit geotechnical exploration activities to least 0.25 mile away from any occupied nest tree, unless otherwise approved by CDFW.

9. Measures Specific to Transmission Line Construction. DWR will not use helicopters to string transmission lines or to conduct field investigations within 0.25 mile of an occupied nest tree. DWR will not remove or trim occupied nest trees for transmission line construction until after the breeding season has ended or the last young have left the nest. If removal or trimming of an occupied nest tree needs to occur for human or wildlife safety, DWR will conduct removal or trimming from October 1 to February 1, or with written approval and guidance from CDFW. DWR will avoid removal or trimming of known or suitable nest trees,

to the extent practicable, during transmission line stringing and reconductoring activities or during power and pole placement. Where practicable, DWR will place poles and lines outside of breeding habitat, as delineated by the qualified biologist(s). DWR will follow the *Nest Tree Avoidance* measures listed above when removal or trimming of known or suitable nest trees cannot be avoided.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>*Compensatory Mitigation*</u>

The creation and enhancement of wetlands as well as habitat for special-status species under the project's CMP would affect special-status and non–special-status raptors through the permanent and temporary loss of habitat (Appendix 13C) on Bouldin Island or at the I-5 ponds from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which could support suitable foraging habitat for Cooper's hawk, white-tailed kite and other nesting raptors and could result in disturbances to these species including the disruption of foraging behaviors. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain habitat for osprey, Cooper's hawk, white-tailed kite, and other nesting raptors and management activities could affect this habitat and result in the disruption of normal behaviors, injury, and mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of nesting habitat from habitat creation by adjusting the overall commitment of riparian and wetland creation and grassland and cultivated lands protection (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-3, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The creation and enhancement activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals if restoration activities occur during the breeding season (February 1 through August 31), as described above under construction-related effects. Environmental Commitments EC-1:

Conduct Worker Awareness Training; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) and Mitigation Measures BIO-36a: *Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors*; and BIO-36b: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite* would minimize disturbance of habitat and avoid take of white-tailed kite, as defined by Section 86 of Fish and Game Code and would reduce the potential for injury, mortality, or the disruption of normal behaviors and disturbances to habitat for osprey, Cooper's hawk, and other nesting raptors to less than significant. These impacts would be less than significant with mitigation because the aforementioned measures would (1) train construction staff on protecting nesting raptors, the requirements for avoiding impacts, and the ramifications for not following these measures; (2) minimize dust; (3) implement spill prevention and containment plans that would avoid material spills that could affect habitat; (4) prior to and during implementing restoration and enhancement ground disturbance, establish protective buffers around occupied nest sites; and (5) have a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented where applicable.

Tidal restoration and creation and enhancement of wetlands at Bouldin Island and the I-5 ponds under the CMP have the potential to increase methylmercury bioavailability, as newly wetted areas produce the biogeochemical conditions to methylate mercury existing in Delta soils. There is potential for increased exposure of foodwebs to methylmercury in these localized areas, with the level of exposure dependent on the amounts of mercury available in the soils and site-specific biogeochemical conditions. Increased methylmercury associated with wetland creation and enhancement may affect osprey, white-tailed kite, Cooper's hawk, and other nesting raptors via uptake through consumption of prey. Because Bouldin Island and the I-5 ponds sites consist of existing managed and agricultural wetlands and ponds, wetland creation and enhancement are not expected to increase mercury methylation, relative to existing conditions. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include mercury monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased mercury methylation, relative to existing conditions. Mitigation Measure WQ-6: *Develop and Implement a Mercury Management and Monitoring Plan*, which contains measures to assess the amount of mercury at tidal restoration sites before project development, followed by appropriate design, monitoring, and adaptation management, would minimize the potential for any effects of increased methylmercury exposure in adjacent aquatic and terrestrial habitats due to tidal restoration. Therefore, the CMP would not be expected to have a significant adverse impact on osprey, white-tailed kite, Cooper's hawk, and other nesting raptors.

Herbicides would be applied at CMP wetland creation and enhancement sites to remove nonnative vegetation for site preparation and to support establishment of new plantings. Natural habitats contribute fewer pesticides to receiving waters than agricultural areas where pesticides are applied. Any newly created wetlands or enhanced natural habitat could also filter stormwater to remove solids and either improve or have no effect on pesticide concentrations in discharges to receiving waters, relative to existing conditions. As such, wetland creation and enhancement areas are expected to somewhat reduce, rather than increase, runoff of pesticides into adjacent waterbodies. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides would be applied in such a manner as to prevent primary or secondary poisoning of osprey, white-tailed kite, Cooper's hawk, and other nesting raptors.

Habitat creation and enhancement under the CMP has the potential to result in conditions that promote CHABs, which could result in impacts on osprey, white-tailed kite, Cooper's hawk, and other nesting raptors foraging near created and enhanced wetland habitats. High levels of microcystins in tissues and microcystin poisoning have been documented in other piscivorous bird species using other aquatic habitats (Chen et al. 2009:3317) and in terrestrial foodwebs (Moy et al. 2016:A) and could affect osprey, white-tailed kite, Cooper's hawk, and other nesting raptors if their prey forage in areas with conditions that promote CHABs. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include CHAB monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased CHAB formation, relative to existing conditions. As discussed in Chapter 9, tidal habitat creation is not expected to cause substantial additional *Microcystis* production. Therefore, the CMP would not result in increased CHAB formation that could cause substantial adverse impacts on osprey, white-tailed kite, Cooper's hawk, and other nesting raptors, relative to existing conditions.

Selenium concentrations increase with trophic level and birds that consume prey with high levels of selenium have a higher risk of selenium toxicity (Ackerman and Eagles-Smith 2009:2139); therefore, osprey, white-tailed kite, Cooper's hawk, and other nesting raptors that forage on fish and terrestrial vertebrates may be at elevated risk of selenium toxicity. Wetland creation and enhancement may result in mobilization of selenium in Delta sediments, which could increase the risk of selenium toxicity to osprey, white-tailed kite, Cooper's hawk, and other nesting raptors. It is difficult to determine whether the effects of potential increases in selenium bioavailability associated with restoration activities under the CMP would lead to adverse effects on these species. Modeled concentrations in piscivorous bird eggs under existing conditions in the Delta were below levels of concern for other bird species (Appendix 9J), and existing selenium concentrations in the Sacramento River watershed are low (Central Valley Regional Water Quality Control Board 1988:14). Analysis included in Chapter 9 for Impact WQ-10: *Effects on Selenium Resulting from Facility Operations* found that compensatory mitigation would not result in a measurable increase in selenium concentrations or selenium bioavailability. Therefore, potential increased exposure to selenium resulting from restoration would not be expected to adversely affect osprey, white-tailed kite, Cooper's hawk, and other nesting raptors. The impact on osprey, white-tailed kite, Cooper's hawk, and other nesting raptors from the project with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, the use of heavy equipment, pile driving, or pesticides that would have the potential to expose osprey, white-tailed kite, and Cooper's hawk to excessive noise, visual disturbance, dust, and hazardous materials that could cause loss of modeled habitat, disruption of normal behaviors, and injury or mortality. The mitigation measures with potential to result in impacts on osprey, white-tailed kite, and Cooper's hawk are similar to those discussed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. Impacts on osprey, white-tailed kite, and Cooper's hawk resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to osprey, white-tailed kite, and Cooper's hawk impacts of the project alternatives.

The impacts of habitat loss, noise, visual disturbance, and exposure to dust or hazardous materials on osprey, white-tailed kite, and Cooper's hawk would be reduced through the CMP, environmental commitments, and Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan* as detailed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. In addition, Mitigation Measures BIO-36a: *Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors*; and BIO-36b: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite* would require species-specific measures to reduce these impacts. Therefore, impacts on osprey, white-tailed kite, and Cooper's hawk from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on osprey, white-tailed kite, and Cooper's hawk from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-37: Impacts of the Project on Golden Eagle and Ferruginous Hawk

The methods for the analysis of effects on golden eagle and ferruginous hawk appear in Section 13.3.1.1, and information on the species' life histories and habitat suitability models are presented in the following species accounts in Appendix 13B: Section 13B.69, *Golden Eagle*, and Section 13B.73, *Ferruginous Hawk*.

All Project Alternatives

Construction

The construction of all project alternatives would affect modeled foraging habitat for golden eagle and ferruginous hawk. Moreover, the same habitat is also suitable to support other wintering raptors (e.g., red-tailed hawk, merlin). Effects on golden eagle and ferruginous hawk would include the permanent and temporary loss of habitat and the potential for injury, mortality, and the disruption of normal behaviors. The loss of foraging habitat for golden eagle, ferruginous hawk, and other wintering raptors would primarily occur as a result of the construction of the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the placement of RTM (all alternatives; Appendix 13C). Habitat loss from the construction of the levee improvements and new roads or road improvements would remove relatively narrow slivers of grassland and cultivated lands that are less likely to be used by these species. Acres of permanent and temporary impacts on modeled habitat for golden eagle, ferruginous hawk, and other wintering raptors are shown in Table 13-78. Environmental Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-78. Impacts on Modeled Foraging Habitat for Golden Eagle, Ferruginous Hawk, and Other Wintering Raptors by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	2,311.30	258.57	2,569.87
2a	2,503.07	286.79	2,789.86
2b	2,074.76	278.45	2,353.21
2c	2,196.98	285.27	2,482.25
3	2,114.40	236.80	2,351.20

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
4a	2,374.06	239.75	2,613.81
4b	1,839.53	231.33	2,070.86
4c	2,000.18	238.16	2,238.34
5	1,381.89	115.31	1,497.20

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities are not expected to injure or kill foraging raptors because they are highly mobile and would avoid direct injury or mortality from slow-moving or stationary construction equipment. Construction-related noise and night lighting may have the potential to affect the behavior of golden eagle or ferruginous hawk and cause them to avoid areas of disturbance. All lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in the levels of light, however, these types of light generate an ambient nighttime luminescence that is visible from a distance. Construction activities could result in dust and the discharge of construction-related fluids, which could also affect golden eagle and ferruginous hawk individuals and their habitat if present in or adjacent to work areas. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting these species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

Ferruginous hawks do not breed in the study area (Polite and Pratt 1999:2) but there are records of golden eagle territories and nests in the southwestern portion of the study area (Wiens pers. comm.). Removal of nests during the breeding season and construction disturbance within 2 miles of occupied golden eagle nests (U.S. Fish and Wildlife Service 2020b:1), could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment.

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on foraging habitat and the disruption of normal behaviors of for golden eagle and ferruginous hawk and the potential for injury or mortality of golden eagle if nests are present within the vicinity of work areas. Geotechnical investigations that would occur in the West Tracy Fault Study area, and over the tunnel alignment footprints which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on modeled habitat (Appendix 13C). The Bethany Fault Study geotechnical investigations

(Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1-day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the potential disruption of normal behaviors of golden eagle and ferruginous hawk if present in the vicinity, as discussed above for conveyance facility construction. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area may cause some disturbance to foraging golden eagles and ferruginous hawks and could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment if surveys are conducted in the vicinity of occupied nests. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting these species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

Operations

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions (Chapter 24, Section 24.4.3.2). If permanent facility lighting associated with project facilities under all alternatives extends into golden eagle nesting territories, it could affect the behavior of individuals, as described above under construction-related effects; however, as stated in Chapter 3, Section 3.4.12, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, and therefore permanent facilities would remain dark the majority of the time at night, which would minimize the potential for this impact.

Power for construction and operation of the conveyance facilities has been designed to use existing power lines and underground conduit to the extent feasible under all project alternatives. Most new project lines would be placed on existing poles and towers and therefore would not substantially alter the existing landscape. New aboveground high-voltage transmission and SCADA lines would be constructed to power the Southern Complex under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c and the Bethany Complex under Alternative 5 (Chapter 3, Figure 3-13 and Figure 3-14). Eagles, like other raptors, are categorized as thermal soarers with low wing loading and low wing aspect ratio (Bevanger 1998:69) and raptors, including eagles and ferruginous hawks are less susceptible to collision than other avian species (Avian Power Line Interaction Committee 2018:8). As aerial hunters, raptors such as golden eagles and ferruginous hawks have good vision and are highly maneuverable, and their depth perception used to pursue prey also makes them less vulnerable to power line collisions (Avian Power Line Interaction Committee 2018:8; Slater et al. 2020:198). In addition, large transmission lines, such as the proposed project lines pose a minimal risk of collision to golden eagles and ferruginous hawk, because the lines are large and relatively visible to the species (Avian Power Line Interaction Committee 2018:5). Most electrocutions of eagles and other raptors, including ferruginous hawks, occur at low voltage distribution lines because of the small spacing between uninsulated energized components (Slater et al. 2020:198; Mojica et al. 2018:3; Avian Power Line Interaction Committee 2018:5). Large transmission lines such as the proposed project lines pose essentially no electrocution risk because of the inherently large spacing required between the electrified components (Avian Power Line Interaction Committee 2018:5). Golden eagles have been recorded nesting in similar transmission towers over multiple years in the vicinity of the Bethany Reservoir (Wiens pers. comm.).

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives would result in periodic disturbances within and adjacent to ferruginous hawk and golden eagle foraging habitat and potential golden eagle nesting territories. Maintenance activities across all facilities that could affect ferruginous hawk and golden eagle (all alternatives) include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle. Maintenance activities at launch, reception, and maintenance shafts along the central alignment (Alternatives 1, 2a, 2b, and 2c), eastern alignment (Alternatives 3, 4a, 4b, and 4c), and Bethany Reservoir alignment alternative (Alternative 5) would include similar semiannual general and ground maintenance in addition to daily inspections by vehicle. Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would also include annual embankment repair and quarterly animal burrow filling. These maintenance activities could result in disturbances to ferruginous hawk (wintering season) and golden eagle (breeding or wintering season). Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting. Noise effects from maintenance activities could negatively affect ferruginous hawk and golden eagle, as described above under construction-related effects.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives would result in impacts on golden eagle and ferruginous hawk through the permanent and temporary loss of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors. The temporary impacts on habitat and potential impacts of injury, mortality, or disruption of normal behaviors from project construction, operations, and maintenance activities would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B); however, even with these commitments, the impacts of the project alternatives on golden eagle (nesting and wintering), ferruginous hawk, and other wintering raptors would be significant. The CMP would be required to offset the loss of habitat by creating and protecting grassland habitat (Appendix 3F, Section 3F.3.3) on Bouldin Island and the I-5 ponds and from the protection of agricultural foraging habitat for sandhill crane, Swainson's hawk, and tricolored blackbird (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*), which would mitigate the loss of golden eagle and ferruginous hawk winter foraging habitat to a less-than-significant level. The purchasing of conservation credits for California red-legged frog and California tiger salamander at a USFWS- and CDFW-approved mitigation bank or other approved conservation areas (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3, CMP-13: *California Tiger Salamander Habitat* and CMP-14: *California Red-Legged Frog Habitat*) would contain upland grasslands also potentially suitable for golden eagle and ferruginous hawk.

Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18); NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; BIO-2c: *Electrical Power Line Support Placement*; and BIO-37: *Conduct Surveys for Golden Eagle and Avoid Disturbance of Occupied Nests* would be required to avoid and minimize disturbance of habitat and avoid take of golden eagle, as defined by Section 86 of Fish and Game Code and would avoid and minimize the potential for injury, mortality, or the disruption of normal behaviors and disturbances to habitat for ferruginous hawk. The impacts on ferruginous hawk and golden eagle from the project alternatives would be less than significant with mitigation because the aforementioned measures would replace lost habitat, reduce direct effects on the species, including habitat, noise, and visual disturbances, by providing environmental awareness training to construction personnel, by implementing protective measures during maintenance activities, and avoidance measures to avoid take of golden eagles, as defined by Section 86 of the California Fish and Game Code during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) would offset the loss of golden eagle and ferruginous hawk habitat by creating and protecting grasslands on Bouldin Island and the I-5 ponds (Appendix 3F, Section 3F.3.3.2). The protection and management of agricultural foraging habitat for sandhill crane, Swainson's hawk, and tricolored blackbird may also provide suitable habitat for these species (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-18b: *Sandhill Crane Foraging Habitat,* CMP-19b: *Swainson's Hawk Foraging Habitat,* CMP-22b: *Tricolored Blackbird Foraging Habitat*). The purchasing of conservation credits for California red-legged frog and California tiger salamander at a USFWS- and CDFW-approved mitigation bank or other approved conservation areas (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3, CMP-13: *California Tiger Salamander Habitat,* and CMP-14: *California Red-Legged Frog Habitat*) would contain upland grasslands also potentially suitable for golden eagle and ferruginous hawk.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-37: Conduct Surveys for Golden Eagle and Avoid Disturbance of Occupied Nests

All Project Alternatives

The following measures will be required to avoid disturbance of occupied golden eagle nests.

1. Prior to the start of construction, DWR will require qualified wildlife biologists (experienced with raptor identification and behaviors) to conduct focused surveys for golden eagle nests in suitable habitat within a 2-mile radius of the construction footprint. Survey methods and survey area boundaries will be determined based on coordination with USFWS and CDFW and all survey results will be submitted to USFWS and CDFW. In addition, prior to conducting surveys, any known breeding area records will be reviewed, and a map of potential nest sites will be created using GIS mapping of suitable nesting habitat.
2. If an occupied golden eagle nest is identified in the survey area, a no-disturbance buffer will be established around the nest site to avoid disturbance or destruction of the site, consistent with the *USFWS Recommended Buffer Zones for Ground-based Human Activities around Nesting Sites of Golden Eagles in California and Nevada* (U.S. Fish and Wildlife Service 2020b:1), or more recent USFWS-approved guidance, if it becomes available. If active eagle nests are identified and avoidance guidelines cannot be feasibly implemented, then DWR will coordinate with the USFWS and CDFW to determine how to implement the project and avoid take.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands as well as habitat for special-status species under the project's CMP would affect golden eagle and ferruginous hawk foraging habitat through the permanent and temporary loss of habitat (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which could support suitable foraging habitat for golden eagle and ferruginous hawk and could result in disturbances to these species including the disruption of foraging behaviors if the birds were present in the area. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain habitat for golden eagle and ferruginous hawk and management activities could affect this habitat and result in the disruption of foraging behaviors if the birds were present in the area. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of nesting habitat from habitat creation by adjusting the overall commitment of riparian and wetland creation and grassland and cultivated lands protection (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-3, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The creation and enhancement activities are not expected to injure or kill golden eagle individuals because the potential for birds to occur in restoration areas is very low. In addition, if a bird forages in a region where restoration activities are occurring, the bird would be expected to avoid the slow-moving or stationary equipment. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would minimize disturbance of habitat and avoid take of golden eagle, as defined by Section 86 of Fish and Game Code and would reduce the potential for injury, mortality, or the disruption of normal behaviors and disturbances to habitat for ferruginous hawk to less than significant. These impacts would be less than significant because the aforementioned environmental commitments would (1) train construction staff on protecting these species, the requirements for avoiding impacts, and the ramifications for not following these measures, (2) minimize dust; (3) implement spill prevention and containment plans that would avoid material spills that could affect habitat; and (4) have a biological monitor present that would ensure that all protective measures are being implemented where applicable. The impact on golden eagle and ferruginous hawk from the project with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, the use of heavy equipment, pile driving, or pesticides that would have the potential to expose golden eagle and ferruginous hawk to excessive noise, visual disturbance, dust, and hazardous materials that could cause loss of modeled habitat, disruption of normal behaviors, and injury or mortality. The mitigation measures with potential to result in impacts on golden eagle and ferruginous hawk are similar to those discussed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. Impacts on golden eagle and ferruginous hawk resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to golden eagle and ferruginous hawk impacts of the project alternatives.

The impacts of habitat loss, noise, visual disturbance, and exposure to dust or hazardous materials on golden eagle and ferruginous hawk would be reduced through the CMP, environmental commitments, and Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan* as detailed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-37: *Conduct Surveys for Golden Eagle and Avoid Disturbance of Occupied Nests* would require species-specific measures to reduce these impacts. Therefore, impacts on golden eagle and ferruginous hawk from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on golden eagle and ferruginous hawk from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-38: Impacts of the Project on Ground-Nesting Grassland Birds

The methods for the analysis of effects on ground-nesting grassland birds appear in Section 13.3.1.1, and information on the species' life histories and habitat suitability models are presented in the following species accounts in Appendix 13B: Section 13B.70, *Northern Harrier*, Section 13B.75, *Short-Eared Owl*, Section 13B.78, *California Horned Lark*, and Section 13B.80, *Grasshopper Sparrow*.

All Project Alternatives

Construction

The construction of all project alternatives would affect modeled nesting habitat for northern harrier, short-eared owl, California horned lark, and grasshopper sparrow. Construction-related effects would include the permanent and temporary loss of habitat and potential injury and mortality of individual birds and eggs, as well as nest abandonment. Temporarily disturbed areas may be susceptible to increased cover of tall invasive weeds, which would reduce the herbaceous ground cover preferred for nesting by grasshopper sparrow and California horned lark (Unitt 2008:396; Vickery 2020).

The loss of nesting habitat for northern harrier, short-eared owl, California horned lark, and grasshopper sparrow would primarily occur as a result of the construction of the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the placement of RTM and associated conveyor features at the Twin Cities Complex (all project alternatives), on Bouldin Island (Alternatives 1, 2a, 2b, 2c), and on Lower Roberts Island (Alternatives 3, 4a, 4b, 4c, and 5; Appendix 13C). Habitat loss from the construction of the levee improvements and new roads or road improvements would also remove relatively narrow slivers of grassland habitat, which are unlikely to be used by short-eared owl or northern harrier (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5) largely because of levee improvements on Bouldin Island (Appendix 13C). Construction of the Bethany Complex and associated access roads (Alternative 5) would also remove modeled habitat for these species. Acres of permanent and temporary impacts on modeled habitat for northern harrier and short-eared owl are shown in Table 13-79; impacts on modeled habitat for California horned lark and grasshopper sparrow are shown in Table 13-80. Environmental Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-79. Impacts on Modeled Nesting and Foraging Habitat for Northern Harrier and Short-Eared Owl by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	2,007.30	198.40	2,205.70
2a	2,175.28	215.90	2,391.18
2b	1,784.06	211.54	1,995.60
2c	1,898.76	217.77	2,116.53
3	2,020.17	204.26	2,224.43
4a	2,248.36	203.81	2,452.17
4b	1,750.89	199.36	1,950.25
4c	1,904.04	205.60	2,109.64
5	1,322.66	87.64	1,410.30

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Table 13-80. Impacts on Modeled Habitat for California Horned Lark and Grasshopper Sparrow by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	2,311.30	258.57	2,569.87
2a	2,503.07	286.79	2,789.86
2b	2,074.76	278.45	2,353.21
2c	2,196.98	285.27	2,482.25
3	2,114.40	236.80	2,351.20
4a	2,374.06	239.75	2,613.81
4b	1,839.53	231.33	2,070.86
4c	2,000.18	238.16	2,238.34
5	1,381.89	115.31	1,497.20

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Grasshopper sparrows and short-eared owl are considered rare breeders in the study area (Unitt 2008:395; Roberson 2008:244) but northern harrier and California horned lark have a high potential to occur within or adjacent to work areas. Ground disturbance (e.g., grubbing during site preparation) in suitable habitat for these ground-nesting species could crush eggs or kill nestlings in active nests. Construction-generated noise and vibration near active nests could cause adults to abandon eggs or recently hatched young if they perceive such disturbances as a threat. Construction activities are not expected to injure or kill foraging or nonbreeding adults or fledged juveniles who are no longer dependent on adults because individuals are mobile and would avoid direct injury or mortality from slow-moving or stationary construction equipment. Night lighting may have the potential to affect the behavior of nesting individuals, as studies show that birds are attracted to artificial lights, which may disrupt their behavioral patterns or cause collision-related fatalities (Gauthreaux and Belser 2006:67–86). All lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in the levels of light, however, these types of light generate an ambient nighttime luminescence that is visible from a distance. Effects of construction-related light would be greater at the intakes where existing conditions are dark and rural in comparison with the Twin Cities Complex, Southern Complex, and Bethany Complex where there are existing sources of light that may illuminate suitable habitat. Construction activities could result in dust and the discharge of construction-related fluids, which could also affect these species and their habitat if present in or adjacent to work areas. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting these species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

Grasshopper sparrow and short-eared owl are considered rare breeders in the study area (Unitt 2008:395; Roberson 2008:244), but northern harrier and California horned lark have a high potential to occur within or adjacent to work areas. There are no known CNDDB occurrences of grasshopper sparrow, short-eared owl, or California horned lark in the vicinity of project facilities (California Department of Fish and Wildlife 2020a), but there are known occurrences of northern harrier nesting throughout the study area, including two occurrences in the vicinity of the Southern Complex and two occurrences in the vicinity of the Bethany Complex (California Department of Water Resources 2011).

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of grassland birds. Geotechnical investigations that would occur in the West Tracy Fault Study area, and over the tunnel alignment footprints which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on modeled habitat (Appendix 13C). The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1-day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the potential for injury, mortality, and disruption of normal behaviors of grassland-nesting birds if present in the vicinity, as discussed above for conveyance facility construction. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area may also cause disturbance to nesting individuals, as described above under construction-related effects. Environmental Commitments EC-1: Conduct W*orker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting these species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

Operations

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions (Chapter 24, Section 24.4.3.2). Permanent facility lighting associated with project facilities under all alternatives could extend into suitable habitat for grassland birds, which could affect the behavior of individuals, as described above under construction-related effects; however, as stated in Chapter 3, Section 3.4.12, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, and therefore permanent facilities would remain dark the majority of the time at night, which would minimize the potential for this impact.

Power for construction and operation of the conveyance facilities has been designed to use existing power lines and underground conduit to the extent feasible. Most new project lines would be placed on existing poles and towers and therefore would not substantially alter the existing landscape. However, new aboveground high-voltage transmission and SCADA lines would be constructed to power the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex under Alternative 5 (Chapter 3, Figure 3-13 and Figure 3-14). The potential for collisions with new project lines varies by species and depends primarily on its level of exposure (or proximity of the bird's habitat and resources to the transmission line) and its sensitivity (morphological and behavioral characteristics that influence the bird's propensity to collide with a line). California horned lark form large flocks in the winter (Green 2008:1), making them more vulnerable than species such as the grasshopper sparrow who may form small, breeding groups of 3 to 12 pairs, but do not flock in winter or summer (Dobkin and Granholm 2008:2). Short-eared owl and northern harrier tend to forage on the wing at elevations below the height of the proposed project transmission lines (Polite 2005:1, 2008:1) and would therefore be at a lower risk of collision with project lines. Transmission line towers also provide perching substrate for raptors, which are predators to California horned lark and grasshopper sparrow. The existing network of transmission lines in the study area currently poses these risks and any incremental risk associated with the new power line corridors would be expected to be low.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in periodic disturbances that could affect grassland birds. Maintenance activities across all facilities that could cause impacts (all alternatives) include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle. Maintenance activities at launch, reception, and maintenance shafts along the central alignment (Alternatives 1, 2a, 2b, and 2c), eastern alignment (Alternatives 3, 4a, 4b, and 4c), and Bethany Reservoir alignment (Alternative 5) would include similar semiannual general and ground maintenance in addition to daily inspections by vehicle. Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would also include annual embankment repair and quarterly animal burrow filling. If these activities take place during the breeding season (February 1 through August 31), they could disrupt foraging and nesting behaviors and result in potential injury and mortality of individuals. Herbicide application could reduce the functions of foraging habitat and result in direct mortality of individuals if present. Adults and fledged young would be expected to avoid slow-moving maintenance equipment and therefore there would be a low probability of vehicle strikes of nonbreeding birds. Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting. Noise effects from maintenance activities could negatively affect breeding birds, as described above under construction-related effects.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives would result in impacts on ground-nesting grassland birds (northern harrier, short-eared owl, California horned lark, and grasshopper sparrow) through the permanent and temporary loss of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors.

The temporary impacts on habitat and potential impacts of injury, mortality, or disruption of normal behaviors from project construction, operations, and maintenance activities would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B); however, even with these commitments, the impacts of the project alternatives on northern harrier, short-eared owl, California horned lark, and grasshopper sparrow would be significant. The CMP would be required to offset the loss of habitat by creating and protecting grassland habitat (Appendix 3F, Section 3F.3.3) on Bouldin Island and the I-5 ponds and from the protection of agricultural foraging habitat for sandhill cranes, Swainson's hawk, and tricolored blackbird (Appendix 3F, Attachment 3F.1, Table 3F.1-3), which would mitigate the loss of habitat for northern harrier, short-eared owl, California horned lark, and grasshopper sparrow to a less-than-significant level.

Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18); NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; BIO-2c: *Electrical Power Line Support Placement*; and BIO-36a: *Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors*, would be required to avoid and minimize the potential for injury, mortality, or the disruption of normal behaviors and disturbances to habitat. The impacts on northern harrier, short-eared owl, California horned lark, and grasshopper sparrow from the project alternatives would be less than significant with mitigation because the aforementioned measures would reduce direct effects on the species, including habitat, noise, and visual disturbances, by providing environmental awareness training to construction personnel, by implementing protective measures during maintenance activities, and avoidance measures for nesting birds during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) would offset the loss of habitat for northern harrier, short-eared owl, California horned lark, and grasshopper sparrow by creating and protecting grasslands on Bouldin Island and the I-5 ponds (Appendix 3F, Section 3F.3.3.2) and through the protection and management of agricultural foraging habitat for sandhill crane, Swainson's hawk, and tricolored blackbird (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-18b: *Sandhill Crane Foraging Habitat,* CMP-19b: *Swainson's Hawk Foraging Habitat,* CMP-22b: *Tricolored Blackbird Foraging Habitat*). The creation and protection of wetlands and riparian natural communities would also provide suitable habitat for northern harrier and short-eared owl (Appendix 3F, Section 3F.3.3.1).

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-36a: Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors

See description of Mitigation Measure BIO-36a under Impact BIO-36.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands as well as habitat for special-status species under the project's CMP would affect northern harrier, short-eared owl, California horned lark, and grasshopper sparrow through the permanent and temporary loss of habitat (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which could support suitable habitat for northern harrier, short-eared owl, California horned lark, and grasshopper sparrow and could result in the disruption of normal behaviors, injury, or mortality of individuals. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain suitable habitat for northern harrier, short-eared owl, California horned lark, and grasshopper sparrow and management activities could affect this habitat and result in the disruption of normal behaviors, injury, or mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of nesting habitat from habitat creation by adjusting the overall commitment of riparian and wetland creation and grassland and cultivated lands protection (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-3, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The creation and enhancement activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals if restoration activities occur during the breeding season (February 1 through August 31), as described above under construction-related effects. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); and Mitigation Measure BIO-36a: *Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors* would reduce the potential for injury, mortality, and the disruption of normal behaviors of individuals to less than significant. These impacts would be less than significant with mitigation because the aforementioned measures would (1) train construction staff on protecting nesting birds, the requirements for avoiding impacts, and the ramifications for not following these measures; (2) minimize dust; (3) implement spill prevention and containment plans that would avoid material spills that could affect habitat; (4) prior to and during implementing restoration and enhancement ground disturbance, establish protective buffers around occupied nest sites; and (5) have a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented where applicable. The impact on ground-nesting grassland birds (northern harrier, short-eared owl, California horned lark, and grasshopper sparrow) from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, the use of heavy equipment, pile driving, or pesticides that would have the potential to expose ground-nesting grassland birds such as northern harrier, short-eared owl, California horned lark, and grasshopper sparrow to excessive noise, visual disturbance, dust, and hazardous materials that could cause loss of modeled habitat, disruption of normal behaviors, and injury or mortality. The mitigation measures with potential to result in impacts on northern harrier, short-eared owl, California horned lark, and grasshopper sparrow are similar to those discussed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. Impacts on northern harrier, short-eared owl, California horned lark, and grasshopper sparrow resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to northern harrier, short-eared owl, California horned lark, and grasshopper sparrow impacts of the project alternatives.

The impacts of habitat loss, noise, visual disturbance, and exposure to dust or hazardous materials on northern harrier, short-eared owl, California horned lark, and grasshopper sparrow would be reduced through the CMP, environmental commitments, and Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan* as detailed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-36a: *Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors* would require species-specific measures to reduce these impacts. Therefore, impacts on northern harrier, short-eared owl, California horned lark, and grasshopper sparrow from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on northern harrier, short-eared owl, California horned lark, and grasshopper sparrow from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-39: Impacts of the Project on Swainson's Hawk

The methods for the analysis of effects on Swainson's hawk appear in Section 13.3.1.1, and information on the species life history and habitat suitability model are presented in the species account in Appendix 13B, Section 13B.72, *Swainson's Hawk*.

All Project Alternatives

Construction

Construction-related effects on Swainson's hawk from all project alternatives would include the permanent and temporary loss of modeled nesting and foraging habitat, and the potential for injury, mortality, and the disruption of normal behaviors. The loss of Swainson's hawk modeled nesting habitat would primarily occur as a result of levee improvements, new roads and road improvements, and construction of the intakes (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled nesting habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment.

Because the availability of foraging habitat has been closely tied to the breeding success of this species, projects that would significantly modify suitable Swainson's hawk foraging habitat are considered to have potential to significantly affect this species (California Department of Fish and Game 1994:7). The loss of Swainson's hawk modeled foraging habitat would occur primarily as a result of the construction of the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the placement of RTM (all alternatives; Appendix 13C). Habitat loss from the construction of the intakes, levee improvements, and new roads or road improvements under all alternatives would remove relatively narrow slivers of grassland and cultivated lands that are less likely to be used for foraging by the species. Acres of permanent and temporary impacts on modeled habitat for Swainson's hawk are shown in Table 13-81. Environmental Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-81. Impacts on Modeled Nesting and Foraging Habitat for Swainson's Hawk by Alternative

Alternative	Permanent Impacts—Nesting (acres) [a]	Permanent Impacts—Foraging (acres) [a]	Temporary Impacts—Nesting (acres)	Temporary Impacts—Foraging (acres)	Total (acres)
1	16.92	2,774.68	9.23	304.40	3,105.23
2a	17.29	3,071.09	11.38	332.68	3,432.44
2b	12.24	2,463.89	10.48	325.09	2,811.70
2c	14.40	2,627.08	10.88	333.10	2,985.46
3	15.21	2,539.11	8.40	249.48	2,812.20
4a	17.39	2,878.41	9.04	250.49	3,155.33
4b	12.34	2,221.57	8.15	242.93	2,484.99

Alternative	Permanent Impacts—Nesting (acres) [a]	Permanent Impacts—Foraging (acres) [a]	Temporary Impacts—Nesting (acres)	Temporary Impacts—Foraging (acres)	Total (acres)
4c	14.50	2,405.92	8.55	250.90	2,679.87
5	17.33	1,643.98	7.82	141.23	1,810.36

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

The losses of modeled nesting habitat and potential for injury and mortality would result from vegetation removal in advance of grading and excavation for the construction of project infrastructure. Removal of nests during the breeding season and construction disturbance within 0.25 mile of occupied Swainson's hawk nests could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Swainson's hawks tend not to be vulnerable to construction disturbance and often construct nests near existing construction sites or other human-disturbance areas. Construction activities have a sliding scale of risk to nesting Swainson's hawks, from high to low: physical contact with the nest tree, activities that occur close to the nest at nest height or above, human activity close to the nest tree, and mechanical activity close to the nest tree. In general, as the distance between the nest and activity increases, risk to nesting success declines (Swainson's Hawk Technical Advisory Committee 2000:5). Swainson's hawks in the Delta often nest adjacent to active farm operations and are not very sensitive to loud construction noise or equipment. In rare instances, Swainson's hawk pairs have shown themselves to be particularly sensitive to humans close to their nests but are less affected by mechanical disturbances (Swainson's Hawk Technical Advisory Committee 2000:5).

Foraging Swainson's hawks are highly mobile and would avoid direct injury or mortality from slow-moving or stationary construction equipment. Furthermore, Swainson's hawks frequently forage in the vicinity of operating farm equipment, therefore the presence of construction equipment and its associated noise is not expected to disrupt Swainson's hawk foraging behavior. Night lighting may have the potential to affect the behavior of Swainson's hawk; however, all lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in the levels of light, however, these types of light generate an ambient nighttime luminescence that is visible from a distance. Effects of construction-related light would be greater at the intakes where existing conditions are dark and rural in comparison with the Twin Cities Complex, Southern Complex, and Bethany Complex, where there are existing sources of light that may illuminate suitable habitat. Construction activities could result in dust and the discharge of construction-related fluids, which could affect individuals and their habitat if present in or adjacent to work areas. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting the species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

There are up to 36 known occurrences of nesting Swainson's hawk within the construction footprint for the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c), up to 37 occurrences of nesting Swainson's hawk within the construction footprint for the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c), and up to 31 occurrences of nesting Swainson's hawk for the Bethany Reservoir alignment alternative (Alternative 5) (California Department of Fish and Wildlife 2020a; California Department of Water Resources 2011). However, Swainson's hawk nests are ubiquitous throughout the study area.

Field investigations would be conducted prior to and during construction under all alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of Swainson's hawk. Geotechnical investigations associated with the tunnels for all alternatives, which include CPTs, and soil borings, would result in impacts on modeled habitat (Appendix 13C). The West Tracy Fault investigations would not affect modeled nesting habitat, but they would occur within modeled Swainson's hawk foraging habitat. The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1-day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the potential for injury, mortality, and disruption of normal behaviors of Swainson's hawk if present in the vicinity, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting the species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area and pile installation test methods at the north Delta intakes may cause disturbance to nesting Swainson's hawks.

Operations

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions (Chapter 24, Section 24.4.3.2). The periodic presence of staff and vehicle traffic at project facilities would not be expected to significantly alter the behavior of Swainson's hawk because they are known to nest and forage in areas of disturbance, as described above under construction-related effects. Permanent facility lighting associated with project facilities under all alternatives could extend into Swainson's hawk nesting and foraging habitat, which could affect the behavior of individuals, as described above under construction-related effects; however, as stated in Chapter 3, Section 3.4.12, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, and therefore permanent facilities would remain dark the majority of the time at night, which would minimize the potential for this impact.

Power for construction and operation of the conveyance facilities has been designed to use existing power lines and underground conduit to the extent feasible under all alternatives. Most new project lines would be placed on existing poles and towers and therefore would not substantially alter the existing landscape. However, new aboveground high-voltage transmission and SCADA lines would be constructed to power the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and Bethany Complex under Alternative 5 (Chapter 3, Figure 3-13 and Figure 3-14). Although Swainson's hawks hunt within the range of heights proposed for the new transmission lines, their keen vision and high maneuverability substantially reduce power line collision risk for the species. Like other diurnal raptors, Swainson's hawks have highly developed eyesight (Potier et al. 2020:8; Mitkus et al. 2018:1), allowing them to detect small prey while hunting from relatively high altitudes. The keen eyesight of raptors, including Swainson's hawks, also allows detection and avoidance of other aerial objects, including aboveground utility lines (Slater et al. 2020:198). Like many other Falconiformes, Swainson's hawk has a long, narrow, tapered wings and body size that allow for efficient soaring flight and highly developed aerial maneuverability (Bevanger 1998:69, Bechard et al. 2020). In addition, Swainson's hawks are less active during inclement weather and are not typically observed in flight during rainy or foggy conditions (Fitzner 1980:30). The species' general maneuverability, its keen eyesight, and fair-weather flight behavior make it a low relative risk for power line collision mortality. Raptors are subject to electrocution from powerlines; however, most electrocutions of raptors occur at low voltage distribution lines because of the small spacing between uninsulated energized components (Slater et al. 2020:198). Large transmission lines, such as the proposed project lines pose minimal electrocution risk to raptors, including Swainson's hawks because of the inherently large spacing required between the electrified components (Slater et al. 2020:198).

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives would result in periodic disturbances within and adjacent to Swainson's hawk nesting and foraging habitat. Maintenance activities at the north Delta intakes (all alternatives) would include semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), annual sediment and debris removal at intakes, and periodic maintenance of the intake gates and associated structures approximately every 1 to 5 years. Maintenance activities at launch, reception, and maintenance shafts along the central (Alternatives 1, 2a, 2b, and 2c), eastern (Alternatives 3, 4a, 4b, and 4c), and Bethany Reservoir (Alternative 5) alignments would include similar semiannual general and ground maintenance in addition to daily inspections by vehicle. Existing access roads in the vicinity of the intakes and shafts would be repaved every 15 years, which could cause noise and visual disturbances to individuals if active nests were present within work areas.

Large equipment or cranes required for maintenance of the intakes (all alternatives), Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), or Bethany Complex (Alternative 5) or any vegetation management that involves tree-trimming or tree removal could disrupt nesting behaviors or result in potential injury or mortality of individuals. Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting. Residual noise or visual disturbance from maintenance activities at water conveyance facilities under all alternatives is not expected to substantially affect Swainson's hawk because they are known to nest and forage in areas of disturbance, as described above under construction-related effects.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives would result in impacts on Swainson's hawk through the permanent and temporary loss of modeled habitat of a special-status species and the potential for injury, mortality, and the disruption of normal behaviors. Loss of Swainson's hawk eggs or nests, any activities resulting in nest abandonment, would be considered a significant impact. The temporary impacts on habitat and potential impacts of injury, mortality, or disruption of normal behaviors from project construction, operations, and maintenance, including the loss of Swainson's hawk eggs or nests, any activities resulting in nest abandonment, would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B); however, even with these commitments, the impacts of the project alternatives on Swainson's hawk would be significant. The CMP would be required to offset the loss of nesting and foraging habitat by creating and protecting riparian, grassland, and agricultural foraging habitat (Appendix 3F, Section 3F.3.3.1, Section 3F.3.3.2, and Attachment 3F.1, Table 3F.1-3, CMP-19a: *Swainson's Hawk Nesting Habitat* and CMP-19b: *Swainson's Hawk Foraging Habitat*), which would mitigate the loss of nesting and foraging habitat to a less-than-significant level. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18); NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; BIO-2c: *Electrical Power Line Support Placement*; and BIO-39: *Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk* would be required to avoid and minimize the potential for injury, mortality, or the disruption of normal behaviors and disturbances to habitat. The impacts on Swainson's hawk from the project alternatives would be less than significant with mitigation because the aforementioned measures would replace lost habitat, reduce direct effects on the species, including habitat, noise, and visual disturbances, by providing environmental awareness training to construction personnel, by implementing protective measures during maintenance activities, and avoidance measures for nesting Swainson's hawk during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) would offset the loss of Swainson's hawk nesting habitat by creating and protecting riparian habitat (Appendix 3F, Section 3F.3.3.1, Attachment 3F.1, Table 3F.1-3, CMP-19a: *Swainson's Hawk Nesting Habitat*) and by compensating for the temporal loss of suitable Swainson's hawk nest sites, and for the loss of nest trees (Attachment 3F.1, Table 3F.1-3, CMP-19a: *Swainson's Hawk Nesting Habitat*). The CMP would offset the loss of Swainson's hawk foraging habitat through the protection and management of grassland and agricultural lands (Appendix 3F, Section 3F.3.3.2, and Attachment 3F.1, Table 3F.1-3, CMP-19b: *Swainson's Hawk Foraging Habitat*).

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-39: Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk

All Project Alternatives

The following measures will be required for activities occurring in suitable Swainson's hawk habitat.

1. <u>Preconstruction Surveys.</u> Preconstruction surveys will be conducted by a CDFW-approved biologist(s) to identify the presence of suitable Swainson's hawk nest trees and known nest trees (occupied within 1 or more of the past 5 years) within 0.5 mile of project sites. DWR will ensure that surveys for nesting Swainson's hawks are conducted in all suitable and known nest trees identified by the CDFW-approved biologist(s) and are consistent with the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee 2000), or methodology modified with written approval from CDFW. DWR will provide survey results to CDFW by phone or email no less than 5 days prior to commencement of construction activities, and in a written report within 30 days after commencement of construction activities. The CDFW-

approved biologist(s) will include the location of all known and occupied nest trees (occupied in 1 or more of the last 5 years) present within 0.5 mile of the construction footprint. A nest tree will be considered occupied from the time the Swainson's hawk pair starts constructing the nest until the young leave the nest, or until the CDFW-approved biologist(s) determine(s) the nesting attempt failed and the nest is abandoned.

2. <u>Timing Restrictions</u>. Where the construction site occurs within 0.5 mile of known or occupied nest trees identified by the CDFW-approved biologist(s), DWR will limit construction activities to outside the Swainson's hawk breeding season (March 1 through August 15), to the extent practicable. Where construction activities cannot be restricted to more than 0.5 mile of an occupied nest tree during the breeding season, DWR will restrict the construction activities to not occur during the period of egg laying until after young have fledged, as determined by the CDFW-approved biologist(s), to the extent practicable. If not practicable, DWR will initiate construction activities prior to egg laying to allow time for Swainson's hawk acclimate to disturbance before eggs are laid. Where restricting work to outside the breeding season or during the period of egg laying to post-fledging is not practicable, DWR will submit plans to initiate construction activities to CDFW for written approval.

3. <u>No-Disturbance Buffer</u>. Where construction activities must occur within 0.5 mile of an occupied Swainson's hawk nest tree, DWR will establish a 650-foot-radius no-activity buffer (buffer) around each occupied nest tree, and the buffer will remain in place until the end of the breeding season or until the last chick has left the nest. DWR will clearly delineate the buffer with fencing or other conspicuous marking. The CDFW-approved biologist(s) will monitor occupied nest trees to track progress of nesting activities (see *Swainson's Hawk Nest Monitoring*, below). DWR will not conduct any construction activities within the buffer unless a smaller buffer is approved in writing by CDFW. If a construction activity must occur within 0. 5 miles of an occupied nest tree, DWR will follow the conditions under *Swainson's Hawk Nest Monitoring* below. DWR will not conduct any construction activity within 150 feet of an occupied nest tree.

4. <u>Swainson's Hawk Nest Monitoring</u>. Where construction activities must occur within 0.5 mile of an occupied Swainson's hawk nest tree, DWR will implement the following monitoring plan. If a nesting bird monitoring and management plan is prepared by a CDFW-approved biologist, and approved in writing by CDFW, it will prevail where it differs from the measures below.

    a. Five days and three days prior to the initiation of construction at any site where an occupied nest is within 0.5 mile of construction, the CDFW-approved biologist will observe the subject nest(s) for at least one hour or until nest status can be determined. The CDFW-approved biologist(s) will document nesting status and behaviors to compare to nesting status and behaviors after construction begins. DWR will report the results of preconstruction monitoring to CDFW within 24 hours of each survey.

    b. Where an occupied nest tree occurs between 150 and 325 feet (46 to 99 meters) from construction activities, the CDFW-approved biologist will observe the nest for at least 4 hours per day during construction to ensure the Swainson's hawks are engaged in normal nesting behavior. DWR will limit construction to between 30 minutes after sunrise and 30 minutes before sunset.

c. Where an occupied nest tree occurs between 325 and 650 feet (99 to 198 meters) of construction, the CDFW-approved biologist(s) will observe the nest for at least 2 hours per day during construction to ensure the Swainson's hawk are engaged in normal nesting behavior.

d. Where an occupied nest tree occurs between 650 and 1,300 feet (198 to 396 meters) of construction, the CDFW-approved biologist(s) will observe the nest for at least one hour on at least three days per week during construction to ensure the Swainson's hawk are engaged in normal nesting behavior and to check the status of the nest.

e. Where an occupied nest tree occurs between 1,300 and 2,640 feet (396 to 805 meters) of construction, the CDFW-approved biologist(s) will observe the nest for at least one hour on at least one day per week during construction to ensure the Swainson's hawks are engaged in normal nesting behavior and to check the status of the nest.

5. Disturbance of Occupied Nest Tree. DWR will prohibit physical contact with an occupied nest tree throughout the breeding season (March 1 through August 15). All workers within 650 feet will be out of the line of sight of the occupied nest tree during breaks or will take breaks more than 650 feet from the occupied nest tree.

6. Authority of CDFW-Approved biologist(s). If, during construction, the CDFW-approved biologist(s) determine(s) that a nesting Swainson's hawk within 0.5 mile of the construction site is disturbed by construction activities to the point where nest abandonment is likely, the CDFW-approved biologist(s) will have the authority to immediately stop work and will immediately notify DWR. A designated representative from DWR will contact CDFW within 24 hours to determine additional protective measures to be implemented. The CDFW-approved biologist(s) will:

a. Stop construction until additional protective measures are implemented, unless Swainson's hawk behavior normalizes on its own. Potential nest abandonment and failure may be indicated if, in the CDFW-approved biologist(s)professional judgment, the Swainson's hawks exhibit distress and/or abnormal nesting behavior, such as swooping/ stooping at equipment or personnel, excessive distress-call vocalization or agitated behavior directed at personnel, failure to remain on nest, or failure to deliver prey items.

b. Continue monitoring and ensure additional protective measures remain in place until the CDFW-approved biologist(s) determine(s) Swainson's hawk behavior has normalized.

c. Determine if additional protective measures are ineffective and stop construction until the additional protective measures are modified.

d. Continue monitoring until determining that Swainson's hawk behavior has normalized.

e. The DWR representative or CDFW-approved biologist(s) will notify CDFW within 24 hours if nests or nestlings are abandoned and if the nestlings are still alive. The CDFW-approved biologist(s) will work with CDFW to determine appropriate actions.

7. Nest Tree Avoidance. DWR will avoid removal of known nest trees and suitable nest trees to the maximum extent practicable. If a known nest tree must be removed for construction activities, DWR will notify and obtain written approval from CDFW. The notification will include the location of the known nest tree, conditions to offset the loss of the nest tree, and

the time of removal, which will generally be October 1 through February 1. DWR will not remove any occupied nest tree until the last young have left the nest, as verified by the CDFW-approved biologist(s).

8. Geotechnical Exploration. DWR will conduct geotechnical exploration outside of the breeding season, to the extent practicable. The CDFW-approved biologist(s) will delineate with flagging or other visible markers suitable breeding habitat within the geotechnical exploration site. DWR will restrict geotechnical exploration to areas outside of the delineated breeding habitat. If geotechnical exploration must occur during the breeding season, the CDFW-approved biologist(s) will survey the breeding habitat within 0.5 mile for nesting Swainson's hawks. DWR will limit geotechnical exploration activities to least 0.5 mile away from any occupied nest tree, unless otherwise approved by CDFW.

9. Measures Specific to Transmission Line Construction. DWR will not use helicopters to string transmission lines or to conduct surveys for field investigations within 0.5 mile of an occupied nest tree. DWR will not remove or trim occupied nest trees for transmission line construction until after the breeding season has ended or the last young have left the nest. If removal or trimming of an occupied nest tree needs to occur for human or wildlife safety, DWR will conduct removal or trimming from October 1 to February 1 (outside of the breeding season), or with written approval and guidance from CDFW. DWR will avoid removal or trimming of known or suitable nest trees, to the extent practicable, during transmission line stringing and reconductoring activities or during power and pole placement. Where practicable, DWR will place poles and lines outside of breeding habitat, as delineated by the CDFW-approved biologist(s). DWR will follow the *Nest Tree Avoidance* measures listed above when removal or trimming of known or suitable nest trees cannot be avoided.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands as well as habitat for special-status species under the project's CMP would affect Swainson's hawk through the permanent and temporary loss of nesting and foraging habitat (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or grasslands are located, and could result in the temporary disturbance of existing Swainson's hawk foraging habitat. Foraging Swainson's hawks are highly mobile and would avoid direct injury or mortality from slow-moving or stationary construction equipment. Furthermore, Swainson's hawks frequently forage in the vicinity of operating farm equipment, therefore the presence of construction equipment and its associated noise is not expected to disrupt Swainson's hawk foraging behavior. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Conversion and management of agricultural lands would provide foraging habitat of equal or greater habitat value for Swainson's hawk and would maintain these lands in non-permanent crop types in perpetuity. Crop rotations, and related management activities would be conducted under a similar disturbance regime that the species would encounter under existing conditions. Grassland enhancement activities could also create temporary disturbances of the foraging habitat for the species. Nesting habitat creation could result in the disruption of normal behaviors, injury, or mortality if conducted adjacent to active nest sites. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of Swainson's hawk nesting and foraging habitat from habitat creation by adjusting the overall commitment of riparian creation (Appendix 3F, Section 3F.1, Section 3F.2.4, Attachment 3F.1, Table 3F.1-3, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The creation and enhancement activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals if they were to nest in the vicinity of restoration activities. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) and Mitigation Measure BIO-39: *Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk* would reduce the potential for injury, mortality, and the disruption of normal behaviors of individuals to less than significant. These impacts would be less than significant with mitigation because the aforementioned measures would (1) train construction staff on protecting Swainson's hawks and their nests, the requirements for avoiding impacts, and the ramifications for not following these measures; (2) minimize dust; (3) implement spill prevention and containment plans that would avoid material spills that could affect habitat; (4) prior to and during implementing restoration and enhancement ground disturbance, establish protective buffers around occupied nest sites; and (5) have a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented where applicable. The impact on Swainson's hawk from the project with the CMP would be less than significant with mitigation.

<u>Other Mitigation Measures</u>

Some mitigation measures would involve ground disturbance, the use of heavy equipment, pile driving, or pesticides that would have the potential to expose Swainson's hawk to excessive noise, visual disturbance, dust, and hazardous materials that could cause loss of modeled habitat, disruption of normal behaviors, and injury or mortality. The mitigation measures with potential to result in impacts on Swainson's hawk are similar to those discussed under Impact BIO-31: *Impacts* *of the Project on Western Yellow-Billed Cuckoo*. Impacts on Swainson's hawk resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to Swainson's hawk impacts of the project alternatives.

The impacts of habitat loss, noise, visual disturbance, and exposure to dust or hazardous materials on Swainson's hawk would be reduced through the CMP, environmental commitments, and Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan* as detailed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-39: *Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk* would require species-specific measures to reduce these impacts. Therefore, impacts on Swainson's hawk from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on Swainson's hawk from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-40: Impacts of the Project on Burrowing Owl

The methods for the analysis of effects on burrowing owl appear in Section 13.3.1.1, and information on the species life history and habitat suitability model are presented in the species account Appendix 13B, Section 13B.74, *Burrowing Owl*.

All Project Alternatives

Construction

The construction of all project alternatives would affect modeled habitat for burrowing owl. Construction-related effects would include the permanent and temporary loss of habitat, and the potential injury or mortality of individual owls and eggs, as well as nest abandonment. The loss of burrowing owl habitat would primarily occur as a result of construction of the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the placement of RTM conveyor and handling facilities at the Twin Cities Complex (all alternatives), on Bouldin Island (Alternatives 1, 2a, 2b, and 2c), and on Lower Roberts Island (Alternatives 3, 4a, 4b, 4c, and 5; Appendix 13C). The majority of these impacts would occur on cultivated lands, which provide low-value habitat for burrowing owl. High- and low-value habitat would also be affected by the construction of new transmission lines to power the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alternatives (Alternatives 3, 4a, 4b, and 4c) and Bethany Reservoir alignment alternative (Alternative 5) largely because of levee improvements on Bouldin Island, which would primarily affect high-value burrowing owl habitat. The Bethany Reservoir alternative (Alternative 5) would also result in impacts on both high- and low-value habitat from the construction of the Bethany Complex and associated access roads (Appendix 13C). Acres of permanent and temporary impacts on modeled habitat for burrowing owl are shown in Table 13-82. Environmental Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-82. Impacts on Modeled Habitat for Burrowing Owl by Alternative

Alternative	Permanent Impacts—High Value (acres) [a]	Permanent Impacts—Low Value (acres) [a]	Temporary Impacts—High Value (acres)	Temporary Impacts—Low Value (acres)	Total (acres)
1	983.62	2,154.09	183.77	212.90	3,534.38
2a	1,108.43	2,321.58	199.65	239.09	3,868.75
2b	873.79	1,917.47	196.69	233.19	3,221.14
2c	923.33	2,051.73	199.16	238.93	3,413.15
3	757.13	2,039.88	152.04	173.32	3,122.37
4a	898.11	2,255.59	153.69	173.90	3,481.29
4b	663.18	1,790.34	150.66	168.06	2,772.24
4c	713.00	1,945.46	153.14	173.77	2,985.37
5	519.41	1,263.62	60.87	117.32	1,961.22

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Ground disturbance and construction vehicles could injure or kill burrowing owls by crushing occupied burrows or collapsing burrow entrances, trapping any owls inside. Burrowing owls are moderately maneuverable and foraging owls outside of their burrows would be able to avoid direct injury or mortality from slow-moving or stationary construction equipment.

Although some burrowing owls in urban and agricultural landscapes appear relatively tolerant of human disturbance (Poulin et al. 2020), it is difficult to predict how and at what distance a given nesting pair would react to noise and vibration. Consequently, it is possible that construction-generated noise and vibration near nest burrows could cause adult owls to abandon eggs or recently hatched young, or cause wintering owls to abandon their burrows, leaving them vulnerable to predation. Increased noise from construction could also mask sounds made by prey, especially if the sounds are in the high frequency range (Scobie et al. 2016:84–85). Artificial sounds with low to mid frequencies may affect an owl's ability to attract a mate (males produce low frequency songs during mating season) or communicate warning calls to mates or young (Scobie et al. 2016:85). Increased cover of tall, invasive weeds in temporarily disturbed areas could reduce habitat suitability for burrowing owls because they prefer areas with short, sparse vegetation (California Department of Fish and Game 2012:20). Construction-related lighting could reduce prey availability to burrowing owls, as prey may remain closer to cover to avoid detection. Predation risk to burrowing owls could also increase due to artificial lighting, because they may be more visible to predators (Scobie et al. 2016:76). All lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in the levels of light, however, these types of light generate an ambient nighttime luminescence that is visible from a distance. Effects of construction-related light would be greater at the intakes where existing conditions are dark and rural in comparison with the Twin Cities Complex, Southern Complex, and Bethany Complex where there are existing sources of light that may illuminate suitable habitat. Construction activities could expose burrowing owl to dust if present in or adjacent to work areas and the discharge of construction-related fluids could also affect the species and its habitat. Environmental Commitments EC-1: *Conduct Worker Awareness*

Training; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting breeding and wintering burrowing owls, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

Two CNDDB occurrences for burrowing owl are located within proposed road improvement areas and a temporary rail right-of-way (occurrences #49 and #612, Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, 4c) just west of Clifton Court Forebay (California Department of Fish and Wildlife 2020a). One CNDDB occurrence overlaps with a subsurface SCADA fiber route alignment (occurrence #207, Alternative 5) and one CNDDB occurrence overlaps with the footprint of the Bethany Complex (occurrence #478, Alternative 5). Many other burrowing owl occurrences (California Department of Fish and Wildlife 2020a; California Department of Water Resources 2011) have been recorded in the vicinity of Southern Forebay and associated features (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and in the vicinity of the Bethany Complex and associated access roads under the Bethany Reservoir alignment (Alternative 5).

Field investigations would be conducted prior to and during construction under all alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of burrowing owl. Geotechnical investigations that would occur in the West Tracy Fault Study area, and over the tunnel alignment footprints which include test trenches, CPTs, soil borings, and geophysical arrays, would result in impacts on both high- and low-value modeled burrowing owl habitat (Appendix 13C). The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1-day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the potential for injury, mortality, and disruption of normal behaviors of burrowing owl if present in the vicinity, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*;

EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting wintering and breeding burrowing owls, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area and pile installation test methods at the north Delta intakes may also cause disturbance to burrowing owls, as described above under construction-related effects.

Operations

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions (Chapter 24, Section 24.4.3.2). Permanent facility lighting associated with project facilities under all alternatives could extend into burrowing owl habitat, which could affect the behavior of individuals, as described above under construction-related effects; however, as stated in Chapter 3, Section 3.4.12, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, and therefore permanent facilities would remain dark the majority of the time at night, which would minimize the potential for this impact. Burrowing owls are susceptible to vehicle collisions (Gervais et al. 2008:222) and the periodic presence of staff-related vehicle traffic would pose a risk of injury or mortality to individuals if vehicle speed were not restricted.

Power for construction and operation of the conveyance facilities has been designed to use existing power lines and underground conduit to the extent feasible under all project alternatives. Most new project lines would be placed on existing poles and towers and therefore would not substantially alter the existing landscape. However, new aboveground high-voltage transmission and SCADA lines would be constructed to power the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex under Alternative 5 (Chapter 3, Figure 3-13 and Figure 3-14). Burrowing owls forage throughout the day but are largely crepuscular, hunting mostly at dusk and dawn. Hunting in low light can be a risk factor for power line collision. However, owls have acute eyesight adapted to low-light conditions and a wide range of vision. In addition, the species feeds primarily on the ground where it catches insects by walking and hopping or catching from burrow mound or perch (Polite 1999:1). Burrowing owls may hunt vertebrates from both perch and by hovering low to the ground. Hunting typically occurs at about 33 feet above ground (Poulin et al. 2020), keeping the owl below the height of the proposed new project transmission lines. The species is large-bodied but with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively, the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk species for power line collision. Transmission line poles and towers also provide perching substrate for raptors, which are predators on burrowing owls. The existing network of transmission lines in the study area currently poses these risks and any incremental risk associated with the new power line corridors would not be expected to affect the study area population.

Current use and legacy pesticides have the potential to bioaccumulate in the food items of burrowing owls. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows and would not result in land-use changes that would increase use of pesticides, relative to existing conditions. Therefore, the project alternatives would not substantially reduce prey populations or increase pesticide exposure to burrowing owl.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in periodic disturbances that could affect burrowing owl. Maintenance activities across all facilities that could affect burrowing owl (all alternatives) include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle. Maintenance activities at launch, reception, and maintenance shafts along the central alignment (Alternatives 1, 2a, 2b, and 2c), eastern alignment (Alternatives 3, 4a, 4b, and 4c), and Bethany Reservoir alignment (Alternative 5) would include similar semiannual general and ground maintenance in addition to daily inspections by vehicle. Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would also include annual embankment repair and quarterly animal burrow filling. These maintenance activities could result in injury or mortality of burrowing owls if they are occupying burrows (during either the breeding or wintering season). Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting. Noise effects from maintenance activities could negatively affect burrowing owls, as described above under construction-related effects.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives would result in impacts on burrowing owl through the permanent and temporary loss of modeled habitat of a special-status species and the potential for injury, mortality, and the disruption of normal behaviors. For all project alternatives, changes in water operations would not be expected to result in a measurable increase in pesticide to burrowing owl.

The temporary impacts on habitat and potential impacts of injury, mortality, or disruption of normal behaviors from project construction, operations, and maintenance activities would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B); however, even with these commitments, the impacts of the project alternatives on burrowing owl would be significant. The CMP would be required to offset the loss of burrowing owl habitat by creating and protecting grassland habitat (Appendix 3F, Section 3F.3.3.2) on Bouldin Island and the I-5 ponds, through the protection and management of agricultural foraging habitat Swainson's hawk (Appendix 3F, Section 3F.3.3.2, and Attachment 3F.1, Table 3F.1-3, CMP-19b: *Swainson's Hawk Foraging Habitat*), and by mitigating for occupied burrowing owl habitat (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-20: *Occupied Burrowing Owl Habitat*), which would mitigate the loss of habitat to a less-than-significant level. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18); NOI-1: *Develop and Implement a Noise*

Control Plan (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; BIO-2c: *Electrical Power Line Support Placement*; BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife*; and BIO-40: *Conduct Surveys and Minimize Impacts on Burrowing Owl,* would avoid and minimize the potential for injury, mortality, or the disruption of normal behaviors and disturbances to habitat. The impacts on burrowing owl from the project alternatives would be less than significant with mitigation because the aforementioned measures would reduce direct effects on the species, including habitat, noise, and visual disturbances, by providing environmental awareness training to construction personnel, by implementing protective measures during maintenance activities, and avoidance measures for burrowing owl during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) would offset the loss of burrowing owl habitat by creating and protecting grassland habitat (Appendix 3F, Section 3F.3.3.2) on Bouldin Island and the I-5 ponds, through the protection and management of agricultural foraging habitat Swainson's hawk (Appendix 3F, Section 3F.3.3.2, and Attachment 3F.1, Table 3F.1-3, CMP-19b: *Swainson's Hawk Foraging Habitat*), and by mitigating for occupied burrowing owl habitat (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-20: *Occupied Burrowing Owl Habitat*).

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Measure BIO-40: Conduct Surveys and Minimize Impacts on Burrowing Owl

All Project Alternatives

The following measures will be required to minimize impacts on burrowing owl.

1. Surveys.
   a. Burrowing owl breeding and wintering surveys will be required within 500 feet of water conveyance work areas and restoration sites where suitable habitat has been identified during habitat assessment surveys where access is available. Surveys will be initiated during the year that precedes construction and will be consistent with the methods described in the Staff Report on Burrowing Owl Mitigation (California Department of Fish and Game 2012), or a modified methodology with written approval from CDFW.

   b. In addition to initial breeding and wintering season surveys, DWR will also require that preconstructions survey be conducted, with one occurring 14 days prior to groundbreaking and/or staging activities and another within 24 hours of these activities. These surveys will confirm whether owls identified during the initial breeding and wintering season surveys are still present or whether the previously unoccupied site has since become occupied by burrowing owls.

2. Avoidance and Minimization. To the extent feasible, burrowing owls will be avoided by relocating work areas with flexible locations, such as geotechnical exploration sites. Within the construction footprint where ground disturbance cannot avoid burrowing owls, owls will be relocated during the nonbreeding season and burrows will be excavated in coordination with CDFW, as described below under *Burrowing Owl Relocation*.

   a. If an active burrow is identified near a work area and work cannot be conducted outside of the nesting season (February 1 through August 31), a qualified biologist will establish a non-disturbance buffer that extends a minimum of 328 feet (200 meters) around the burrow. If burrowing owls are present at the site during the nonbreeding season (September 1 through January 31), a qualified biologist will establish a no-activity zone that extends a minimum of 656 feet (100 meters) around the burrow. The extent of non-disturbance buffers will be determined based on time of year and level of disturbance described in the *Staff Report on Burrowing Owl Mitigation* (California Department of Fish and Game 2012:9)

   b. If the appropriate no-activity buffer for breeding or nonbreeding burrowing owls cannot be established, a qualified biologist will evaluate site-specific conditions and, in consultation with CDFW, recommend a smaller buffer that still minimizes the potential to disturb the owls (and still allows reproductive success during the breeding season). The site-specific buffer will be established by taking into consideration the type and extent of the proposed activity occurring near the occupied burrow, the duration and timing of the activity, the sensitivity and habituation of the owls to existing conditions, and the dissimilarity of the proposed activity to background activities. If an appropriate buffer cannot be established around the active owl burrows, actions will be taken to exclude the owls from the site per the requirements below.

   c. A biological monitor will be present during all construction activities occurring within any reduced buffers. If during the breeding season there is any change in owl nesting and foraging behavior as a result of construction activities, the biological monitor will have the authority to immediately stop work and will work with construction personnel and the environmental manager to provide additional protections to reduce disturbance, such as adding visual and sound curtains; any modifications to the standard protections will be in consultation with CDFW.

d. If monitoring indicates that the nest is abandoned prior to the end of nesting season or the burrow is no longer in use by owls (e.g., chicks have fledged), the no-activity buffer may be removed. If the burrow cannot be avoided by construction activity, the biologist will excavate and collapse the burrow to prevent reoccupation.

3. Burrowing Owl Relocation. No relocation of burrowing owls will occur during the breeding season. If burrowing owls are present within the construction footprint and cannot be avoided during the nonbreeding season (generally September 1 through January 31), they will be relocated through passive relocation, with or without burrow exclusion. Burrow exclusion is the prevention of burrows being re-occupied through the use of one-way doors. Passive relocation will be used when (1) there is a sufficient amount of suitable habitat adjacent to the work area to support nesting and foraging, (2) there are compatible land use practices in the area, and (3) the area is preferably currently under or proposed for conservation. Passive relocation will be conducted during the nonbreeding season; however, passive relocation techniques may be used during the breeding season (February 1 through August 31) if a qualified biologist, coordinating with CDFW, determines through site surveillance that the burrow is not occupied by a breeding pair, young, or eggs. To the extent feasible, passive relocation will first be considered without the use of exclusion devices in order to avoid and minimize harassment of owls. DWR will develop Burrowing Owl Artificial Burrow and Exclusions Plans to be approved by CDFW prior to relocation activities.

a. Passive relocation without exclusion. Prior to relocating owls, all potential burrowing owl burrows in suitable nesting habitat and within the project footprint and 75 feet (23 meters) around the footprint, will be surveyed for owl use, and excavated if no owls are found. If occupied burrows are found, two natural or artificial burrows will be provided for each occupied burrow, within 165 to 325 feet (50 to 99 meters) of the natural burrow where feasible. Artificial burrows will be installed following the methods in Barclay (2008:53–55) and Johnson et al. (2010:4–32), or more current methodology if it becomes available, upon CDFW approval. Sites used for artificial burrows will either be properties currently used for or proposed for conservation if feasible. After constructing the artificial burrows, the owls will be given 60 days to relocate on their own. The work area will be monitored weekly for up to 60 days to determine whether the owls have left the burrow and to confirm occupancy at the artificial or other nearby burrows. The formerly occupied burrows will then be excavated. Whenever feasible, burrows will be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe (at least 3 inches in diameter) will be inserted into burrows during excavation to maintain an escape route for any animals inside the burrow.

b. Passive relocation with exclusion. If the burrowing owls found do not relocate on their own through the above methodology, passive relocation will be accomplished by installing one-way doors (e.g., modified dryer vents). The one-way doors will be left in place for a minimum of 48 hours and be monitored twice daily to ensure that the owls have left the burrow. The burrow will be excavated using hand tools, and a section of flexible plastic pipe (at least 3 inches in diameter) will be inserted into the burrow tunnel during excavation to maintain an escape route for any animals that may be inside the burrow.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands as well as habitat for special-status species under the project's CMP would affect burrowing owl through the permanent and temporary loss of habitat (Appendix 13C), from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which could support suitable burrowing owl habitat and could result in the disruption of normal behaviors, injury, or mortality of individuals. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain suitable burrowing owl habitat and management activities could affect this habitat and result in the disruption of normal behaviors, injury, or mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of burrowing owl habitat from habitat creation by adjusting the overall commitment of riparian creation (Appendix 3F, Section 3F.1, Section 3F.2.4, Attachment 3F.1, Table 3F.1-3, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The creation and enhancement activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals if restoration activities occur during the breeding season (February 1 through August 31) or in the vicinity of occupied burrows (in both the breeding and wintering season), as described above under construction-related effects. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); and Mitigation Measure BIO-40: *Conduct Surveys and Minimize Impacts on Burrowing Owl* would reduce the potential for injury, mortality, and the disruption of normal behaviors of individuals to less than significant. These impacts would be less than significant with mitigation because the aforementioned measures would (1) train construction staff on protecting breeding and wintering burrowing owls, the requirements for avoiding impacts, and the ramifications for not following these measures; (2) minimize dust; (3) implement spill prevention and containment plans that would avoid material spills that could affect habitat; (4) prior to and during implementing restoration and enhancement ground disturbance, identify burrowing owl habitat and establish protective buffers around burrows; and (5) have a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented where applicable.

Herbicides would be applied at CMP creation and enhancement sites to remove nonnative vegetation for site preparation and to support establishment of new plantings. Natural habitats contribute fewer pesticides to receiving waters than agricultural areas where pesticides are applied. Any newly created wetlands or enhanced natural habitat could also filter stormwater to remove solids and either improve or have no effect on pesticide concentrations in discharges to receiving waters, relative to existing conditions. As such, restoration areas are expected to somewhat reduce, rather than increase, runoff of pesticides in adjacent waterbodies. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides would be applied in such a manner as to prevent primary or secondary poisoning of burrowing owl. The impact on burrowing owl from the project with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, the use of heavy equipment, pile driving, or pesticides that would have the potential to expose burrowing owl to excessive noise, visual disturbance, dust, and hazardous materials that could cause loss of modeled habitat, disruption of normal behaviors, and injury or mortality. The mitigation measures with potential to result in impacts on burrowing owl are similar to those discussed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. Impacts on burrowing owl resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to burrowing owl impacts of the project alternatives.

The impacts of habitat loss, noise, visual disturbance, and exposure to dust or hazardous materials on burrowing owl would be reduced through the CMP, environmental commitments, and Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan* as detailed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-40: *Conduct Surveys and Minimize Impacts on Burrowing Owl* would require species-specific measures to reduce these impacts. Therefore, impacts on burrowing owl from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on burrowing owl from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-41: Impacts of the Project on Other Nesting Special-Status and Non–Special-Status Birds

The methods for the analysis of effects on other nesting special-status and non–special-status birds appear in Section 13.3.1.1. Information on the species' life histories and habitat suitability models that were developed for special-status birds with the potential to nest in the study area are presented in the following species accounts in Appendix 13B: Section 13B.62, *Least Bittern*, Section 13B.76, *Loggerhead Shrike*, Section 13B.81, *Modesto Song Sparrow*, Section 13B.83, *Yellow-Breasted Chat*, Section 13B.84, *Yellow-Headed Blackbird*, and Section 13B.87, *Yellow Warbler*. The impact analysis for bank swallow relies on the information in the species account rather than a habitat suitability model, as described in Appendix 13B, Section 13B.79, *Bank Swallow*.

All Project Alternatives

<u>*Construction*</u>

The construction of all project alternatives would affect special-status and non–special-status birds. Construction effects would include the permanent and temporary loss of modeled habitat, habitat fragmentation, and the potential for the disruption of normal behaviors, injury, and mortality.

Modesto song sparrow and yellow-breasted chat may nest and forage in riparian shrubs and woodlands (Appendix 13B, Sections 13B.81 and 13B.83). Loggerhead shrike may nest in shrubs and trees in more open portions of the study area such as grasslands (Appendix 13B, Section 13B.76). Least bittern, Modesto song sparrow, and yellow-headed blackbird may nest in emergent wetland vegetation (Appendix 13B, Sections 13B.62, 13B.81, and 13B.84). Numerous non–special-status birds also may nest in these areas. Yellow warbler and bank swallow are not known to nest in the study area (Appendix 13B, Sections 13B.87 and 13B.79); however, individuals migrate through the region (eBird 2021). Based on a review of aerial imagery, there is no suitable bank swallow nesting habitat (i.e., alluvial soils that form steep, eroded banks that have not been stabilized with levee revetment) within or adjacent to the construction footprint for any project alternatives. RTM storage areas are not expected to be colonized by nesting bank swallows, as it is unlikely that the substrate would provide suitable nesting habitat for the species. However, RTM sites could become suitable for swallows over time, as the substrate stabilizes.

The removal of riparian vegetation, grassland, wetland vegetation, and cultivated lands resulting from the construction of project facilities would reduce the amount of available nesting and foraging habitat for special-status and non–special-status birds (Table 13-83 through Table 13-88). The loss of nesting and foraging habitat for yellow-breasted chat, Modesto song sparrow, and least bittern, and nesting habitat for yellow-headed blackbird would primarily occur as a result of levee improvements, new roads, and road improvements (Appendix 13C). Yellow-breasted chat and Modesto song sparrow nesting habitat, and yellow warbler potential recolonization habitat (Appendix 13B) would also be lost from the construction of the intakes. The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled nesting and foraging habitat for these species compared to the eastern alternatives (Alternatives 3, 4a, 4b, and 4c) and Bethany Reservoir alignment (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment (Appendix 13C). The loss of nesting and foraging habitat for loggerhead shrike and yellow-headed blackbird foraging habitat would primarily occur as a result of the construction of the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the placement of RTM and associated conveyor features at the Twin Cities Complex (all alternatives), on Bouldin Island (Alternatives 1, 2a, 2b, 2c), and on Lower Roberts Island (Alternatives 3, 4a, 4b, 4c, and 5) and the construction of the Bethany Complex and associated access roads (Alternative 5; Appendix 13C).

Table 13-83. Impacts on Modeled Nesting and Foraging Habitat for Least Bittern by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres) [a]	Total (acres)
1	5.30	5.37	10.67
2a, 2c	3.68	6.75	10.43
2b	3.46	6.45	9.91
3, 4a, 4c	0.27	0.97	1.24
4b	0.05	0.67	0.72
5	0.48	0.83	1.31

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Table 13-84. Impacts on Modeled Nesting and Foraging Habitat for Loggerhead Shrike by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	2,353.27	270.30	2,623.57
2a	2,544.42	299.87	2,844.29
2b	2,114.15	291.26	2,405.41
2c	2,237.70	298.30	2,536.00
3	2,118.96	243.54	2,362.50
4a	2,379.38	246.54	2,625.92
4b	1,842.89	237.86	2,080.75
4c	2,004.87	244.89	2,249.76
5	1,389.31	121.39	1,510.70

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Table 13-85. Impacts on Modeled Nesting and Foraging Habitat for Modesto Song Sparrow by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	59.83	22.87	82.70
2a	58.68	26.77	85.45
2b	52.55	25.51	78.06
2c	55.27	26.29	81.56
3	16.98	11.55	28.53
4a	19.68	12.17	31.85
4b	13.54	10.92	24.46
4c	16.27	11.70	27.97
5	19.95	10.70	30.65

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Table 13-86. Impacts on Modeled Nesting and Foraging Habitat for Yellow-Breasted Chat by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	52.87	16.91	69.78
2a	52.37	19.34	71.71
2b	47.87	18.38	66.25
2c	50.03	18.85	68.88
3	11.71	9.83	21.54
4a	13.33	10.46	23.79
4b	8.84	9.50	18.34
4c	11.00	9.97	20.97
5	12.92	9.00	21.92

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Table 13-87. Impacts on Modeled Nesting and Foraging Habitat for Yellow-Headed Blackbird by Alternative

Alternative	Permanent Impacts—Nesting (acres) [a]	Permanent Impacts—Foraging (acres) [a]	Temporary Impacts—Nesting (acres)	Temporary Impacts—Foraging (acres)	Total (acres)
1	5.30	2,311.30	5.37	258.57	2,580.54
2a	3.68	2,503.07	6.75	286.79	2,800.29
2b	3.46	2,074.76	6.45	278.45	2,363.12
2c	3.68	2,196.98	6.75	285.27	2,492.68
3	0.27	2,116.37	0.97	239.17	2,356.78
4a	0.27	2,376.03	0.97	242.11	2,619.38
4b	0.05	1,841.50	0.67	233.70	2,075.92
4c	0.27	2,002.15	0.97	240.52	2,243.91
5	0.48	1,383.86	0.83	117.56	1,502.73

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Table 13-88. Impacts on Modeled Nesting and Foraging Habitat for Yellow Warbler by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	48.92	12.77	61.69
2a	48.44	14.84	63.28
2b	44.75	13.96	58.71
2c	46.57	14.40	60.97
3	9.34	7.62	16.96
4a	10.46	8.22	18.68
4b	6.77	7.34	14.11
4c	8.59	7.77	16.36
5	9.69	6.80	16.49

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Birds that nest in bridges and culverts (e.g., black phoebe, cliff swallow) may be affected by the widening of the Hood-Franklin bridge at Snodgrass Slough (all alternatives), the resurfacing of a bridge on Byron Highway, the resurfacing of an overpass on Lambert Road (all alternatives), in addition to the widening of a bridge and overpass on SR 12 over Little Potato Slough (Alternatives 1, 2a, 2b, and 2c), and at the replacement of a bridge connecting Mandeville and Bacon Islands over Connection Slough (Alternatives 1, 2a, 2b, and 2c).

Environmental Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Vegetation removal and other construction activities during the breeding season (February 1 through August 31) could result in the mortality or disturbance of nesting birds in and adjacent to the construction work areas. Removal of nests or suitable nesting habitat and construction-related noise and visual disturbances during the breeding season could mask calls, disrupt foraging and nesting behaviors, reduce the functions of nesting habitat, result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Construction activities are not expected to injure or kill foraging or nonbreeding adults or fledged juveniles who are no longer dependent on adults because individuals are highly mobile and would avoid direct injury or mortality from slow-moving or stationary construction equipment. Night lighting may have the potential to affect the behavior of nesting special-status and non–special-status birds; studies show that birds are attracted to artificial lights, which may disrupt their behavioral patterns or cause collision-related fatalities (Gauthreaux and Belser 2006:67–86). All lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in the levels of light, however, these types of light generate an ambient nighttime luminescence that is visible from a distance. Effects of construction-related light would be greater at the intakes where existing conditions are dark and rural in comparison with the Twin Cities Complex, Southern Complex, and Bethany Complex where there are existing sources of light that may illuminate suitable habitat. Construction activities could result in dust and the discharge of construction-related fluids, which could also affect individuals and their habitat if present in or adjacent to work areas. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting nesting special-status and non–special-status birds, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

There are no occurrences of least bittern or yellow warbler in the vicinity of the project footprints under any alternative. There is one occurrence of yellow-breasted chat (California Department of Water Resources 2011) along the proposed intake haul road footprint, north of Lambert Road and one occurrence of yellow-headed blackbird (occurrence #9, California Department of Fish and Wildlife 2020a) that overlaps with the footprint of a new access road along the Sacramento River west of Beach Lake. The nearest bank swallow occurrence is in the Brannan Island State Recreation Area approximately 6 miles west of the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c). Modesto song sparrow is ubiquitous throughout the study area and is expected to nest and forage in the majority of modeled habitat. One occurrence for loggerhead shrike is within the footprint of a road right-of-way west of the Southern Forebay (California Department of Water Resources 2011), but there are many other loggerhead shrike occurrences (California Department of Water Resources 2011) in the vicinity of Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex and associated access roads (Alternative 5).

Field investigations would be conducted prior to and during construction under all alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of special-status and non–special-status birds. Geotechnical investigations that would occur in the West Tracy Fault Study area, and over the tunnel alignment footprints which include test trenches, CPTs, soil borings, and geophysical arrays, would result in impacts on modeled habitat for least bittern, loggerhead shrike, Modesto song sparrow, yellow-breasted chat, yellow warbler (Appendix 13C) with the greatest impacts on grassland and cultivated lands. The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1-day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pile installation test methods at the north Delta intakes, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the potential for injury, mortality, and disruption of normal behaviors of special-status and non–special-status birds if present in the vicinity, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting nesting special-status and non-special-status birds, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area and pile installation test methods at the north Delta intakes may also cause disturbance to individuals, as described above under construction-related effects.

Operations

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions (Chapter 24, Section 24.4.3.2). Permanent facility lighting associated with project facilities under all alternatives could extend into suitable habitat for special-status and non–special-status birds, which could affect the behavior of individuals, as described above under construction-related effects; however, as stated in Chapter 3, Section 3.4.12, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, and therefore permanent facilities would remain dark the majority of the time at night, which would minimize the potential for this impact.

Power for construction and operation of the conveyance facilities has been designed to use existing power lines and underground conduit to the extent feasible under all project alternatives. Most new project lines would be placed on existing poles and towers and therefore would not substantially alter the existing landscape. However, new aboveground high-voltage transmission and SCADA lines would be constructed to power the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex under Alternative 5 (Chapter 3, Figure 3-13 and Figure 3-14). The potential for collisions with new project lines varies by species and depends primarily on its level of exposure (or proximity of the bird's habitat and resources to the transmission line) and its sensitivity (morphological and behavioral characteristics that influence the bird's propensity to collide with a line). Loggerhead shrike, Modesto song sparrow, yellow-breasted chat, and yellow warbler are relatively maneuverable. Least bittern is less maneuverable because of its body shape, but there is minimal suitable habitat in the vicinity of proposed lines. Flocking species such as yellow-headed blackbird are more vulnerable than solitary species such as loggerhead shrike or yellow-breasted chat. Modeled habitat for special-status birds and natural communities that are suitable for nesting are present in the vicinity of proposed lines and therefore some potential for collision risk exists. Transmission line towers also provide perching substrate for raptors, which are predators to many special-status and non–special-status bird species. The existing network of transmission lines in the study area currently poses these risks and any incremental risk associated with the new power line corridors would be expected to be low.

Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the species is loss of nesting habitat from the placement of rock revetment for levee stabilization. Because of this limited available habitat, and the reduction of natural river process, the species is highly sensitive to (1) reductions in winter flows that are necessary to erode banks for habitat creation, and (2) high flows during the breading season. The potential impacts of changes in upstream flows during the breeding season on bank swallows are the flooding of active burrows and destruction of burrows from increased bank sloughing. Chapter 5, *Surface Water*, details the hydrologic modeling methods (Appendix 5A, *Modeling Technical Appendix,* Section B, *Hydrology and Systems Operations Modeling*) and results (Appendix 5A, Section B, Attachment 3, *CalSim 3 Modeling Results*) with respect to flows within and upstream of the Delta. Based on hydrologic modeling results, modeled flows under all project alternatives are not expected to change substantially beyond the existing variation in flows. For many months, there would be little to no change in flow under the project alternatives, relative to existing conditions, and for those months where there are changes in flow rates, flows would remain within the range occurring under existing conditions. Thus, the project is not anticipated to result in any flow-related changes in rivers upstream of the Delta that would affect bank swallow breeding success, relative to existing conditions.

Similarly, project operations were analyzed for potentially altered river flows within and upstream of the Delta that may affect habitat of other nesting birds, particularly those that use riparian or tidal wetlands. Modeled flows under all project alternatives are not expected to change substantially beyond the existing variation in flows (Chapter 9). Thus, the project is not anticipated to alter nesting bird habitats within or upstream of the Delta, relative to existing conditions.

Changes in water operations under all project alternatives have the potential to exacerbate bioaccumulation of mercury in nesting birds using tidal wetlands and adjacent terrestrial habitats. Largemouth bass was used as an indicator species for analysis of impacts from changes in operations from the construction of the water conveyance facilities because they are good indicators of mercury contamination throughout the aquatic foodweb (Wood et al. 2010:67). Although the magnitude of methylmercury bioaccumulation differs among species and foodwebs, methylmercury can be transported to terrestrial foodwebs through consumption of aquatic prey (Cristol et al. 2008:335), therefore changes in aquatic foodweb methylmercury concentrations are assumed to result in changes in adjacent terrestrial foodwebs. The modeled effects of mercury concentrations from changes in water operations on largemouth bass did not differ substantially from existing conditions (Appendix 9H); therefore, results also indicate nesting bird mercury exposure would not measurably increase as a result of project operations.

Microcystin toxins originate in aquatic systems and can be transported through foodwebs through consumption (Moy et al. 2016:A). Microcystins have also been found in terrestrial foodwebs, such as spiders and songbirds in riparian habitats, likely through consumption of emergent aquatic insects (Moy et al. 2016:A, E), and could affect nesting bird populations if project operations result in conditions that promote *Microcystis* blooms. Operation of all project alternatives is not expected to substantially change the five factors that could create conditions more conducive to CHAB formation (i.e., temperature, residence time, nutrients, water velocities and associated turbulence and mixing, and water clarity and associated irradiance) relative to existing conditions upstream of the Delta or within the Delta (Chapter 9). The water quality modeling results show a potential for increased residence time in some locations and months within the central Delta, namely Discovery Bay where residence times are already very long, which could contribute to increased *Microcystis* bloom size in some years at these locations if the remaining four environmental factors were also at levels conducive to forming CHABs. Nevertheless, based on known *Microcystis* dynamics in the Delta a small increase of residence time at Discovery Bay would not cause *Microcystis* blooms to substantially increase in size or last substantially longer, relative to existing conditions. Because the project alternatives, through their effects on the five factors potentially associated with CHABs in the Delta, are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystin or any other cyanotoxins in the Delta that could cause a substantial adverse impact on other nesting special-status and non-special-status birds, relative to existing conditions.

Current use and legacy pesticides have the potential to bioaccumulate in the food items of nesting bird species. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows and would not result in land-use changes that would increase use of pesticides, relative to existing conditions (Chapter 9). Therefore, the project alternatives would not substantially increase pesticide exposure to other nesting special-status and non-special-status birds.

Changes in water operations under all project alternatives have the potential to exacerbate bioaccumulation of selenium in nesting birds using tidal wetlands and adjacent terrestrial habitats. Modeled selenium concentrations in the eggs of insect-eating and fish-eating birds were below the level of concern and did not differ substantially from existing conditions under all alternatives (Appendix 9J). Therefore, the project alternatives are not anticipated to substantially increase the risk of selenium contamination in nesting special-status and non-special-status birds.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in periodic disturbances that could affect special-status and non–special-status birds.

The maintenance of aboveground water conveyance facilities for all project alternatives would result in periodic disturbances within and adjacent to nesting and foraging habitat for raptors. Maintenance activities at the north Delta intakes (all project alternatives) would include semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), annual sediment and debris removal at intakes, and periodic maintenance of the intake gates and associated structures approximately every 1 to 5 years. Maintenance activities at launch, reception, and maintenance shafts along the central alignment (Alternatives 1, 2a, 2b, and 2c), eastern alignment (Alternatives 3, 4a, 4b, and 4c), and Bethany Reservoir alignment (Alternative 5) would include similar semiannual general and ground maintenance in addition to daily inspections by vehicle. Existing access roads in the vicinity of the intakes and shafts would be repaved every 15 years.

Large equipment or cranes required for maintenance of the intakes (all alternatives), the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) or Bethany Complex (Alternative 5), and for vegetation removal activities that take place during the breeding season (February 1 through August 31) could disrupt foraging and nesting behaviors and result in potential injury and mortality of individuals. Herbicide application could reduce the functions of foraging habitat and result in direct mortality of individuals if present. Adults and fledged young would be expected to avoid slow-moving maintenance equipment and therefore there would be a low probability of vehicle strikes of nonbreeding birds. Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting. Noise effects from maintenance activities could negatively affect breeding birds, as described above under construction-related effects.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives would result in impacts on special-status and non–special-status bird species through the permanent and temporary loss of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors. For all project alternatives, changes in water operations would not be expected to result in a measurable increase in mercury or selenium bioavailability or pesticide or microcystin exposure to nesting special-status and non–special-status birds and would not result in changes in upstream flows that would interfere with nesting habitat for bank swallow. The temporary impacts on habitat and potential impacts of project construction, operations, and maintenance activities would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B); however, even with these commitments, the impacts of the project alternatives on special-status and non–special-status birds would be significant. The CMP would be required to offset the loss of habitat for special-status and non–special-status nesting birds by creating and protecting riparian, tidal emergent wetland, and grassland habitat for least Bell's vireo, western yellow-billed cuckoo, California black rail, Swainson's hawk, and burrowing owl (Appendix 3F, Sections 3F.3.2.3, 3F.3.2.5, and 3F.3.3.2, and Attachment 3F.1, Table 3F.1-3) on Bouldin Island and the I-5 ponds and the protection of agricultural foraging habitat for sandhill cranes, Swainson's hawk, and tricolored blackbird (Appendix 3F, Attachment 3F.1, Table 3F.1-3), which would mitigate the loss of nesting and foraging habitat of special-status and non–special-status birds to a less-than-significant level. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18); NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; BIO-2c: *Electrical Power Line Support Placement*; and BIO-36a: *Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors*, would be required to avoid and minimize the potential for injury, mortality, or the disruption of normal behaviors and disturbances to habitat. The impacts on special-status and non–special-status bird species from the project alternatives would be less than significant with mitigation because the aforementioned measures would replace lost habitat, reduce direct effects on these species, including habitat, noise, and visual disturbances, by providing environmental awareness training to construction personnel, by implementing protective measures during maintenance activities, and avoidance measures for nesting birds during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) would offset the loss of nesting and foraging habitat for special-status and non–special-status birds by creating and protecting riparian, tidal emergent wetland, and grassland natural communities on Bouldin Island and the I-5 ponds (Appendix 3F, Sections 3F.3.2.3, 3F.3.2.5, and 3F.3.3.2,) and by restoring or protecting nesting and foraging habitat for western yellow-billed cuckoo, California black rail, sandhill crane, Swainson's hawk, least Bell's vireo, and tricolored blackbird (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-16: *Western Yellow-Billed Cuckoo Habitat,* CMP-17: *California Black Rail Habitat,* CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat,* CMP-19a: *Swainson's Hawk Nesting Habitat,* CMP-19b: *Swainson's Hawk Foraging Habitat,* CMP-21: *Least Bell's Vireo,* CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*).

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-36a: Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors

See description of Mitigation Measure BIO-36a under Impact BIO-36.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands as well as habitat for special-status species under the project's CMP would affect special-status and non–special-status birds through the permanent and temporary loss of habitat (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which could support suitable nesting habitat for special-status and non-special-status birds and could result in the disruption of normal behaviors, injury, or mortality of individuals. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and

CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain suitable nesting habitat for special-status and non-special-status birds and management activities could affect this habitat and result in the disruption of normal behaviors, injury, or mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of nesting habitat from habitat creation by adjusting the overall commitment of riparian and wetland creation and grassland and cultivated lands protection (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-3, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The creation and enhancement activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals if restoration activities occur during the breeding season (February 1 through August 31), as described above under construction-related effects. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); and Mitigation Measure BIO-36a: *Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors* would reduce the potential for injury, mortality, and the disruption of normal behaviors of individuals to less than significant. These impacts would be less than significant with mitigation because the aforementioned measures would (1) train construction staff on protecting nesting birds, the requirements for avoiding impacts, and the ramifications for not following these measures; (2) minimize dust; (3) implement spill prevention and containment plans that would avoid material spills that could affect habitat; (4) prior to and during restoration and enhancement ground disturbance, establish protective buffers around active nest sites; and (5) have a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented where applicable.

Tidal restoration and wetland creation and enhancement at Bouldin Island and the I-5 ponds under the CMP have the potential to exacerbate bioaccumulation of mercury in nesting special-status and non-special-status birds by creating newly inundated wetlands. Methylmercury can be transported from aquatic to adjacent terrestrial foodwebs through ingestion of aquatic prey items, where it can biomagnify and expose songbirds to high concentrations in large insect prey (Cristol et al. 2008:335). Potential effects of increased mercury exposure are likely low for many of these species because they primarily forage on lower-trophic items with less potential to biomagnify mercury such as seeds, although some riparian songbirds have been found to have high mercury concentrations. Because Bouldin Island and the I-5 ponds sites consist of existing managed and agricultural wetlands and ponds, wetland creation and enhancement are not expected to increase mercury methylation, relative to existing conditions. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include mercury monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased mercury methylation, relative to existing conditions. Mitigation Measure WQ-6: *Develop and Implement a Mercury Management and Monitoring Plan*, which contains measures to assess the amount of mercury at tidal restoration sites before project development, followed by appropriate design, monitoring, and adaptative management, would minimize the potential for any effects of increased methylmercury exposure due to tidal restoration. Therefore, implementation of the CMP would not be expected to have a significant adverse impact on nesting special-status and non-special-status birds.

Herbicides would be applied at CMP restoration sites to remove nonnative vegetation for site preparation and to support establishment of new plantings. Natural habitats contribute fewer pesticides to receiving waters than agricultural areas where pesticides are applied. Any newly created wetlands or enhanced natural habitat could also filter stormwater to remove solids and either improve or have no effect on pesticide concentrations in discharges to receiving waters, relative to existing conditions. As such, restoration areas are expected to somewhat reduce, rather than increase, runoff of pesticides into adjacent waterbodies. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides would be applied in such a manner as to prevent primary or secondary poisoning of nesting special-status and non–special-status birds.

Habitat creation and enhancement under the CMP has the potential to result in conditions that promote CHABs, which could result in impacts on nesting special-status and non-special-status birds using created and/or enhanced wetland and aquatic habitats. High levels of microcystins have also been found in terrestrial foodwebs, such as spiders and songbirds in riparian habitats, likely through consumption of emergent aquatic insects (Moy et al. 2016:A, E), and could affect nesting special-status and non-special-status birds if they forage in or near habitats with conditions that promote CHABs. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include CHAB monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased CHAB formation, relative to existing conditions. As discussed in Chapter 9, tidal habitat creation is not expected to cause substantial additional *Microcystis* production. Therefore, implementation of the CMP would not result in increased CHAB formation that could cause substantial adverse impacts on nesting special-status and non-special-status birds, relative to existing conditions.

Wetland restoration actions may provide habitat for nesting special-status and non–special-status birds, which could increase the risk of selenium toxicity to these species. It is difficult to determine whether the effects of potential increases in selenium bioavailability associated with restoration activities under the CMP would lead to adverse effects. Potential effects of increased selenium exposure are likely low for these species because they primarily forage on lower-trophic items with less potential to biomagnify selenium such as seeds and insects, and existing selenium concentrations in the Sacramento River watershed are low (Central Valley Regional Water Quality Control Board 1988:14). Modeled concentrations in insect-eating bird eggs under existing conditions in the Delta were below levels of concern for other bird species (Appendix 9J). Analysis included in Chapter 9 for Impact WQ-10: *Effects on Selenium Resulting from Facility Operations* found that compensatory mitigation would not result in a measurable increase in selenium concentrations or selenium bioavailability. Should increases in selenium occur as a result of compensatory mitigation, such increases are not expected to negatively affect nesting special-status and non-special-status birds due to their low trophic position. Therefore, potential increased exposure to selenium resulting from restoration would not be expected to adversely affect nesting special-status and non–special-status bird populations. The impact on nesting special-status and non–special-status birds from the project with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, the use of heavy equipment, pile driving, or pesticides that would have the potential to expose special-status and non–special-status bird species to excessive noise, visual disturbance, dust, and hazardous materials that could cause loss of modeled habitat, disruption of normal behaviors, and injury or mortality. The mitigation measures with potential to result in impacts on special-status and non–special-status bird species are similar to those discussed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. Impacts on special-status and non–special-status bird species resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to special-status and non–special-status bird species impacts of the project alternatives.

The impacts of habitat loss, noise, visual disturbance, and exposure to dust or hazardous materials on special-status and non–special-status bird species would be reduced through the CMP, environmental commitments, and Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan* as detailed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-36a: *Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors* would require species-specific measures to reduce these impacts. Therefore, impacts on special-status and non–special-status bird species from other mitigation measures would be reduced to less than significant.

Overall, the impacts on special-status and non–special-status bird species from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-42: Impacts of the Project on Least Bell's Vireo

The methods for the analysis of effects on least Bell's vireo appear in Section 13.3.1.1, and information on the species life history and recolonization habitat suitability model are presented in the species account in Appendix 13B, Section 13B.77, *Least Bell's Vireo*. At the time of this writing, least Bell's vireo is not assumed to be a resident of the Delta; thus, the habitat suitability model identifies areas of potential recolonization. Because there are so few occurrences in or around the Delta from which to confidently determine a range within the study area, the entire Delta is assumed to have potential to provide recolonization habitat.

All Project Alternatives

<u>*Construction*</u>

The construction of all project alternatives would result in the permanent and temporary loss of modeled recolonization habitat, and the potential for injury, mortality, and the disruption of normal behaviors. The loss of habitat would primarily occur as a result of levee improvements, new roads and road improvements, and construction of the intakes (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment. Acres of permanent and temporary impacts on modeled habitat for least Bell's vireo are shown in Table 13-89. The losses of habitat and potential for injury and mortality would result from vegetation removal in advance of grading and excavation for the construction of project infrastructure. Environmental Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-89. Impacts on Modeled Recolonization Habitat for Least Bell's Vireo by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	48.92	12.77	61.69
2a	48.44	14.84	63.28
2b	44.75	13.96	58.71
2c	46.57	14.40	60.97
3	9.34	7.62	16.96
4a	10.46	8.22	18.68
4b	6.77	7.34	14.11
4c	8.59	7.77	16.36
5	9.69	6.80	16.49

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

If least Bell's vireo were to nest in or adjacent to work areas, construction-related noise and visual disturbances during the breeding season could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of nesting habitat for the species. Intake construction would require the use of loud, heavy equipment within the construction site and along the access roads to the site. Pile driving would be required for intake construction, which would create noise and vibration effects in and adjacent to modeled recolonization habitat. Construction-related night lighting may also have the potential to affect least Bell's vireo. While there is no data on effects of night lighting on this species, studies show that birds of other species are attracted to artificial lights and this may disrupt their behavioral patterns or cause collision-related fatalities (Gauthreaux and Belser 2006:67–86). All lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in the levels of light, however, these types of light generate an ambient nighttime luminescence that is visible from a distance (Chapter 18, Impact AES-4: *Create New Sources of Substantial Light or Glare That Would Adversely Affect Daytime or Nighttime Views of the Construction Areas or Permanent Facilities*). Construction activities could expose least Bell's vireo to dust if present in or adjacent to work areas. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting the species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

No known occurrences of least Bell's vireo are located within the construction footprint for any of the alternatives (California Department of Fish and Wildlife 2020a; eBird 2021). Nesting least Bell's vireos have not been detected within or around either the central alignment (Alternatives 1, 2a, 2b, and 2c), the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c), or the Bethany Reservoir alignment alternative (Alternative 5). The nearest least Bell's vireo occurrence to project impacts under any alternative is a record of two singing males on Bradford Island in 2018 and 2019 (eBird

2021), which is approximately 5 miles west of the levee improvement work on Bouldin Island (Alternatives 1, 2a, 2b, and 2c), and approximately 15 miles west of a proposed RTM storage area and an associated RTM conveyor on Lower Roberts Island (Alternatives 3, 4a, 4b, 4c, and 5).

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal behaviors of least Bell's vireo. Geotechnical investigations associated with the tunnels for all project alternatives, which include CPTs and soil borings, would result in impacts on habitat (Appendix 13C). The West Tracy Fault Study and the Bethany Fault Study investigations would not affect modeled habitat for least Bell's vireo. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of least Bell's vireo if present in the work area, as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting the species, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area and pile installation test methods at the north Delta intakes may affect least Bell's vireo if present in the vicinity, as described above under construction-related effects.

Operations

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions (Chapter 24, Section 24.4.3.2) and the periodic presence of staff would not be expected to affect least Bell's vireo if present. Permanent facility lighting could extend into suitable least Bell's vireo habitat and could affect the behavior of individuals if present within the illuminated habitat; however, as stated in Chapter 3, Section 3.4.12, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, and therefore permanent facilities would remain dark the majority of the time at night, which would minimize the potential for this impact.

Power for construction and operation of the conveyance facilities has been designed to use existing power lines and underground conduit to the extent feasible. Most new project lines would be placed on existing poles and towers and therefore would not substantially alter the existing landscape. New aboveground high-voltage transmission and SCADA lines would be constructed to power the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex under Alternative 5 (Chapter 3, Figure 3-13 and Figure 3-14), where the landcover in that region is primarily grassland and agriculture with minimal riparian vegetation that would support least Bell's vireo. Least Bell's vireo does not currently breed in the study area. The species typically occurs in early to mid-successional riparian habitat, which is very limited in the vicinity of the proposed new transmission lines in the southwestern portion of the study area. The species does not form flocks and generally remains at or below the riparian canopy. Therefore, it is highly unlikely that this species would experience bird strikes at project transmission lines.

Changes in water operations under all project alternatives have the potential to exacerbate bioaccumulation of methylmercury in least Bell's vireo. Methylmercury can be transported from aquatic to adjacent terrestrial foodwebs through ingestion of aquatic prey items, where it can biomagnify and expose songbirds to high concentrations in insect prey (Cristol et al. 2008:335). Largemouth bass was used as an indicator species for analysis of impacts from changes in operations from the construction of the water conveyance facilities because they are good indicators of mercury contamination throughout the aquatic foodweb (Wood et al. 2010:67). Modeled effects of mercury concentrations from changes in operations of water conveyance facilities on largemouth bass, did not differ substantially from existing conditions (Appendix 9H). Even though least Bell's vireo do not use aquatic habitats, the lack of substantial change in aquatic foodweb mercury concentrations indicates that mercury concentrations in adjacent riparian foodwebs would also not increase appreciably; therefore, these results indicate that bioavailability of methylmercury to least Bell's vireo would not measurably increase as a result of project operation.

Microcystin toxins originate in aquatic systems and can be transported through foodwebs through consumption (Moy et al. 2016:A). Microcystins have also been found in terrestrial foodwebs, such as spiders and songbirds in riparian habitats, likely through consumption of emergent aquatic insects (Moy et al. 2016:A, E), and can affect least Bell's vireo if they forage in or near habitats with conditions that promote *Microcystis* blooms. Operation of all project alternatives is not expected to substantially change the five factors that could create conditions more conducive to CHAB formation (i.e., temperature, residence time, nutrients, water velocities and associated turbulence and mixing, and water clarity and associated irradiance) relative to existing conditions upstream of the Delta or within the Delta (Chapter 9). The water quality modeling results show a potential for increased residence time in some locations and months within the central Delta, namely Discovery Bay where residence times are already very long, which could contribute to increased *Microcystis* bloom size in some years at these locations if the remaining four environmental factors were also at levels conducive to forming CHABs. Nevertheless, based on known *Microcystis* dynamics in the Delta a small increase of residence time at Discovery Bay would not cause *Microcystis* blooms to substantially increase in size or last substantially longer, relative to existing conditions. Because the project alternatives, through their effects on the five factors potentially associated with CHABs in the Delta, are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystin or any other cyanotoxins in the Delta that could cause a substantial adverse impact on least Bell's vireo, relative to existing conditions.

Current use and legacy pesticides have the potential to bioaccumulate in the food items of least Bell's vireo. Impacts of all project alternatives on pesticides in the Delta were analyzed in Chapter 9. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows and would not result in land-use changes that would increase use of pesticides in or adjacent to habitats used by least Bell's vireo, relative to existing conditions. Therefore, the project alternatives would not substantially reduce prey availability or increase pesticide exposure to least Bell's vireo.

Changes in water operations under all project alternatives is not expected to affect least Bell's vireo habitat, but there is some potential to exacerbate bioaccumulation of selenium in least Bell's vireo. Modeled selenium concentrations in the eggs of insect-eating birds, such as least Bell's vireo, were below the level of concern and did not differ substantially from existing conditions under all alternatives (Appendix 9J). Therefore, the project alternatives are not anticipated to substantially increase the risk of selenium contamination in least Bell's vireo.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in periodic disturbances that may affect least Bell's vireo. Maintenance activities at the north Delta intakes (all project alternatives) would include semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), annual sediment and debris removal at intakes, and periodic maintenance of the intake gates and associated structures approximately every 1 to 5 years. Maintenance activities at launch, reception, and maintenance shafts along the central (Alternatives 1, 2a, 2b, and 2c) and eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5) would include similar semiannual general and ground maintenance in addition to daily inspections by vehicle. Existing access roads in the vicinity of the intakes and shafts would be repaved every 15 years. Maintenance activities could reduce the functions of least Bell's vireo habitat if these activities take place during the breeding season (mid-March through September 1). Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting. Noise effects from maintenance could disturb least Bell's vireos if they use habitat in the vicinity of water conveyance facilities.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives would result in impacts on least Bell's vireo through the permanent and temporary loss of modeled habitat potential for injury, mortality, and the disruption of normal behaviors if individuals are present in the study area. For all project alternatives, changes in water operations would not be expected to result in a measurable increase in mercury or selenium bioavailability or increased pesticide or microcystin exposure to least Bell's vireo. The temporary impacts on habitat and the potential impacts of the disruption of normal behavior from project construction, operations, and maintenance would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*, and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B); however, even with these commitments, the impacts of the project alternatives on least Bell's vireo would be significant. The CMP would be required to offset the loss of migratory habitat (Appendix 3F, Section 3F.3.3.1 and Attachment 3F.1, Table 3F.1-3, CMP-21: *Least Bell's*

Vireo), which would reduce the impact associated with habitat loss to less than significant. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18); NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; BIO-2c: *Electrical Power Line Support Placement*; and BIO-42: *Conduct Surveys and Minimize Impacts on Least Bell's Vireo* would be required to avoid and minimize the potential for injury, mortality, or the disruption of normal behaviors and disturbances to habitat. The impacts on least Bell's vireo from the project alternatives would be less than significant with mitigation because the aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat, noise, and visual disturbances, by providing environmental awareness training to construction personnel, by implementing protective measures during maintenance activities, and avoidance measures for least Bell's vireo during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) would offset the loss of recolonization habitat (Appendix 3F, Section 3F.3.2.3; Appendix 3F, Section 3F.3.3.1 and Attachment 3F.1, Table 3F.1-3, CMP-21: *Least Bell's Vireo*) by creating riparian habitat on Bouldin Island and at the I-5 ponds and managing these areas in perpetuity. Channel margin restoration would include riparian plantings on rock benches (Appendix 3F, Section 3F.4.3.3.3) that may provide habitat for least Bell's vireo.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-42: Conduct Surveys and Minimize Impacts on Least Bell's Vireo

All Project Alternatives

The following measures will be required for all construction activities occurring between May 15 through September 1 to avoid and minimize impacts on least Bell's vireo.

1. Prior to the construction, a noise expert will create a sound level contour map showing the 60 dBA sound level contour specific to the type and location of construction to occur in the area.
2. Two weeks prior to construction, a USFWS- and CDFW-approved biologist will conduct daily surveys, consistent with a USFWS- or CDFW- approved survey protocol, in suitable habitat where construction-related noise levels could exceed 60 dBA L_{eq} (1 hour).
3. If a least Bell's vireo is found, construction activities will be limited such that sound will not exceed 60 dBA within 500 feet of the habitat being used until the USFWS- and CDFW-approved biologist has confirmed that the bird has left the area.
4. If surveys find least Bell's vireos in an area where vegetation will be removed, vegetation removal will be conducted when the USFWS- and CDFW-approved biologist has confirmed that least Bell's vireos are not present within 500 feet of vegetation removal activities.
5. Portable and stationary equipment will be located, stored, and maintained as far as possible, with a minimum distance of 500 feet, from suitable least Bell's vireo habitat.
6. All lights will be screened and directed down toward work activities and away from suitable habitat. A biological construction monitor will ensure that lights are properly directed at all times during construction.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands as well as habitat for special-status species under the project's CMP would affect modeled recolonization habitat for least Bell's vireo through the permanent and temporary loss of habitat (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or grasslands are located, which do not provide habitat for least Bell's vireo and therefore there would not likely be any effects on the species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could support suitable recolonization habitat for least Bell's vireo and management activities within occupied habitat could result in the disruption of normal behaviors, injury, or mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of least Bell's vireo recolonization habitat from habitat creation by adjusting the overall commitment of riparian creation (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-3, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The creation and enhancement activities would also have the potential for the disruption of normal behaviors of individuals if restoration activities take place during the breeding season (March 15 through September 1). Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); and Mitigation Measure BIO-42: *Conduct Surveys and Minimize Impacts on Least Bell's Vireo* would reduce the potential for injury, mortality, and the disruption of normal behaviors of individuals to less than significant. These impacts would be less than significant with mitigation because the aforementioned measures would (1) train construction staff on protecting least Bell's vireo, the requirements for avoiding impacts, and the ramifications for not following these measures; (2) minimize dust; (3) implement spill prevention and containment plans that would avoid material spills that could affect habitat; (4) prior to and during restoration and enhancement ground disturbance, establish protective buffers around occupied habitat; and (5) have a biological monitor present that would ensure that non-disturbance buffers are intact and avoidance measures for least Bell's vireo and all protective measures are being implemented where applicable.

Creation and enhancement of wetlands under the CMP have the potential to exacerbate bioaccumulation of mercury in least Bell's vireo by creating newly inundated wetlands which can produce the biogeochemical conditions to methylate mercury existing in Delta soils. Methylmercury can subsequently be transported to adjacent terrestrial foodwebs through ingestion of aquatic insects (Cristol et al. 2008:335). Potential effects of increased methylmercury exposure are likely low for least Bell's vireo because the species does not currently breed in the study area. Because Bouldin Island and the I-5 ponds sites consist of existing managed and agricultural wetlands and ponds, wetland creation and enhancement are not expected to increase mercury methylation, relative to existing conditions. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include mercury monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased mercury methylation, relative to existing conditions. Mitigation Measure WQ-6: *Develop and Implement a Mercury Management and Monitoring Plan*, which contains measures to assess the amount of mercury at tidal restoration sites before project development, followed by appropriate design, monitoring, and adaptative management, would further minimize the potential for any effects of increased methylmercury exposure in adjacent riparian habitats. Therefore, implementation of the CMP would not be expected to have a significant adverse impact on least Bell's vireo.

Herbicides would be applied at CMP creation and enhancement sites to remove nonnative vegetation for site preparation and to support establishment of new plantings. Natural habitats contribute fewer pesticides to receiving waters than agricultural areas where pesticides are applied. Any newly created wetlands or enhanced natural habitat could also filter stormwater to remove solids and either improve or have no effect on pesticide concentrations in discharges to receiving waters, relative to existing conditions. As such, restoration areas are expected to somewhat reduce, rather than increase, runoff of pesticides into adjacent waterbodies. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides would be applied in such a manner as to prevent primary or secondary poisoning of nesting special-status and least Bell's vireo.

Habitat creation and enhancement under the CMP has the potential to result in conditions that promote CHABs, which could result in impacts on least Bell's vireo. High levels of microcystins have been found in terrestrial foodwebs, such as spiders and songbirds in riparian habitats, likely through consumption of emergent aquatic insects (Moy et al. 2016:A, E), and could impact least Bell's vireo if they forage in or near habitats with conditions that promote CHABs. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include CHAB monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased CHAB formation, relative to existing conditions. As discussed in Chapter 9, tidal habitat creation is not expected to cause substantial additional *Microcystis* production. Therefore, implementation of the CMP would not result in increased CHAB formation that could cause substantial adverse impacts on least Bell's vireo, relative to existing conditions.

CMP habitat creation and enhancement may result in mobilization of selenium in Delta sediments, which could increase the risk of selenium toxicity to least Bell's vireo. It is difficult to determine whether the effects of potential increases in selenium bioavailability associated with the CMP would lead to adverse effects. Potential effects of increased selenium exposure are likely low for least Bell's vireo because the species does not currently breed in the study area, existing selenium concentrations in the Sacramento River watershed are low (Central Valley Regional Water Quality Control Board 1988:14), and modeled concentrations in insect-eating bird eggs under existing conditions in the Delta were below levels of concern for other bird species (Appendix 9J), Analysis included in Chapter 9 for Impact WQ-10: *Effects on Selenium Resulting from Facility Operations* found that compensatory mitigation would not result in a measurable increase in selenium concentrations or selenium bioavailability. Should increases in selenium occur as a result of compensatory mitigation, such increases are not expected to negatively affect least Bell's vireo due to their low trophic position. Therefore, potential increased exposure to selenium resulting from restoration would not be expected to adversely affect least Bell's vireo populations. The impact on least Bell's vireo from the project with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, the use of heavy equipment, pile driving, or pesticides that would have the potential to expose least Bell's vireo to excessive noise, visual disturbance, dust, and hazardous materials that could cause loss of modeled habitat, disruption of normal behaviors, and injury or mortality. The mitigation measures with potential to result in impacts on least Bell's vireo are similar to those discussed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. Impacts on least Bell's vireo resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to least Bell's vireo impacts of the project alternatives.

The impacts of habitat loss, noise, visual disturbance, and exposure to dust or hazardous materials on least Bell's vireo would be reduced through the CMP, environmental commitments, and Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan* as detailed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-

42: *Conduct Surveys and Minimize Impacts on Least Bell's Vireo* would require species-specific measures to reduce these impacts. Therefore, impacts on least Bell's vireo from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on least Bell's vireo from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-43: Impacts of the Project on Suisun Song Sparrow and Saltmarsh Common Yellowthroat

The methods for the analysis of effects on Suisun song sparrow and saltmarsh common yellowthroat appear in Section 13.3.1.1, and information on the life histories and habitat suitability models are presented in the following species accounts in Appendix 13B: Section 13B.82, *Suisun Song Sparrow*, and Section 13B.86, *Saltmarsh Common Yellowthroat*.

All Project Alternatives

Construction

The construction of the proposed project alternatives would not affect Suisun song sparrow or saltmarsh common yellowthroat (Table 13-90). The modeled habitat for these species depicted in Figure 13B.82-1 and Figure 13B.86-1 is more than 11 miles from the nearest project infrastructure and more than 14 miles from the nearest occurrences (California Department of Fish and Wildlife 2020a).

Table 13-90. Impacts on Modeled Habitat for Suisun Song Sparrow and Saltmarsh Common Yellowthroat by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
All Alternatives	0.00	0.00	0.00

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Operations

The operations of the water conveyance facilities under all project alternatives would not result in impacts on Suisun song sparrow or saltmarsh common yellowthroat because of the distance of modeled and known occupied habitat from the infrastructure and any affected Delta waterways.

Power for construction and operation of the conveyance facilities would not be placed in the vicinity of modeled habitat for Suisun song sparrow or saltmarsh common yellowthroat and therefore would not affect either species.

In general, the highest mercury methylation rates are associated with high tidal marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008:15), which are primary Suisun song sparrow and saltmarsh common yellowthroat habitat (Gardali and Evens 2008:348; Takekawa et al. 2011:11). Water quality modeling results indicated that the project alternatives would not result in substantial increases in total mercury and methylmercury concentrations in Delta waters or in Delta outflows (Chapter 9). As such, the project alternatives would not cause a substantial change in total mercury and methylmercury concentrations in Suisun Marsh, Suisun Bay, or San Francisco Bay under all project alternatives, relative to existing conditions. Methylmercury can be transported to terrestrial foodwebs through consumption of aquatic prey (Cristol et al. 2008:335), therefore changes in aquatic foodweb methylmercury concentrations are assumed to result in changes in adjacent terrestrial foodwebs. The lack of substantial change in water column mercury concentrations indicates that methylmercury transported to tidal marsh foodwebs would also not increase appreciably; therefore, these results indicate that bioavailability of methylmercury to Suisun song sparrow or saltmarsh common yellowthroat would not measurably increase as a result of project operation.

Microcystin toxins originate in aquatic systems and can be transported through foodwebs through consumption (Moy et al. 2016:A). Operation of all project alternatives is not expected to substantially change the five factors that could create conditions more conducive to CHAB formation (i.e., temperature, residence time, nutrients, water velocities and associated turbulence and mixing, and water clarity and associated irradiance) relative to existing conditions in Suisun Marsh or Suisun Bay (Chapter 9). The water quality modeling results show a potential for increased residence time in some locations and months within the central Delta, namely Discovery Bay where residence times are already very long, which could contribute to increased *Microcystis* bloom size in some years at these locations if the remaining four environmental factors were also at levels conducive to forming CHABs. These locations are outside of the range of Suisun song sparrow and saltmarsh common yellowthroat, and, based on known *Microcystis* dynamics in the Delta a small increase of residence time at Discovery Bay would not cause *Microcystis* blooms to substantially increase in size or last substantially longer, relative to existing conditions. Because the project alternatives, through their effects on the five factors potentially associated with CHABs in the Delta, are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystin or any other cyanotoxins in the Delta that could cause a substantial adverse impact on Suisun song sparrow and saltmarsh common yellowthroat, relative to existing conditions.

Current use and legacy pesticides have the potential to bioaccumulate in the food items of birds such as Suisun song sparrow and saltmarsh common yellowthroat. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows, relative to existing conditions (Chapter 9). Moreover, project alternatives would not change land use practices or the extent of pesticide use within and around the Suisun Marsh, Suisun Bay, San Francisco Bay, or SWP/CVP export service area waterbodies, relative to existing conditions. Consequently, the project alternatives would not substantially affect pesticide runoff from surrounding lands directly into these waterbodies. As such, there would not be a substantial change in pesticide concentrations in Suisun Marsh, Suisun Bay, San Francisco Bay, or within the SWP/CVP export service areas under all project alternatives, relative to existing conditions. Therefore, the project alternatives would not substantially increase pesticide exposure to Suisun song sparrow or saltmarsh common yellowthroat.

Because Suisun song sparrow and saltmarsh common yellowthroat are obligate wetland species, they may be at risk of selenium toxicity. Water quality modeling results indicated that the project alternatives would not result in substantial increases in selenium concentrations in Delta waters or in Delta outflows (Chapter 9). As such, the project alternatives would not cause a substantial change in selenium concentrations in Suisun Marsh, Suisun Bay, or San Francisco Bay under all project alternatives, relative to existing conditions. Therefore, the project alternatives are not anticipated to substantially increase the risk of selenium contamination in Suisun song sparrow or saltmarsh common yellowthroat.

Maintenance

The maintenance of the water conveyance facilities under all project alternatives would not result in impacts on Suisun song sparrow or saltmarsh common yellowthroat due to the distance of modeled and known occupied habitat from the infrastructure and any affected Delta waterways.

CEQA Conclusion—All Project Alternatives

Construction and maintenance of all project alternatives would result in no impact on Suisun song sparrow and saltmarsh common yellowthroat because no modeled or known habitat for this species occurs in the vicinity of project construction, operations, or maintenance areas. For all project alternatives, changes in water operations would not be expected to result in a measurable increase in mercury or selenium bioavailability or increased exposure to pesticides to Suisun song sparrow or saltmarsh common yellowthroat. Therefore, project operations would result in no impact on Suisun song sparrow and saltmarsh common yellowthroat.

Mitigation Measure CMP: Compensatory Mitigation Plan

None of the measures in the CMP (Appendix 3F) would specifically benefit Suisun song sparrow or saltmarsh common yellowthroat because the locations of compensatory mitigation sites are outside of the known species ranges.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The implementation of the CMP would not result in impacts on Suisun song sparrow or saltmarsh common yellowthroat and none of the measures in the plan would specifically benefit these species because Bouldin Island and the I-5 ponds, the locations of where tidal wetland habitat restoration and channel margin enhancement, non-bank locations, and site protection instruments could occur are outside of the known species ranges (Appendix 3F, Section 3F.4.3.4.2, *Site Selection Criteria and Tools*).

Other Mitigation Measures

Other mitigation measures proposed would not have impacts on Suisun song sparrow or saltmarsh common yellowthroat because the modeled habitat for these species depicted in Figure 13B.82-1 and Figure 13B.86-1 is more than 11 miles from the nearest project infrastructure and more than 14 miles from the nearest occurrences (California Department of Fish and Wildlife 2020a).

Overall, the construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not affect Suisun song sparrow and saltmarsh common yellowthroat and would not change the impact conclusion of no impact.

Impact BIO-44: Impacts of the Project on Tricolored Blackbird

The methods for the analysis of effects on tricolored blackbird appear in Section 13.3.1.1, and information on the species life history and habitat suitability model are presented in the species account for tricolored blackbird (Appendix 13B, Section 13B.85, *Tricolored Blackbird*).

All Project Alternatives

Construction

The construction of all project alternatives would affect modeled habitat for tricolored blackbird. Construction effects would include the permanent and temporary loss of modeled potentially suitable nesting habitat and modeled foraging habitat, and the potential for injury, mortality, and the disruption of normal behaviors.

Based upon recent survey results, tricolored blackbird appears to be an uncommon breeder in the Delta (California Department of Fish and Wildlife 2020a; Meese pers. comm.) and historical nesting activity was generally restricted to the northern and southern ends of the Delta (California Department of Fish and Wildlife 2020a). The Delta is recognized as an important wintering area for tricolored blackbirds (Hamilton 2004:11; Beedy 2008:438), and suitable nesting habitat may also be used for roosting during the nonbreeding season (August 1 through March 14). There would be no permanent or temporary loss of previously occupied colony habitat (active colony within the past 15 years) under any project alternative and there is minimal previously occupied colony habitat in the vicinity of project facilities. Previously occupied colony habitat (associated with CNDDB occurrence #480; California Department of Fish and Wildlife 2020a) would occur adjacent the construction of a road and associated work areas between Intakes A and B (Alternatives 2a and 4a). The next nearest previously occupied colony habitat (associated with CNDDB occurrence #369; California Department of Fish and Wildlife 2020a) to project facilities is approximately 450 feet from a new access road that would be constructed southeast of the Bethany Reservoir (Alternative 5). Previously occupied colony habitat (associated with CNDDB occurrence #593; California Department of Fish and Wildlife 2020a) is located approximately 2,018 feet from the Southern Forebay Outlet and Control Structure and associated work areas (Alternatives, 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c).

Loss of potentially suitable nesting habitat would occur primarily from the construction of levee improvements areas on Bouldin Island (Alternatives 1, 2a, 2b, and 2c) and on Lower Roberts Island (Alternatives 3, 4a, 4b, 4c, and 5; Appendix 13C). Suitable nesting habitat also meets habitat criteria for nighttime roosting habitat during the nonbreeding season (August 1 through March 14) and thus roosting birds could potentially be affected by construction in these areas. Loss of foraging habitat would occur primarily from the construction of the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the placement of RTM (all alternatives). Additional foraging habitat would be removed for the construction of the shafts and from levee and road improvements throughout the central alignment (Alternatives 1, 2a, 2b, and 2c), eastern alignment (Alternatives 3, 4, 4b, and 4c), and Bethany Reservoir alignment (Alternative 5) (Appendix 13C). Acres of permanent and temporary impacts on modeled habitat for tricolored blackbird are shown in Table 13-91.

Environmental Commitment EC-14: *Construction Best Management Practices for Special-Status Species* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-91. Impacts on Modeled Habitat for Tricolored Blackbird by Alternative

Alternative	Permanent Impacts—Previously Occupied Colony (acres) [a]	Permanent Impacts—Potential Nesting (acres) [a]	Permanent Impacts—Foraging (acres) [a]	Temporary Impacts—Previously Occupied Colony (acres)	Temporary Impacts—Potential Nesting (acres)	Temporary Impacts—Foraging (acres)	Total (acres)
1	0.00	8.25	2,570.04	0.00	7.32	318.31	2,903.92
2a	0.00	7.10	2,765.26	0.00	8.74	355.73	3,136.83
2b	0.00	6.37	2,303.28	0.00	8.39	345.45	2,663.49
2c	0.00	6.59	2,442.16	0.00	8.74	353.50	2,810.99
3	0.00	0.90	2,314.68	0.00	1.89	290.63	2,608.10
4a	0.00	1.41	2,590.01	0.00	1.89	294.55	2,887.86
4b	0.00	0.68	2,017.82	0.00	1.53	284.17	2,304.20
4c	0.00	0.90	2,194.71	0.00	1.89	292.24	2,489.74
5	0.00	1.76	1,526.47	0.00	1.76	152.99	1,682.98

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Operation of construction equipment could result in injury or mortality of tricolored blackbirds. Risk of injury or mortality would be greatest to eggs and nestlings, which are susceptible to land-clearing activities, nest abandonment, or increased exposure to the elements or to predators. Injury to adults and fledged juveniles is less likely as these individuals are mobile and have the ability to avoid contact with construction equipment. If tricolored blackbird nest in or adjacent to work areas, construction-related noise and visual disturbances during the breeding season (March 15 through July 31), including pile driving, helicopters, and human presence, could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of nesting habitat for the species such that individuals experience reduced survivability or abandon nests. Roosting tricolored blackbirds could be injured or killed by nighttime construction activities conducted during the nonbreeding season (August 1 through March 14). Nighttime noise, light or visual disturbances could also cause altered behavior or abandonment of nighttime roosts. All lights used during nighttime construction would be downcast, cut-off type fixtures with non-glare finishes, natural light qualities, and minimum intensity. Construction-related lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in the levels of light; however, these types of light generate an ambient nighttime luminescence that is visible from a distance. Effects of construction-related light would be greater at the intakes where existing conditions are dark and rural in comparison with the Twin Cities Complex, Southern Complex, and Bethany Complex where there are existing sources of light that may illuminate suitable habitat. Construction activities could result in dust and the discharge of construction-related fluids, which could also affect tricolored blackbird, if present in or adjacent to work areas, and result in degradation of nesting, roosting, or foraging habitat. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best*

Management Practices for Biological Resources (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting nesting tricolored blackbirds, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable.

There are no known tricolored blackbird occurrences from the CNDDB (California Department of Fish and Wildlife 2020a) or the Tricolored Blackbird Portal (Meese pers. comm.) that overlap with permanent or temporary construction footprints for any of the project alternatives. The proximity of known occurrences (CNDDB occurrences #480, #369, and #593, California Department of Fish and Wildlife 2020a) within the study area in relation to previously occupied colony habitat is discussed above.

Field investigations would be conducted prior to and during construction under all project alternatives to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat and the potential for injury, mortality, and the disruption of normal nesting and foraging behaviors of tricolored blackbird. Geotechnical investigations associated with the tunnels under all project alternatives, which include CPTs and soil borings, would result in impacts on modeled habitat (Appendix 13C). The West Tracy Fault investigations would not affect previously occupied colony habitat or potential nesting habitat, but they would occur within modeled foraging habitat for tricolored blackbird. The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1-day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction-related footprints but could still result in the potential for injury, mortality, and disruption of normal nesting and foraging behaviors of tricolored blackbird if present in the vicinity, as discussed above for conveyance facility construction. While these impact mechanisms are present, the likelihood of injury or mortality of tricolored blackbird from field investigations is low given the small number of breeding colonies currently in the Delta. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by (1) training construction staff on protecting nesting tricolored blackbirds, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect suitable habitat; and (3) having a biological monitor present that would ensure that non-disturbance buffers are intact and all protective measures are being implemented, where applicable. Noise and visual disturbances from helicopter surveys to identify buried groundwater and natural gas wells throughout the project area may also cause disturbance to tricolored blackbirds, as described above under construction-related effects. Field investigations would occur during daylight hours and therefore would not affect roosting tricolored blackbirds if roost sites are present.

Operations

The operation of project facilities would not require ground disturbance or result in additional habitat loss, but project operations would generate small levels of noise, have permanent light sources, and require the periodic presence of staff and vehicle traffic. Noise from the operation of the water conveyance facilities would not be discernably higher than existing conditions (Chapter 24, Section 24.4.3.2). The periodic presence of staff and vehicle traffic at project facilities would not be expected to significantly alter the behavior of tricolored blackbird if present in the vicinity. Permanent facility lighting associated with project facilities under all alternatives could extend into tricolored blackbird foraging habitat and facility lighting for the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) could extend into potentially suitable nesting habitat, which could affect the behavior of individuals, as described above under construction-related effects; however, as stated in Chapter 3, Section 3.4.12, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, and therefore permanent facilities would remain dark the majority of the time at night, which would minimize the potential for this impact.

Power for construction and operation of the conveyance facilities has been designed to use existing power lines and underground conduit to the extent possible under all project alternatives. Most new project lines would be placed on existing poles and towers and therefore would not substantially alter the existing landscape. However, new aboveground high-voltage transmission and SCADA lines would be constructed to power the Southern Complex (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex under Alternative 5 (Chapter 3, Figure 3-13 and Figure 3-14). The new transmission lines overlap with patches of modeled foraging habitat potential nesting habitat in the vicinity of Discovery Bay and Clifton Court Forebay and one tricolored blackbird colony has been recorded within the past 15 years (occurrence # 369; California Department of Fish and Wildlife 2020a) within 2.5 miles of these new lines. Tricolored blackbirds would have the highest risk of collision the proposed transmission lines during winter movements throughout the study area, when individuals are migrating in large flocks and dense fog is common. Migratory movements and daily flights between roosting and foraging habitat make tricolored blackbird vulnerable to collision with transmission lines. Tricolored blackbirds are considered strong and agile flyers with moderate maneuverability (i.e., low wing loading/low aspect ratio) (Beedy et al. 2020) and therefore are physically equipped to avoid collision with power lines. However, tricolored blackbird are known to form large flocks which locking increases collision risk compared to non-flocking species because of decreased visibility for birds flying at the rear of the flock (Murphy et al. 2009:18; Jenkins et al. 2010:10; Avian Power Line Interaction Committee 2012:37; Murphy et al. 2016b:315). Transmission line poles and towers also provide perching substrate for raptors, which prey on tricolored blackbird. The existing network of transmission lines in the study area currently poses these risks and any incremental risk associated with the new power line corridors would not be expected to affect the study area population.

Changes in water operations under all project alternatives is not expected to affect tricolored blackbird habitat, but there is some potential to exacerbate bioaccumulation of mercury in tricolored blackbird because mercury can be transported to terrestrial foodwebs (Cristol et al. 2008:335). Largemouth bass was used as an indicator species for analysis of impacts from changes in operations due to the project alternatives because they are good indicators of mercury contamination throughout the aquatic foodweb (Wood et al. 2010:67). Although the magnitude of methylmercury bioaccumulation differs among species and foodwebs, methylmercury can be transported to terrestrial foodwebs through consumption of aquatic prey (Cristol et al. 2008:335); therefore, changes in aquatic foodweb methylmercury concentrations are assumed to result in changes in adjacent terrestrial foodwebs. The modeled effects of mercury concentrations from changes in water operations on largemouth bass did not differ substantially from existing conditions (Appendix 9H); therefore, these results also indicate tricolored blackbird mercury exposure would not measurably increase as a result of project operations.

Microcystin toxins originate in aquatic systems and can be transported through foodwebs through consumption (Moy et al. 2016:A) and can affect tricolored blackbirds if they forage near aquatic habitats with conditions that promote formation of CHABs. Operation of all project alternatives is not expected to substantially change the five factors that could create conditions more conducive to CHAB formation (i.e., temperature, residence time, nutrients, water velocities and associated turbulence and mixing, and water clarity and associated irradiance) relative to existing conditions within the Delta (Chapter 9). The water quality modeling results show a potential for increased residence time in some locations and months within the central Delta, namely Discovery Bay where residence times are already very long, which could contribute to increased *Microcystis* bloom size in some years at these locations if the remaining four environmental factors were also at levels conducive to forming CHABs. Nevertheless, based on known *Microcystis* dynamics in the Delta a small increase of residence time at Discovery Bay would not cause *Microcystis* blooms to substantially increase in size or last substantially longer, relative to existing conditions. Because the project alternatives, through their effects on the five factors potentially associated with CHABs in the Delta, are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystin or any other cyanotoxins in the Delta that could cause a substantial adverse impact on tricolored blackbird, relative to existing conditions.

Current use and legacy pesticides have the potential to bioaccumulate in the food items of tricolored blackbird. Impacts of all project alternatives on pesticides in the Delta were analyzed in Chapter 9. Operation of all project alternatives and potential runoff from project facilities would not result in substantial increases in pesticide concentrations in Delta waters or in Delta outflows, and would not result in land-use changes that would increase use of pesticides in habitats used by tricolored blackbirds, relative to existing conditions. Therefore, the project alternatives would not substantially reduce prey availability or increase pesticide exposure to tricolored blackbird.

Changes in water operations under all project alternatives is not expected to affect tricolored blackbird habitat, but there is some potential to exacerbate bioaccumulation of selenium in tricolored blackbird because selenium can be transported to terrestrial foodwebs. Modeled selenium concentrations in the eggs of insect-eating birds, such as tricolored blackbird, were below the level of concern and did not differ substantially from existing conditions under all alternatives

(Appendix 9J). Therefore, the project alternatives are not anticipated to substantially increase the risk of selenium contamination in tricolored blackbird.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in periodic disturbances that could affect tricolored blackbird. Maintenance activities across all facilities that could affect tricolored blackbird include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle. Maintenance activities at launch and maintenance shafts along the central alignment (Alternatives 1, 2a, 2b, and 2c), eastern alignment (Alternatives 3, 4a, 4b, and 4c), and Bethany Reservoir alignment (Alternative 5) would include similar semiannual general and ground maintenance in addition to daily inspections by vehicle. Maintenance activities at all project facilities including human presence, could create noise and visual disturbance that could disrupt normal foraging behavior, cause loss or injury of eggs or nestlings, or cause collision-related mortality. Maintenance-related accidental discharge of contaminants or the use of herbicides, and pesticides within suitable habitat could expose tricolored blackbird (and/or their prey) to toxic materials could result in injury and mortality of individuals as well as lead to habitat degradation. Maintenance activities would generally be conducted during the day, except for emergency maintenance, and would therefore not require additional lighting, or affect roosting tricolored blackbirds during the nonbreeding season (August 1 through March 14) if roost sites are present.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of the water conveyance facilities under all project alternatives would result in impacts on tricolored blackbird through the permanent and temporary loss of modeled habitat of a special-status species and the potential for injury, mortality, and the disruption of normal behaviors. While these impact mechanisms are present, the likelihood of injury or mortality of nesting tricolored blackbirds is low given the small number of breeding colonies currently in the Delta. Suitable nesting habitat also meets habitat criteria for nighttime roosting habitat and thus roosting birds could potentially be affected by nighttime construction occurring during the nonbreeding season. For all project alternatives, changes in water operations would not be expected to result in a measurable increase in mercury or selenium bioavailability or increased exposure to pesticides or microcystins on tricolored blackbird. The temporary impacts on habitat and potential impacts of injury, mortality, or disruption of normal behaviors from project construction, operations, and maintenance activities would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Special-Status Species* (Appendix 3B); however, even with these commitments, the impacts of the project alternatives on tricolored blackbird would be significant. The CMP would be required to offset the loss of previously occupied (occupied within the last 15 years) or occupied nesting habitat by protecting tricolored blackbird colonies and associated foraging habitat (Appendix 3F, Table 3F.1-3, CMP-22a: *Tricolored Blackbird Nesting Habitat,* CMP-22b: *Tricolored Blackbird Foraging Habitat*), which would mitigate the loss of tricolored blackbird previously occupied (occupied within the last 15 years) or occupied nesting habitat to a less-than-significant level. The CMP also includes creation or enhancement of valley/foothill riparian, nontidal freshwater emergent wetland, and pond habitat on Bouldin Island (Appendix 3F, Section 3F.4.1.3) and the I-5 ponds (Appendix 3F, Section 3F.4.1.4) and tidal restoration activities which would include channel margin enhancement (Appendix 3F, Section 3F.4.3.2.1) and tidal emergent wetland habitat restoration (Appendix 3F, Section 3F.4.3.2.3) some of which may also provide suitable nesting and roosting habitat for tricolored blackbird. The upland grassland components of the Bouldin Island (Appendix 3F, Section 3F.4.1.3) and I-5 ponds (Appendix 3F, Section 3F.4.1.4) created or enhanced wetlands and the compensation for loss of Swainson's hawk foraging habitat (Attachment 3F.1, Table 3F.1-3, CMP-19b: *Swainson's Hawk Foraging Habitat*) would also provide suitable foraging habitat for tricolored blackbird. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences* (Chapter 18); NOI-1: *Develop and Implement a Noise Control Plan* (Chapter 24); BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities*; BIO-2c: *Electrical Power Line Support Placement*; and BIO-44: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird* would be required to avoid and minimize the potential for injury, mortality, or the disruption of normal nesting, roosting, and foraging behaviors and disturbances to habitat. The impacts on tricolored blackbird from the project alternatives would be less than significant with mitigation because the aforementioned measures would replace lost habitat, reduce direct effects on the species, including habitat, noise, and visual disturbances, by providing environmental awareness training to construction personnel, by implementing protective measures during maintenance activities, and avoidance measures for tricolored blackbird during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP (see Impact BIO-1 for a summary discussion of the CMP) would offset the loss of tricolored blackbird previously occupied colony habitat (occupied in the last 15 years) and occupied nesting habitat by protecting tricolored blackbird colonies or by restoring and managing nesting habitat (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-22a: *Tricolored Blackbird Nesting Habitat*) and associated foraging habitat (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-22b: *Tricolored Blackbird Foraging Habitat*). Protection or restoration of tricolored blackbird nesting and foraging habitat would occur at the I-5 pond mitigation sites or on Bouldin Island, or at another location subject to CDFW approval. Although no mitigation is specifically proposed for tricolored blackbird suitable nesting habitat (which also provides suitable habitat for nonbreeding night roosts), the CMP also includes creation or enhancement of valley/foothill riparian, nontidal freshwater emergent wetland, and pond habitat on Bouldin Island (Appendix 3F, Section 3F.4.1.3) and the I-5 ponds (Appendix 3F, Section 3F.4.1.4) and tidal restoration activities which would include channel margin enhancement (Appendix 3F, Section 3F.4.3.2.1) and tidal emergent wetland habitat restoration (Appendix 3F, Section 3F.4.3.2.3) some of which may also provide suitable nesting and roosting habitat for tricolored blackbird. The upland grassland components of the Bouldin Island (Appendix 3F, Section 3F.4.1.3) and I-5 ponds (Appendix 3F, Section 3F.4.1.4) created or enhanced wetlands and the compensation for loss of Swainson's hawk foraging habitat (Attachment 3F.1, Table 3F.1-3, CMP-19b: *Swainson's Hawk Foraging Habitat*) would also provide suitable foraging habitat for tricolored blackbird.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure NOI-1: Develop and Implement a Noise Control Plan

See description of Mitigation Measure NOI-1 under Impact NOI-1 in Chapter 24.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

See description of Mitigation Measure BIO-2c under Impact BIO-2.

Mitigation Measure BIO-44: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird

All Project Alternatives

The following measures will be required to avoid disturbance of tricolored blackbird.

1. Preconstruction Surveys.
    a. Nesting. Prior to construction, DWR will contact the UC Davis Tricolored Blackbird Portal Project staff, or another group as recommended by CDFW, to acquire recent colony information. Prior to initiation of construction in area given work area and within 1,300 feet (396 meters) of the work area, the CDFW-approved biologist(s) will conduct preconstruction surveys to evaluate the presence of tricolored blackbird breeding colonies and suitable nesting habitat. Surveys will be conducted during the breeding season (March 15 through July 31) 1 year prior to, and then again in the year of, construction. During each year, surveys will be conducted monthly in March, April, May, June, and July. If construction is initiated during the breeding season, the CDFW-approved biologist(s) will conduct three surveys within 15 days of construction, with one of the surveys within 5 days of the start of construction. If there is a break in construction of 1 week or more, surveys will be conducted prior to starting construction again in the area. DWR will use a breeding season survey protocol approved in writing by CDFW. The CDFW-approved biologist(s) will delineate suitable nesting habitat and breeding colonies with flagging or other visible marking. If active tricolored blackbird nesting colonies are identified, the following avoidance measures will be implemented.
    b. Roosting. Prior to initiation of nighttime construction activities (30 minutes before sunset to 30 minutes after sunrise) within 300 feet of a construction site, the CDFW-approved biologist(s) will conduct preconstruction surveys to establish the existence and use of roosting habitat by tricolored blackbird. Surveys will be conducted during the

nonbreeding season (August 1 through March 14) the year of construction. If nighttime construction is initiated at a site during the nonbreeding season, the CDFW-approved biologist(s) will conduct three surveys within 15 days prior to the nighttime construction, with one of the surveys within 5 days prior to the start of the nighttime construction. DWR will use a roosting survey protocol approved in writing by CDFW. DWR will consider roosting habitat occupied by large mixed blackbird flocks to be occupied by tricolored blackbird if the CDFW-approved biologist(s) cannot clearly identify tricolored blackbird presence within the flock. During nighttime construction activities (30 minutes before sunset to 30 minutes after sunrise), the CDFW-approved biologist(s) will check suitable roost sites within 300 feet of construction areas that are not occupied at the time of preconstruction surveys each day throughout the nonbreeding season, in accordance with the roosting survey protocol approved by CDFW, to determine whether tricolored blackbird later occupy the roost site.

2. No-Activity Buffer for Breeding. DWR will ensure construction avoids suitable nesting habitat within 1,300 feet, to the extent practicable. If nesting habitat cannot be avoided and a tricolored blackbird breeding colony is detected, DWR will ensure construction does not occur within a 1,300-foot diameter no-activity buffer surrounding the colony and associated habitat during the breeding season (March 15 through July 31). The no-activity buffer may be reduced to a minimum of 300 feet (91 meters), with written approval from CDFW, in areas with dense forest, buildings, or other features between the construction and the breeding colony, where there is sufficient topographic relief to protect the colony from excessive noise or visual disturbance; or where sound curtains have been installed. If tricolored blackbird colonizes habitat adjacent to construction after they have been initiated, DWR will reduce disturbance through establishment of no-activity buffers or sound curtains, as determined in consultation with CDFW.

3. Night Work. DWR will restrict construction to 30 minutes after sunrise to 30 minutes before sunset if occurring within 1,300 feet (396 meters) of a breeding colony occupied by tricolored blackbird to the extent feasible.

4. Daily Monitoring. Where access allows, the CDFW-approved biologist(s) will monitor breeding colonies that are within 1,300 feet (396 meters) of construction for at least 6 hours per day, to verify that construction is not disrupting the colony. If the Designated Biologist(s) determines that construction is causing a disruption to the colony, the CDFW-approved biologist(s) will have the authority to stop construction and will notify DWR immediately. The DWR Representative will notify CDFW within 24 hours to determine additional protective measures that can be implemented. The CDFW-approved biologist(s) will have the authority to:

    a. Stop construction activities that are resulting in the disturbance until additional protective measures are implemented, unless tricolored blackbird breeding behavior normalizes on its own.

    b. Continue monitoring and ensure additional protective measures will remain in place for the duration of construction.

    c. Determine if additional protective measures are ineffective and stop construction as needed until the additional protective measures are modified.

    d. Maintain additional protective measures until the CDFW-approved biologist determines tricolored blackbird behavior has normalized and continue monitoring.

Additional protective measures may include, but are not limited to, increasing the size of the buffer, delaying construction until the colony is finished breeding and chicks have left the nest site, temporarily relocating staging areas, and temporarily rerouting access to the construction site. The CDFW-approved biologist(s) will notify CDFW within 24 hours if nests or nestlings are abandoned. If the nestlings are still alive, the CDFW-approved biologist (s) will work with CDFW to determine appropriate actions. Notification to CDFW will be via telephone or email, followed by a written incident report. Notification will include the date, time, location, and circumstances of the incident.

5. No-Activity Buffer for Roosting. DWR will not conduct nighttime construction (30 minutes before sunset to 30 minutes after sunrise) within a 300-foot no-activity buffer surrounding the roost site (no-activity buffer). The no-activity buffer may be modified in areas with dense forest, buildings, or other features between the nighttime construction and the occupied roost site; where there is sufficient topographic relief to protect the roost site from excessive noise or visual disturbance; or where sound curtains are installed, as approved in writing by CDFW. Occupied roost sites that are within 300 feet of nighttime construction that occurs 30 minutes before sunset to 30 minutes after sunrise will be monitored daily (beginning 30 minutes before sunset) by the CDFW-approved biologist(s), for at least 4 hours or until the roost site is no longer occupied, to verify that the activity is not disrupting the roosting birds. If the CDFW-approved biologist(s) determines construction are disrupting roosting activity, DWR will put additional protective measures in place until the tricolored blackbird behavior normalizes. Additional protective measures may include, but are not limited to, increasing the size of the no-activity buffer, delaying nighttime construction until the flock has left the roost site or the end of the nonbreeding season, temporarily relocating staging areas, temporarily rerouting access to the construction site, or installation of sound curtains. DWR will contact CDFW if protective measures are not effectively reducing disruption to the roost site.

6. Disturbance of Breeding Colonies and Roost Sites. DWR will prohibit physical contact with a breeding colony during the breeding season (March 15 through July 31) from the time of nest site selection until after the chicks have fledged. DWR will prohibit physical contact with an occupied roost site during the nonbreeding season (August 1 through March 14). Project personnel will not exit vehicles when inside the established no-activity buffer for breeding or roosting when tricolored blackbird is present.

7. Nesting Habitat Avoidance for Geotechnical Exploration and Transmission Line Construction. The CDFW-approved biologist (s) will delineate breeding colonies and buffers with flagging or other visible marking at construction sites for geotechnical exploration and transmission line construction, including work and staging areas and access roads. DWR will restrict these construction activities to construction sites outside of the delineated habitat. DWR will not conduct these construction activities within no-activity buffers established for breeding colonies.

8. Helicopters. DWR will not use helicopters to conduct field investigations or to string transmission lines within 200 horizontal feet (61 meters) or 150 vertical feet (46 meters) of breeding colonies unless the helicopter is small enough to only cause a down draft of 15 to 18 miles per hour at up to 150 feet (46 meters). DWR will only operate helicopters at these distances from the breeding colony for up to 3 minutes in duration, once or twice per day, with a minimum of 4 hours between helicopter activities. For larger helicopters or longer work periods, DWR will consult with CDFW to establish the appropriate buffer. DWR will

ensure helicopters do not land or take off within 500 feet (152 meters) of any breeding colony. This buffer may be modified in areas with dense forest, buildings, or other features between the helicopter landing/take-off site and the breeding colony, where there is sufficient topographic relief to protect the breeding colony from excessive noise or disturbance; and as approved in writing by CDFW. Helicopters will not be used between 30 minutes before sunset to 30 minutes after sunrise.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands as well as habitat for special-status species under the project's CMP would affect tricolored blackbird through the permanent and temporary loss of habitat (Appendix 13C), from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or grasslands are located, and could result in the temporary disturbance of existing tricolored blackbird foraging habitat and the potential for disruption of normal behaviors, injury, or mortality of the species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Conversion and management of agricultural lands would provide foraging habitat of equal or greater habitat value for tricolored blackbird and would maintain these lands in non-permanent crop types in perpetuity. Crop rotations, and related management activities would be conducted under a similar disturbance regime that the species would encounter under existing conditions, but could result in the disruption of normal behaviors, injury, or mortality. Grassland enhancement activities could also create temporary disturbances of the species. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would account for any losses of tricolored blackbird previously occupied colony habitat (occupied in the last 15 years) and occupied nesting habitat from habitat creation by adjusting the overall commitment of riparian creation (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-3, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The creation and enhancement activities would also have the potential for injury, mortality, and the disruption of normal nesting and foraging behaviors of individuals if restoration activities occur during the breeding season (March 15 through July 31). Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-11: *Fugitive Dust Control*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); and Mitigation Measure BIO-44: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird* would reduce the potential for injury, mortality, and the disruption of normal behaviors of individuals to less than significant. These impacts would be less than significant with mitigation because the aforementioned measures would (1) train construction staff on protecting tricolored blackbird, the requirements for avoiding impacts, and the ramifications for not following these measures; (2) minimize dust; (3) implement spill prevention and containment plans that would avoid material spills that could affect habitat; (4) prior to and during restoration and enhancement ground disturbance, establish protective buffers around occupied nesting habitat; and (5) have a biological monitor present that would ensure that non-disturbance buffers are intact and avoidance measures for tricolored blackbird and all protective measures are being implemented where applicable. Construction activities associated with the CMP would be expected to be conducted during the day, and would therefore not require additional lighting, or affect roosting tricolored blackbirds during the nonbreeding season (August 1 through March 14) if roost sites are present.

Creation and enhancement of wetlands under the CMP have the potential to exacerbate bioaccumulation of methylmercury in tricolored blackbird by creating newly inundated wetlands which can produce the biogeochemical conditions to methylate mercury existing in Delta soils and expose songbirds to potentially high concentrations of methylmercury in large insect prey (Cristol et al. 2008:335). Potential effects of increased mercury exposure are unknown for tricolored blackbird but high concentrations of methylmercury have been reported in some songbirds. Because Bouldin Island and the I-5 ponds sites consist of existing managed and agricultural wetlands and ponds, wetland creation and enhancement are not expected to increase mercury methylation, relative to existing conditions. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include mercury monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased mercury methylation, relative to existing conditions. Mitigation Measure WQ-6: *Develop and Implement a Mercury Management and Monitoring Plan*, which contains measures to assess the amount of mercury at tidal restoration sites before project development, followed by appropriate design, monitoring, and adaptative management, would minimize the potential for any effects of increased methylmercury exposure. Therefore, implementation of the CMP would not be expected to have a significant adverse impact on tricolored blackbird.

Herbicides would be applied at CMP creation and enhancement sites to remove nonnative vegetation for site preparation and to support establishment of new plantings. Natural habitats contribute fewer pesticides to receiving waters than agricultural areas where pesticides are applied. Any newly created wetlands or enhanced natural habitat could also filter stormwater to remove solids and either improve or have no effect on pesticide concentrations in discharges to receiving waters, relative to existing conditions. As such, wetland creation and enhancement areas are expected to somewhat reduce, rather than increase, runoff of pesticides into adjacent waterbodies. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that herbicides would be applied in such a manner as to prevent primary or secondary poisoning of tricolored blackbirds.

Habitat creation and enhancement under the CMP has the potential to result in conditions that promote CHABs, which could result in impacts on tricolored blackbirds using created and/or enhanced wetland and aquatic habitats. High levels of microcystins in tissues and microcystin poisoning have been documented in other wetland bird species (Chen et al. 2009:3317) and could affect tricolored blackbirds if they forage in areas with conditions that promote CHABs. Monitoring and adaptive management plans as described in the CMP (Appendix 3F, Section 3F.7.2) would include CHAB monitoring and adaptive management at Bouldin Island and the I-5 ponds to prevent increased CHAB formation, relative to existing conditions. As discussed in Chapter 9, tidal habitat creation is not expected to cause substantial additional *Microcystis* production. Therefore, implementation of the CMP would not result in increased CHAB formation that could cause substantial adverse impacts on tricolored blackbird, relative to existing conditions.

Wetland creation and enhancement may provide habitat for tricolored blackbirds, which could increase the risk of selenium toxicity to the species. It is difficult to determine whether the effects of potential increases in selenium bioavailability associated with the CMP would lead to adverse effects. Potential effects of increased selenium exposure are likely low for tricolored blackbirds because they primarily forage on lower-trophic items with less potential to biomagnify selenium such as seeds and insects and often forage in non-wetland habitats, and existing selenium concentrations in the Sacramento River watershed are low (Central Valley Regional Water Quality Control Board 1988:14). Modeled concentrations in insect-eating bird eggs under existing conditions in the Delta were below levels of concern for other bird species (Appendix 9J). Therefore, potential very low-level increase in exposure to selenium resulting from wetland creation and enhancement would not be expected to adversely affect tricolored blackbird populations. The impact on tricolored blackbird from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, the use of heavy equipment, pile driving, or pesticides that would have the potential to expose tricolored blackbird to excessive noise, visual disturbance, dust, and hazardous materials that could cause loss of modeled habitat, disruption of normal behaviors, and injury or mortality. The mitigation measures with potential to result in impacts on tricolored blackbird are similar to those discussed under Impact BIO-31: *Impacts of the Project on Western Yellow-Billed Cuckoo*. Impacts on tricolored blackbird resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to tricolored blackbird impacts of the project alternatives.

The impacts of habitat loss, noise, visual disturbance, and exposure to dust or hazardous materials on tricolored blackbird would be reduced through the CMP, environmental commitments, and Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan* as detailed under Impact BIO-31: *Impacts of the Project on Impacts of the Project on Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-44: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird* would require species-specific measures to reduce these impacts. Therefore, impacts on tricolored blackbird from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on tricolored blackbird from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-45: Impacts of the Project on Bats

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life histories and habitat suitability models for pallid bat, Townsend's big-eared bat, big brown bat, silver-haired bat, western red bat, hoary bat, California myotis, little brown bat, western small footed myotis, Yuma myotis, western pipistrelle, western mastiff bat, and Mexican free-tailed bat are presented in the species accounts in Appendix 13B, *Species Accounts*, Sections 13B.88 through 13B.100.

All Project Alternatives

Construction

The construction of all the project alternatives would result in permanent and temporary impacts on modeled habitat for bats. The mechanisms for the loss of foraging and roosting habitat would generally be similar for all project alternatives and would primarily occur as a result of the levee improvement work, new roads and road improvements, the intake construction, and in addition for Alternative 5 the Bethany Reservoir Pumping Plant and access roads (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements throughout the central alignment (Table 13-92). Alternative 5 would result in substantially fewer impacts on modeled bat habitat, largely due to not having the Southern Complex as part of this alternative. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-92. Impacts on Modeled Bat Habitat by Alternative

Alternative	Permanent Impacts (foraging) (acres) [a]	Temporary Impacts (foraging) (acres)	Permanent Impacts (structure roosting) (acres) [a]	Temporary Impacts (structure roosting) (acres)	Permanent Impacts (tree roosting) (acres) [a]	Temporary Impacts (tree roosting) (acres)	Total (acres)
1	3,331.10	444.42	6.16	5.65	146.57	21.82	3,955.72
2a	3,623.05	498.69	5.94	6.08	194.90	29.97	4,358.63
2b	2,870.68	483.58	5.77	5.29	59.30	23.12	3,447.74
2c	3,143.89	496.85	5.94	5.85	143.34	24.04	3,819.91
3	3,016.67	393.54	8.28	5.78	108.58	18.14	3,550.99
4a	3,381.57	397.15	8.28	6.01	159.30	24.20	3,976.51
4b	2,573.11	382.03	8.11	5.23	23.71	17.35	3,009.54
4c	2,867.24	395.27	8.28	5.78	107.75	18.29	3,402.61
5	2,007.49	240.38	9.95	6.88	231.38	24.61	2,520.75

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities associated with all facilities under all project alternatives have a potential for injury, mortality, and the disruption of normal behaviors (i.e., foraging, roosting, breeding) of bats from general construction disturbance (e.g., lights used for night work, vibrations, noise), the removal of buildings, vegetation removal in advance of grading and excavation for the construction of project infrastructure, bridge widening on the Hood-Franklin bridge over Snodgrass Slough (Alternatives 1, 2a, 2c, 3, 4a, 4c, and 5), the widening of the SR 12 bridge over Little Potato Slough (Alternatives 1, 2a, 2b, and 2c), and the widening of an overpass on SR 12 on Bouldin Island (Alternatives 1, 2a, 2b, and 2c). Additional disturbance would take place with the removal of the bridge over Connection Slough between Mandeville and Bacon Islands (Alternatives 1, 2a, 2b, and 2c), surface disturbance of the UPRR rail bridge over the California Aqueduct (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), and work on Lambert Road beneath the I-5 overpass (all alternatives). All of these bridges and overpasses, except the overpass on Bouldin Island, were assessed for bats and bat roosting habitat by DWR in 2009 (California Department of Water Resources 2011). Table 13-93 provides a summary of the structures, their potential to support bats, a listing of the relevant alternatives, and proposed project activity. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that construction staff are trained on protecting bat colonies, reporting requirements, and the ramifications for not following these measures and would reduce these potential impacts by having a qualified biological monitor present and implementing non-disturbance buffers using construction fencing, where applicable.

Table 13-93. Structures Evaluated for Bat Habitat in the Project Footprint [a]

Structure Type	Location	Summary of Findings	Alternatives	Project Activity
Bridge	Hood-Franklin Road at Snodgrass Slough	No sign of bats, potential night-roosting habitat	1, 2a, 2c, 3, 4a, 4c, 5	Bridge widening
Bridge	UPRR Railroad at California Aqueduct	Potential day and night roosting	1, 2a, 2b, 2c, 3, 4a, 4b, 4c	New tracks on existing bridge
Overpass	I-5 at Lambert Road	No sign of bats, potential night roost habitat	All	Resurfacing of road
Bridge	SR 12 at Little Potato Slough	No sign of bats (not all areas accessible), potential roosting habitat assumed	1, 2a, 2b, 2c	Bridge widening
Overpass	SR 12 at farm road on Bouldin Island	Not assessed	1, 2a, 2b, 2c	Overpass widening
Bridge	Un-named road at Connection Slough connecting Mandeville and Bacon Islands	No habitat (metal structure with no potential habitat)	1, 2a, 2b, 2c	Temporary work area for removing the bridge

I- = Interstate; SR = State Route.
[a] Evaluation conducted by DWR staff in 2009 (California Department of Water Resources 2011).

There are no CNDDB occurrences of bats that would be permanently or temporarily affected by project construction for any of the project alternatives (California Department of Fish and Wildlife 2020a); however, that does not mean bats are not currently occupying these areas because surveys have not been conducted in all parts of the study area. The nearest bat occurrence is a western red bat record (#68, from 1999) approximately 4 miles west of a tunnel shaft work area between Walnut Grove and Thornton (California Department of Fish and Wildlife 2020a).

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15, *Field Investigations*; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat, the potential for injury, mortality, and the disruption of normal behaviors of bats. Geotechnical investigations associated with the tunnels for all alternatives, which include CPTs and soil borings, would result in temporary impacts on modeled habitat (Appendix 13C). The West Tracy Fault Study investigations would temporarily disturb modeled foraging habitat but not roosting habitat for bats. The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1-day) duration of the disturbance, impacts on modeled foraging habitat are not quantified and are considered negligible. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pile installation test methods at the north Delta intakes, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of bats as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that construction staff are trained on protecting bat colonies, reporting requirements, and the ramifications for not following these measures and reduce these potential impacts by having a qualified biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

Operations

Lighting at project facilities has the potential to affect bats if roosting habitat is close to the light source or if light is directed toward roosting habitat, which could make the roost unusable or disrupt normal behaviors of bats using the roost.

It is unclear whether lighting affects bat foraging behavior because their prey (insects) respond very differently to different types of lighting and thus bat attraction also varies (Johnston et al. 2019:3-2, 3-3).

As stated in Chapter 3, Section 3.4.12, *Fencing and Lighting*, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, which would avoid the potential for this impact. The analysis in Chapter 18, Impact AES-4: *Create New Sources of Substantial Light That Would Adversely Affect Day or Nighttime Views of the Construction Areas or Permanent Facilities*, shows that with the project designs the lighting would be shielded and oriented in such a manner so as not to subject the immediate surroundings to extremes in levels of light; however, some impact on bats may remain.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives infrastructure could result in impacts on bats. Maintenance activities across all facilities that could affect bats include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle, could result in disturbances to roosting bats, if present.

CEQA Conclusion—All Project Alternatives

Construction, operation, and maintenance of all project alternatives would result in impacts on bats through the permanent and temporary loss of modeled habitat and the potential for injury, mortality, and the disruption of normal behaviors. The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors of bats from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); however, even with these commitments, the loss of habitat from the construction of the project alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction, operations, and maintenance on bats would be significant. The CMP would offset the loss of tree-roosting habitat by creating and protecting riparian habitat (Appendix 3F, Section 3F.3.2.3) and offset the loss of foraging habitat by creating and protecting wetlands, riparian, and grasslands on Bouldin Island and at the I-5 ponds (Appendix 3F, Sections 3F.3.2 and 3F.3.3) and through the protection of agricultural foraging habitat for sandhill cranes, Swainson's hawk, and tricolored blackbird (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat,* CMP-19b: *Swainson's Hawk Foraging Habitat*, and CMP-22a: *Tricolored Blackbird Nesting Habitat,* and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Any losses of roosting habitat on bridges and overpasses would be mitigated by Mitigation Measure BIO-45a: *Compensate for Impacts on Bat Roosting Habitat on Bridges and Overpasses*. The CMP together with Mitigation Measure BIO-45a would reduce the loss of bat habitat to a less-than-significant level. Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction* (Chapter 18), BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, and BIO-45b: *Avoid and Minimize Impacts on Bats* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on bats from the project alternatives would be less than significant with mitigation because these measures would replace lost habitat and reduce direct effects on the species (including habitat modification) by (1) implementing protective measures during maintenance activities, which would include assessing work areas for habitat and conducting surveys for bats where appropriate and delaying maintenance activities where possible; (2) designing lighting that avoids spillover into habitats and choosing light sources less disruptive to wildlife and thus avoiding disrupting roost sites and foraging activity; and (3) prior to and during construction, identifying occupied roosts and implementing construction activities such that the avoid disrupting roosts, in particular maternal roosts, and establishing protective buffers around roosts.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of bat tree-roosting habitat by creating and protecting riparian habitat on Bouldin Island and at the I-5 ponds, and managing these areas in perpetuity (Appendix 3F, Section 3F.3.2.3). Bat foraging habitat losses would be offset by creating and protecting wetlands, riparian, and grasslands on Bouldin Island and at the I-5 ponds (Appendix 3F, Sections 3F.3.2 and 3F.3.3) and through the protection and management of agricultural foraging habitat for sandhill cranes, Swainson's hawk, and tricolored blackbird, which would also generally benefit foraging bats, in particular on lands managed for tricolored blackbird, which have limitations on insecticide use (Appendix 3F, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat,* and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Channel margin restoration would include riparian plantings on rock benches (Appendix 3F, Section 3F.4.3.3.3) that may provide for future tree-roosting bat habitat once trees mature.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-45a: Compensate for the Loss of Bat Roosting Habitat on Bridges and Overpasses

All Project Alternatives

If bridge or overpass roosting habitat is lost during bridge or overpass widening, DWR will replace habitat on the same bridge or overpass at a minimum ratio of 1:1 or a functionally equivalent amount of habitat. To the extent practicable, replacement habitat will have similar dimensions and orientation as the habitat that was affected or lost. Replacement habitat on bridges/overpasses and associated monitoring will follow the guidance in *Caltrans Bat Mitigation: A Guide to Developing Feasible and Effective Solutions* (Johnston et al. 2019), or the most recent guidance available at that time, with final plans developed in coordination with CDFW.

Mitigation Measure BIO-45b: Avoid and Minimize Impacts on Roosting Bats

All Project Alternatives

The following measures were designed to avoid and minimize impacts on special-status bats. These measures are in part adopted from *Caltrans Bat Mitigation: A Guide to Developing Feasible* *and Effective Solutions* (Johnston et al. 2019). Bat species with potential to occur in the study area employ varied roost strategies, from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as buildings and bridges. Daily and seasonal variations in habitat use are common. To obtain the highest likelihood of detection, preconstruction bat surveys will be implemented by DWR approximately 2 years prior to the beginning of construction at a given location, to the extent practicable.

Preconstruction Bridge, Overpass, and Other Structure Surveys

1. Approximately 2 years prior to construction, including demolition, beginning on a bridge, overpass or a structure, a qualified biologist, with knowledge of the natural history of California bats, experience identifying habitat, and experience using full-spectrum acoustic equipment, will conduct a daytime search for bat sign (e.g., guano, urine staining, culled insect parts) on or underneath the bridge, overpass, or structure. This 2-year period prior to construction allows enough time to conduct surveys and plan for evictions, if necessary. Biologists conducting daytime surveys will listen for audible social calls through the use of bat detector, which converts ultrasonic echolocation emissions into frequencies audible to humans in real-time. This field assessment can be performed during any time of year, provided that weather conditions or local flooding do not affect the biologist's ability to do a thorough evaluation. Visual observations can be made using the naked eye, binoculars, a high-powered flashlight, and or a fiber-optic camera probe to inspect eaves and attics of structures and on bridge or overpass expansion joints, weep holes, and other bridge or overpass features that could house bats. Surveys should include the following methods.
    a. Survey under the entire bridge or overpass, as practicable.
    b. Identify the type of habitat present (e.g., day and night-roosting habitat).
    c. Describe the features that provide the roosting habitat (e.g., expansion joints, hinges, closure pours).
    d. Describe signs of bat use with respect to each habitat feature, if present.
    e. Include a sketch of the structure showing the locations of suitable habitat features and bat activity in each feature, based on sign or visual detection. A sketch will help in describing the habitat feature and planning for future surveys.
    f. Use the preferred method of documenting conditions in the survey area, including evidence of bats: a digital camera capable of capturing high-resolution images that provide scale. Take adequate photos to capture the bridge or overpass size, structural type, and all features that are relevant to bat use. At a minimum, the photographs should document the bridge or overpass signage (with identification number, post mile, and bridge or overpass name [if applicable]); a right-angle (i.e., side perspective) view showing the entire span; the abutments and any details associated with potential roosting habitat; representative images of the soffit, expansion joints, hinges, and closure pours; how the piers support the deck; representative weep holes documenting the presence or absence of screens; and images of various bat sign, such as urine staining and guano on the structure.
    g. Because several species may occupy a bridge or overpass, ensure that each type of guano sign is photographed. If bats occupy the bridge or overpass, the survey time under active roosts needs to be limited. Any use of flash photography to document

roosting bats will create some level of disturbance. Many digital cameras can take images at very low light; if a flash is required, use a minimum setting such as 1/8 power or less.

h. Estimate dimensions (i.e., length, width, depth) of each roost habitat type. Dimensions should be taken into consideration when designing mitigation habitat.

i. Describe surrounding environmental conditions, including the dominant habitat type present, aquatic features, and other potential roost habitat (e.g., tree snags or large sycamores with cavities) on-site and in its vicinity. Survey the entire project site plus a 100-foot-wide buffer for potential roosting habitat.

2. If no habitat or sign of bats is observed, no further surveys are warranted. The biologist will carefully document the reasons for determining that no bat habitat is present on the bridge, overpass, or structure, and why further surveys are not merited. If habitat is present, but no sign of bats is observed, additional surveys would be necessary to support the conclusion that bats are not present because small colonies and individuals may often not produce obvious signs of occupancy and depending on the timing of the habitat assessment bats may have migrated or are not occupying the habitat at that time.

3. If suitable habitat or signs of bat use are observed during the preliminary field assessment, focused surveys should be performed by a biologist to determine whether colonies are present and the approximate size of the colony or colonies and the species present. Caution should be taken when conducting field surveys at active roosts. To ensure that disturbance is kept to a minimum, the biologist and any field assistants should not loiter directly underneath known or suspected occupied roosts longer than is necessary to record data. Surveys should be performed in the summer, fall, spring, and winter to determine how the site is used by bats. Information collected during focused surveys should include an estimate of the number of bats and species present during the summer, fall or spring, and winter to provide an assessment of spatial and temporal use, as described below.

a. Maternity season surveys. In California, the maternity season generally occurs from March 1 to August 31. The exact timing of the maternity season surveys will be determined by the biologist and take into consideration conditions in a given year. The following methods will be used for maternity season surveys.

i. Conduct a daytime inspection to determine if bats are present and to identify areas of high use. While daytime inspections are usually sufficient to determine the presence of night-roosting habitat, nighttime roost inspections (2 to 3 hours after sunset) are recommended if special-status species are suspected to occur.

ii. Conduct a follow-up dusk emergence count survey. Dusk emergence count surveys should be conducted on a warm night when nighttime lows are not less than 45°F and during dry weather conditions. Surveys should be conducted from approximately 15 minutes before sunset to 1 hour after sunset. Prior to any dusk emergence count, the biologist should understand the primary locations where bats are day roosting so these locations can be targeted during the emergence count. Depending on the locations and number of roost exit points, multiple surveyors may be needed. Surveyors should each be assigned a specific area that does not overlap with other surveyors' locations. Surveyors should station themselves such that roost exit points are backlit by the sky. If possible, night-vision goggles should be used to assist in the counting.

iii. Use bat detectors that produce an audible sound, which is helpful in identifying and counting bats as they emerge from the roost. Conduct active acoustic monitoring concurrent with exit count surveys to determine species or frequency group of bats.

b. Fall and spring migratory period surveys. At least one daytime site inspection and one dusk emergence count should be conducted between March and April, and between early September and mid-October, to assess if bats are present and to count individuals.

c. Winter surveys. At least one daytime site inspection should be conducted in January or February to determine if winter hibernacula or overwintering habitat for bats are present. Crevice-roosting species typically roost deep in crevices in the winter, and they may not be visible during winter inspections. Therefore, visual surveys, in combination with the use of an extendable fiber-optic camera probe to view inside crevices may be required for some bridges, overpasses, or structures.

Preconstruction Tree Surveys

4. If tree removal or trimming is necessary for project construction, approximately 1 year prior to construction at a given location a biologist will examine trees to be removed or trimmed for suitable bat roosting habitat. High-value habitat features (e.g., large tree cavities, basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch) will be identified and the area around these features searched for bats and bat sign (e.g., guano, culled insect parts, staining). Riparian woodland, orchards, and stands of mature broadleaf trees should be considered potential habitat for solitary foliage-roosting bat species.

5. 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 to 2 hours after sunset for a minimum of 2 nights within the season that construction would be taking place. Methodology should follow that described above for the bridge or overpass emergence survey.

6. Additionally, if suitable tree-roosting habitat is present, acoustic monitoring with a bat detector will be used to assist in determining species present. These surveys will be conducted in coordination with the acoustic monitoring conducted for the bridge, overpass, or structure.

Protective Measures for Bats Using Bridges, Overpasses, Structures, and Trees

7. Avoidance and minimization measures will be necessary if it is determined that bats are using a bridge, overpass, or structure or trees as roost sites and/or sensitive bats species are detected during acoustic monitoring. Appropriate measures will be determined by DWR in consultation with CDFW and will include, as applicable, the following measures.

    a. Ensure that bats are protected from noise, vibrations, and light that result from construction activities associated with project infrastructure as well as operations and maintenance of aboveground water conveyance facilities. This would be accomplished by either directing noise barriers and lights inward from the disturbance or ensuring that the disturbances do not extend more than 300 feet from the point source.

b. Avoid disturbance of the bridge, overpass, or structure between March 1 and August 31 (the maternity period) to avoid impacts on reproductively active females and dependent young.

c. Installation of exclusion devices from March 1 through October 31 to preclude bats from occupying the bridge or overpass during construction. Exclusionary devices will only be installed by or under the supervision of an experienced biologist.

d. Avoid tree removal between April 15 and September 15 (the maternity period for bat species that use trees) to avoid impacts on pregnant females and active maternity roosts (whether colonial or solitary).

e. Conduct tree removal between September 15 and October 31 to the maximum extent practicable, which corresponds to a time period when bats would not likely have entered winter hibernation and would not be caring for flightless young. If weather conditions remain conducive to regular bat activity beyond October 31, later tree removal may be considered in consultation with CDFW.

f. Remove trees in pieces, rather than felling the entire tree.

g. If a maternity roost is located, whether solitary or colonial, leave that roost undisturbed with a buffer as determined in consultation with CDFW until September 15 or until a biologist has determined the roost is no longer active.

h. If a non-maternity roost is found, avoid that roost to the maximum extent practicable and use an appropriate buffer established in consultation with CDFW. Every effort will be made to avoid the roost to the maximum extent practicable, as methods to evict bats from trees are largely untested. However, if the roost cannot be avoided, eviction will be attempted and procedures designed in consultation with CDFW to reduce the likelihood of mortality of evicted bats. In all cases:

    i. Eviction will not occur before September 15 and will match the timeframe for tree removal approved by CDFW.

    ii. Biologists will carry out or oversee the eviction tasks and monitor the tree trimming or removal.

    iii. Eviction will take place late in the day or in the evening to reduce the likelihood of evicted bats falling prey to diurnal predators.

    iv. Eviction will take place during weather and temperature conditions conducive to bat activity.

    v. Special-status bat roosts will not be disturbed.

    vi. Evictions will not occur until temporary or permanent replacement roosting habitat is established in close proximity to the roost. Replacement habitat plans will be reviewed and approved by CDFW. Habitat will be replaced at a ratio of 1:1 and will be functionally equivalent.

8. Eviction procedures will include but are not limited to:

    a. Pre-eviction surveys to obtain data to inform the eviction approach and subsequent mitigation requirements. Relevant data may include the species, sex, reproductive status, and number of bats using the roost, and roost conditions such as temperature and dimensions. Surveys may include visual emergence, night vision, acoustic, and capture.

b. Structural changes may be made to the roost, performed without harming bats, such that the conditions in the roost are undesirable to roosting bats and the bats leave on their own (e.g., open additional portals so that temperature, wind, light, and precipitation regime in the roost change).

c. Uninjurious harassment at the roost site to encourage bats to leave on their own, such as ultrasound deterrents or other sensory irritants.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands and other waters as well as habitat for special-status species on Bouldin Island and at the I-5 ponds under the project's CMP would affect modeled roosting and foraging habitat for bats (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish/restore habitats. The CMP could also affect modeled riparian habitat for bats through tidal wetland habitat restoration and channel margin enhancement because potential areas identified generally overlap with modeled bat habitat (Appendix 3F, Section 3F.4.3.4.2, *Site Selection Criteria and Tools*).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which could be used for bat foraging but these activities would not likely result in effects on bats because the work would be during the daytime, not take place in areas of roosting habitat, and the habitat disturbance would be minimal. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain roosting and foraging habitat for bats and management activities could affect this habitat and result in the disruption of normal behaviors, injury, and mortality of bats. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure no significant loss in habitat or habitat value (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. The creation and enhancement activities would also have the potential to cause injury, mortality, and the disruption of normal behaviors of bats. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B), and Mitigation Measure BIO-45b: *Avoid and Minimize Impacts on Bats* would reduce the potential for injury, mortality, and the disruption of normal behaviors of individuals to less than significant. These impacts would be less than significant with mitigation because the aforementioned measures would (1) train construction staff on protecting bats, the requirements for avoiding impacts, and the ramifications for not following these measures, and (2) prior to and during restoration and enhancement ground disturbance, identify occupied tree roosts and implement activities such that they avoid disrupting roosts, in particular maternal roosts, and establish protective buffers around roost sites.

The impact on special-status bats from the project with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance, building removal, vegetation removal, and the use of heavy equipment that would have the potential to result in loss of modeled habitat or result in injury, mortality, and the disruption of normal behaviors from exposure to excessive lighting, vibrations, and noise. Impacts on bats resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to impacts of the project alternatives on bats.

The loss of habitat and potential impacts of injury, mortality, and the disruption of normal behaviors of bats from the implementation of mitigation measures would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*, and EC-14: *Construction Best Management Practices for Biological Resources*; Mitigation Measure AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*, and Mitigation Measure BIO-45b: *Avoid and Minimize Impacts on Roosting Bats*. Therefore, impacts on bats from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on bats from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-46: Impacts of the Project on San Joaquin Kit Fox

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for San Joaquin kit fox are presented in the species account in Appendix 13B, Section 13B.101, *San Joaquin Kit Fox*.

Although habitat was modeled and the species is being considered for potential impacts, recent data shows an absence of San Joaquin kit fox from the northern portion of the range, including extensive surveys using scent dogs in 2001–2003 in Contra Costa and Alameda Counties that did not detect any sign of kit fox (U.S. Fish and Wildlife Service 2020a:27). Surveys and monitoring conducted in 2009–2017, and in 2021 to the east and west of Bethany Reservoir, which included den surveys and trail camera use, did not detect San Joaquin kit fox in these areas (California Department of Water Resources 2021:2; Environmental Science Associates 2017:4-23). USFWS, in their 2020 status assessment for the species, concluded that the Livermore analysis unit, which includes the westernmost portion of the study area, is in a "very low condition" for San Joaquin kit fox and shows "no evidence of a current population" (U.S. Fish and Wildlife Service 2020a:50–54).

All Project Alternatives

Construction

The construction of Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would not result in impacts on modeled habitat. The nearest project infrastructure is the SCADA line that connects the South Delta Outlet and Control Structure to the facilities at the Banks Pumping Plant, which passes adjacent to modeled kit fox habitat but would be buried in the existing access road running along the California Aqueduct.

Construction of the SCADA line from the South Delta Outlet and Control Structure to the Banks Pumping Plant for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c could result in the injury, mortality, and disruption of normal behaviors (e.g., foraging, dispersal) of San Joaquin kit fox if they are active in areas adjacent to this work area during construction. These effects could result from trenching and the use of construction-related vehicles. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality by (1) training construction staff on protecting San Joaquin kit fox, reporting requirements, and the ramifications for not following these measures; (2) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented; (3) ensuring trenches are covered at the end of the day or escape ramps are installed; (4) limiting construction vehicle traffic to a maximum speed limit of 15 miles per hour on unpaved, non-public construction access roads and nighttime speed limits to 10 miles per hour on these roads when they occur adjacent to suitable habitat for San Joaquin kit fox; (5) properly disposing of trash; and (6) keeping the work area free of firearms and pets.

The construction of Alternative 5 would result in the permanent and temporary loss of San Joaquin kit fox modeled habitat as a result of grading and excavation (Table 13-94). These impacts would occur as a result of the construction of the Bethany Reservoir Aqueduct (permanent and temporary impacts on low-quality modeled habitat), construction of the Bethany Reservoir Discharge Structure and associated access road (permanent and temporary impacts on low-quality modeled habitat), and construction of a metering area near Bethany Reservoir (permanent and temporary impacts on high-quality habitat). Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-94. Impacts on San Joaquin Kit Fox Habitat by Alternative

Alternative	Permanent Impacts High Quality (acres) [a]	Permanent Impacts Moderate Quality (acres) [a]	Permanent Impacts Low Quality (acres) [a]	Temporary Impacts High Quality (acres)	Temporary Impacts Moderate Quality (acres)	Temporary Impacts Low Quality (acres)	Total (acres)
1, 2a, 2b, 2c, 3, 4a, 4b, 4c	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	38.26	0.04	0.02	16.31	54.61

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction of the Bethany Reservoir Aqueduct, the Bethany Reservoir Discharge Structure, and access roads could result in the injury, mortality, and disruption of normal behaviors of San Joaquin kit fox if they are active in these areas during construction. These effects could result from project grading, excavation, the use of construction-related vehicles, and exposure of San Joaquin kit fox to construction-related fluids, such as fuels, oils, and cement. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality by (1) training construction staff on protecting San Joaquin kit fox, reporting requirements, and the ramifications for not following these measures; (2) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented; (3) ensuring trenches are covered at the end of the day or escape ramps are installed; (4) limiting construction vehicle traffic to a maximum speed limit of 15 miles per hour; (5) properly disposing of trash; (6) reducing the potential for discharge of construction materials in areas of potential habitat; and (7) keeping the work area free of firearms and pets.

Three historic CNDDB occurrences for San Joaquin kit fox overlap with the project footprint for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c (California Department of Fish and Wildlife 2020a). Occurrence #1,033 overlaps with the Southern Forebay, new permanent roads, and the temporary railway. This occurrence states that an observation was made sometime between 1972 and 1975 west of Clifton Court Forebay and 1.5 miles east of Byron Hot Springs. The area where this record is mapped is agricultural (i.e., hay, pasture, and alfalfa). CNDDB occurrence #61 overlaps with new road construction west of Byron Highway. This occurrence also lacks a specific location and is defined as being in the vicinity of Byron Airport, approximately 2 miles south of Byron (California Department of Fish and Wildlife 2020a). The occurrence is a mix of roadkill and sightings between 1972 and 1975, and an unknown number observed between 1990 and 1993 (California Department of Fish and Wildlife 2020a). This occurrence consists of a large polygon that covers areas of agriculture (hay and pasture), grassland, and developed areas. CNDDB occurrence # 561 overlaps with the SCADA line connecting the South Delta Outlet and Control Structure to the Banks Pumping Plant. This occurrence lacks a specific location and is defined as being near the Alameda/Contra Costa County Line and the California Aqueduct (California Department of Fish and Wildlife 2020a). The occurrence is a mix of sightings between 1972 and 1975 and an adult observed in 1987(California Department of Fish and Wildlife 2020a). The polygon for this occurrence overlaps with developed areas, grassland, alkali seasonal wetland, and vernal pool complex, with only a small portion overlapping modeled low-quality habitat.

One historic CNDDB occurrence (#44) for San Joaquin kit fox overlaps with the road improvements on Mountain House Road under Alternative 5 (California Department of Fish and Wildlife 2020a). This occurrence is from 1992, just east of the intersection of Mountain House Road and the Delta-Mendota Canal, is described as an adult foraging (California Department of Fish and Wildlife 2020a). The occurrence overlaps with modeled low-quality habitat and a wheat field.

Field investigations for Alternative 5 would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat, the potential for injury, mortality, and the disruption of normal behaviors of San Joaquin kit fox. Geotechnical investigations associated with the tunnel for the Bethany Reservoir Aqueduct (Alternative 5), which include CPTs and soil borings, would result in temporary impacts on habitat (Appendix 13C). The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1-day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The West Tracy Fault investigations and the tunnel alignments for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would not affect modeled habitat for San Joaquin kit fox. Utility potholing would also occur within the footprints for the Bethany Reservoir Aqueduct and the Bethany Reservoir Discharge Structure and would temporarily affect habitats. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of San Joaquin kit fox as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality by (1) training construction staff on protecting San Joaquin kit fox, reporting requirements, and the ramifications for not following these measures; (2) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented; (3) ensuring trenches are covered at the end of the day or escape ramps are installed; (4) limiting construction vehicle traffic to a maximum speed limit of 15 miles per hour; (5) properly disposing of trash; (6) reducing the potential for discharge of construction materials in areas of potential habitat; and (7) keeping the work area free of firearms and pets.

Operations

Alternative 5 has the potential for impacts on San Joaquin kit fox during operations from vehicle traffic on the access road leading to the Bethany Reservoir Discharge Structure, which could result in the injury, mortality, and disruption of normal behaviors.

Maintenance

The maintenance of the Bethany Reservoir Discharge Structure and associated access road under Alternative 5, which would include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily/weekly inspections by vehicle could result in impacts on San Joaquin kit fox, including injury, mortality, and disruption of normal behaviors.

CEQA Conclusion—All Project Alternatives

Construction of Alternative 5 would result in permanent and temporary losses of modeled San Joaquin kit fox habitat. Taking into consideration that the permanently affected San Joaquin kit fox modeled habitat is almost all modeled as low-quality habitat (38 acres of low-quality habitat relative to 0.01 acre of high-quality habitat) and that the USFWS considers that there is no evidence of a current population in this portion of the species range (U.S. Fish and Wildlife Service 2020a:50), the loss of modeled habitat would be less than significant and therefore no compensatory mitigation is being proposed specifically for San Joaquin kit fox, The purchasing of conservation credits for California red-legged frog and California tiger salamander at a USFWS- and CDFW-approved mitigation bank or other approved conservation areas (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3, CMP-13: *California Tiger Salamander Habitat* and CMP-14: *California Red-Legged Frog Habitat*) would contain upland grasslands potentially suitable for San Joaquin kit fox, providing a potential benefit if a population were to establish in the northern portion of the species range. There would be no permanent or temporary losses of modeled habitat under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, or 4c.

Though the likelihood of San Joaquin kit fox occurring in the study area is low, there is still a potential for dispersing individuals to show up at some point and therefore construction of all project alternatives and the operations and maintenance under Alternative 5 would result in impacts on San Joaquin kit fox through the potential for injury, mortality, and the disruption of normal behaviors. The potential impacts of injury, mortality, and the disruption of normal behaviors from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); however, even with these commitments, the potential for San Joaquin kit fox injury, mortality, and disruption of normal behaviors from construction of the project alternatives and from operations and maintenance under Alternative 5 would be significant. Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife*, and BIO-46: *Conduct Preconstruction Survey for San Joaquin Kit Fox and Implement Avoidance and Minimization Measures* would avoid and minimize the potential for injury, mortality, and disruption of normal behaviors. The impacts on San Joaquin kit fox from the project alternatives would be less than significant with mitigation because the aforementioned measures would reduce direct effects on the species by (1) implementing protective measures during maintenance activities, which would include conducting den surveys where appropriate and avoiding certain activities where possible, and (2) implementing traffic controls on facility access roads during operations, which would minimize the potential for vehicle strikes if San Joaquin kit fox is present in these areas.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP that DWR would implement (see Impact BIO-1 for a summary discussion of the CMP) does not include specific compensatory mitigation for San Joaquin kit fox. The proposed mitigation for California tiger salamander and California red-legged frog (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3, CMP-13: *California Tiger Salamander Habitat* and CMP-14: *California Red-Legged Frog Habitat*) could provide benefits to San Joaquin kit fox through the protection of grasslands associated with aquatic habitats. As specified in Attachment 3F.1, Table 3F.1-3, CMP-13: *California Tiger Salamander Habitat* and CMP-14: *California Red-Legged Frog Habitat*, mitigation for those species would be prioritized in recovery areas for both species, which overlap with the range of San Joaquin kit fox.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Measure BIO-46: Conduct Preconstruction Survey for San Joaquin Kit Fox and Implement Avoidance and Minimization Measures

As properties become accessible for initiating project activities within areas of modeled San Joaquin kit fox habitat, DWR will require suitability assessments of the modeled habitat by a biologist qualified to identify suitable habitat for this species.

1. For areas verified as being suitable for San Joaquin kit fox, preconstruction surveys will be initiated within 14 to 30 days prior to ground disturbance, vegetation removal, or establishment of staging areas related to project activities. A USFWS- and CDFW-approved biologist with experience surveying for and observing the species will survey the project footprint and the area within 200 feet beyond the footprint to identify known or potential San Joaquin kit fox dens. Adjacent parcels under different land ownership will not be surveyed unless access is granted within the 200-foot radius of the project footprint. The biologists will conduct these searches by systematically walking 30- to 100-foot-wide transects throughout the survey area; transect width will be adjusted based on vegetation height and topography. The biologist will conduct walking transects such that 100% visual coverage of the worksite footprint is achieved. Dens will be classified in one of the following four den status categories outlined in the *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* (U.S. Fish and Wildlife Service 2011:8–9).

    a. **Potential den.** Any subterranean hole within the species' range that has entrances of appropriate dimensions for which available evidence is sufficient to conclude that it is being used or has been used by a San Joaquin kit fox. Potential dens comprise any suitable subterranean hole or any den or burrow of another species (e.g., coyote, badger, red fox, or ground squirrel) that otherwise has appropriate characteristics for kit fox use. If a potential den is found, the biologist will establish a 50-foot buffer using flagging.

    b. **Known den.** Any existing natural den or artificial structure that is used or has been used at any time in the past by a San Joaquin kit fox. Evidence of use may include historical records; past or current radiotelemetry or spotlighting data; kit fox sign such as tracks, scat, or prey remains; or other reasonable proof that a den is being or has been used by a kit fox. If a known den is found, the biologist will establish a 100-foot buffer using flagging.

    c. **Natal or pupping den.** Any den used by San Joaquin kit foxes to whelp or rear their pups. Natal or pupping dens may be larger with more numerous entrances than dens occupied exclusively by adults. These dens typically have more kit fox tracks, scat, and prey remains near the den and may have a broader apron of matted dirt or vegetation at one or more entrances. A natal den, defined as a den in which kit fox pups are actually whelped but not necessarily reared, is a more restrictive version of the pupping den. In practice, however, it is difficult to distinguish between the two types of dens; therefore, for purposes of this definition, either term applies. If a natal or pupping den is discovered, the biologist will establish a buffer of at least 200 feet will be established using fencing but a final buffer will be established in coordination with USFWS and CDFW.

d. **Atypical den.** Any artificial structure that has been or is being occupied by a San Joaquin kit fox. Atypical dens may include pipes, culverts, and diggings beneath concrete slabs and buildings. If an atypical den is discovered, the biologist will establish a 50-foot buffer using flagging.

2. Disturbance to all San Joaquin kit fox den status categories (described directly above) will be avoided to the extent possible. Where avoidance is not possible, limited den destruction may be allowed provided the following procedures are observed.
3. If an atypical, natal or pupping, known or potential San Joaquin kit fox den is discovered within a project footprint, the den will be monitored for 3 days by a USFWS- and CDFW-approved biologist using a tracking medium or an infrared beam camera to determine if the den is currently being used.
4. If an active natal or pupping den is found within a project footprint, USFWS and CDFW will be notified immediately. The den will not be destroyed until the pups and adults have vacated and then only after further coordination with USFWS and CDFW.
5. If San Joaquin kit fox activity is observed at the potential, known, or atypical den during the preconstruction surveys, den use will be actively discouraged with the approval of the USFWS- and CDFW-approved biologist, as described below, and monitoring will continue for an additional 5 consecutive days from the time of the first observation to allow any resident animals to move to another den. For dens other than natal or pupping dens, use of the den can be discouraged by partially plugging the entrance with soil such that any resident animal can easily escape. Alternatively, if the animal is still present after 5 or more consecutive days of plugging and monitoring, the den may have to be excavated by hand when, in the judgment of a biologist, it is temporarily vacant (i.e., during the animal's normal foraging activities). If at any point during excavation a San Joaquin kit fox is discovered inside the den, the excavation activity will cease immediately and monitoring of the den, as described above, will be resumed. Destruction of the den may be completed when, in the judgment of the biologist, the animal has escaped from the partially destroyed den.
6. Construction requirements from *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or during Ground Disturbance* (U.S. Fish and Wildlife Service 2011:5–9) or the latest guidelines will be implemented.
7. If potential, known, atypical, or natal or pupping dens are identified within temporary work areas or within a 200-foot buffer of a temporary work area, exclusion zones around each den entrance or cluster of entrances will be demarcated. The configuration of exclusion zones will be circular, with a radius measured outward from the den entrance(s). No activities will occur within the exclusion zones. Exclusion zone radii for atypical dens and potential dens will be at least 50 feet and will be demarcated with four to five flagged stakes. Exclusion zone radii for known dens will be at least 100 feet and will be demarcated with staking and flagging that encircle each den or cluster of dens but do not prevent access to the den by the foxes.

8. Written results of the surveys will be submitted to USFWS and CDFW within 5 calendar days of the completion of surveys and prior to the beginning of ground disturbance and/or construction activities in San Joaquin kit fox modeled habitat.

During construction, the following measures will be implemented for all activities in suitable San Joaquin kit fox habitat (as determined by a USFWS- and CDFW-approved biologist):

9. The USFWS- and CDFW-approved biologist for San Joaquin kit fox will be the contact source for any employee or contractor who might incidentally kill or injure a kit fox or who finds a dead, injured, or entrapped kit fox.
10. Any personnel who are responsible for incidentally killing or injuring a San Joaquin kit fox will immediately report the incident to the USFWS- and CDFW-approved biologist. The USFWS- and CDFW-approved biologist will contact USFWS immediately in the case of a dead, injured, or entrapped kit fox.
11. USFWS and CDFW will be notified immediately of the accidental death or injury to a San Joaquin kit fox. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information. The USFWS contact is the Assistant Field Supervisor of Endangered Species.
12. New sightings of kit fox will be reported to the CNDDB. A copy of the reporting form and a topographic map clearly marked with the location of where the kit fox was observed will also be provided to USFWS at the address below.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

Implementation of the compensatory mitigation plan would not result in impacts on San Joaquin kit fox because Bouldin Island and the I-5 ponds as well as the potential locations of tidal restoration and channel margin enhancement, where habitat creation and enhancement are planned, are well outside the known range of the species.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, depending on the location these areas could potentially be used by dispersing San Joaquin kit foxes though the likelihood is low. The USFWS considers that there is no evidence of a current population in the northern portion of the species range, where these activities would likely take place (U.S. Fish and Wildlife Service 2020a:50). Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area

(Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas would not likely be within the range of the species and therefore no effects are anticipated. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The impact on San Joaquin kit fox from the project with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance and the use of heavy equipment that would have the potential to result in loss of modeled habitat or result in injury, mortality, and the disruption of normal behaviors from ground disturbance, increased traffic volume, and the inadvertent discharge of construction-related fluids such as fuels, oils, and cement. Impacts on San Joaquin kit fox resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to impacts of the project alternatives on San Joaquin kit fox.

The impacts of habitat loss, ground disturbance, increased traffic, and exposure to hazardous materials on San Joaquin kit fox from mitigation measures would be reduced through Environmental Commitment EC-1: *Conduct Worker Awareness Training*, and Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife*, and BIO-46: *Conduct Preconstruction Survey for San Joaquin Kit Fox and Implement Avoidance and Minimization Measures*. Therefore, impacts on San Joaquin kit fox from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on San Joaquin kit fox from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-47: Impacts of the Project on American Badger

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for American badger are presented in the species account in Appendix 13B, Section 13B.102, *American Badger*.

All Project Alternatives

Construction

The construction of all the project alternatives would affect modeled habitat for American badger. Construction effects would include the permanent and temporary loss of habitat and habitat fragmentation. The loss of habitat would result from most project activities, with the largest contributors being levee improvements, the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), the Jones Outlet and Control Structure (Alternatives 2a and 4a), the Bethany Reservoir Discharge Structure (Alternative 5), and the construction of new roads and road improvements (all alternatives) (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements required for the central alignment (Table 13-95). The loss of habitat would result from vegetation removal in advance of grading and excavation for the construction of project infrastructure. Construction of all alternatives would result in the fragmentation of habitat in the area west of Byron Highway. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-95. Impacts on Modeled Habitat for American Badger by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	170.21	42.03	212.24
2a	238.97	51.75	290.72
2b	153.60	49.29	202.89
2c	161.58	50.18	211.76
3	102.87	34.17	137.04
4a	180.20	35.74	215.94
4b	94.85	33.27	128.12
4c	102.81	34.17	136.98
5	64.71	32.45	97.16

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities for all project alternatives could result in the injury, mortality, and disruption of foraging, breeding, and dispersal of American badgers. These effects could result from project grading, excavation, the use of construction-related vehicles, and exposure of badgers to construction-related fluids, such as fuels, oils, and cement. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality by (1) training construction staff on protecting American badger, reporting requirements, and the ramifications for not following these measures; (2) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented; (3) ensuring trenches are covered at the end of the day or escape ramps are installed; (4) limiting construction vehicle traffic to a maximum speed limit of 15 miles per hour on unpaved non-public construction access roads; (5) properly disposing of trash; (6) reducing the potential for discharge of construction materials in areas of potential habitat; and (7) keeping the work area free of firearms and pets.

Two CNDDB occurrences overlap with the project alternative footprints (California Department of Fish and Wildlife 2020a). One occurrence (#209) from 1938 overlaps with the Intake B (Alternatives 1, 2a, 2c, 3, 4a, 4c, and 5) and associated improvements and the other occurrence (#397) from 2007, a roadkill, overlaps with the SCADA construction area on Kelso Road as part of Alternative 5 (California Department of Fish and Wildlife 2020a).

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat, the potential for injury, mortality, and the disruption of normal behaviors of American badger. Geotechnical investigations that would occur in the West Tracy Fault Study area, the main tunnels, the tunnels linking the Southern Forebay to the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), and the tunnel for the Bethany Reservoir Aqueduct (Alternative 5), which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on habitat (Appendix 13C). The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1-day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of American badger as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality by (1) training construction staff on protecting American badger, reporting requirements, and the ramifications for not following these measures; (2) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented; (3) ensuring trenches are covered at the end of the day or escape ramps are installed; (4) limiting construction vehicle traffic to a maximum speed limit of 15 miles per hour; (5) properly disposing of trash; (6) reducing the potential for discharge of construction materials in areas of potential habitat; and (7) keeping the work area free of firearms and pets.

Operations

All project alternatives have the potential for impacts on American badger from vehicle traffic on access roads to project facilities during operations, which could result in the injury, mortality, and disruption of normal behaviors.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on American badger. Maintenance activities across all facilities that could affect American badger include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle could result in the injury, mortality, and disruption of normal behaviors (i.e., foraging, breeding, and dispersal) of American badger. Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would include annual embankment repair and quarterly animal burrow filling, which could also result in the injury, mortality, and disruption of normal behaviors.

CEQA Conclusion—All Project Alternatives

The construction, operations, and maintenance of all project alternatives would result in impacts on American badger through the permanent and temporary loss of modeled habitat, habitat fragmentation, and the potential for injury, mortality, and the disruption of normal behaviors. The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors of American badger from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); however, even with these commitments, the loss of habitat from the construction of the alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction, operations, and maintenance on American badger would be significant. The CMP would offset the loss of modeled habitat by creating and protecting grasslands on Bouldin Island (Appendix 3F, Section 3F.3.3.2) and through the protection of upland grasslands with the purchase of conservation credits at an USFWS- and CDFW--approved mitigation bank for California red-legged frog and California tiger salamander (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3, CMP-13: *California Tiger Salamander Habitat* and CMP-14: *California Red-Legged Frog Habitat*), which could be used by American badger, would reduce the impact associated with habitat loss to less than significant. Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife,* and BIO-47: *Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on American badger from the project alternatives would be less than significant with mitigation because the aforementioned measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by (1) implementing protective measures during maintenance activities, which would include assessing work areas for habitat and conducting dens surveys where appropriate and avoiding certain activities where possible, (2) implementing traffic controls on facility access roads during operations, which would minimize the potential for vehicle strikes, and (3) implementing avoidance measures for active dens during construction.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP that DWR would implement (see Impact BIO-1 for a summary discussion of the CMP) does not include specific compensatory mitigation for American badger; however, with its creation and protection of grasslands on Bouldin Island (Appendix 3F, Section 3F.3.3.2) and through the protection of upland grasslands as part of California red-legged frog and California tiger salamander mitigation (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3, CMP-13: *California Tiger Salamander Habitat* and CMP-14: *California Red-Legged Frog Habitat*), habitat that could be used by American badger would be conserved.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Measure BIO-47: Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures

All Project Alternatives

DWR will require a qualified biologist to survey for American badger concurrently with the preconstruction surveys for burrowing owl within 14 days prior to the start of ground disturbance. If an active den is detected within the work area, DWR will establish a suitable buffer distance and avoid the den until the biologist determines that the den is no longer active through direct monitoring, using wildlife cameras, or using a camera probe. Potential dens that are determined to be inactive by one or more of the aforementioned methods will be collapsed by hand to prevent occupation of the den between the time of the survey and construction activities.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>*Compensatory Mitigation*</u>

The creation and enhancement of wetlands and other waters as well as habitat for special-status species on Bouldin Island and at the I-5 ponds under the project's CMP would affect modeled habitat for American badger (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats. The CMP could also affect American badger through tidal wetland habitat restoration and channel margin enhancement because potential areas identified generally overlap with modeled habitat (Appendix 3F, Section 3F.4.3.4.2).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary disturbance of existing American badger habitat and the potential for disruption of normal behaviors, injury, or mortality of the species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain grasslands suitable for American badger and management activities could affect this habitat and result in the disruption of normal behaviors, injury, and mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure no significant loss in habitat or habitat value (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. These activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); and Mitigation Measure BIO-47: *Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. These impacts would be less than significant because the aforementioned measures would reduce direct effects on the species, including habitat disturbance, by (1) training construction staff on protecting American badger, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the species; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

The impact on American badger from the project with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance and the use of heavy equipment that would have the potential to result in loss of modeled habitat or result in injury, mortality, and the disruption of normal behaviors from ground disturbance, increased traffic volume, and the inadvertent discharge of construction-related fluids such as fuels, oils, and cement. Impacts on American badger resulting from mitigation measures would be similar to construction effects of the project alternatives in certain construction areas and would contribute to impacts of the project alternatives on American badger.

The impacts of habitat loss, ground disturbance, increased traffic, and exposure to hazardous materials on American badger would be reduced through Mitigation Measure BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife* and the environmental commitments detailed under Impact BIO-46: *Impacts of the Project on San Joaquin Kit Fox*. In addition, Mitigation Measure BIO-47: *Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures* would require species-specific measures to reduce these impacts. Therefore, impacts on American badger from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on American badger from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-48: Impacts of the Project on San Joaquin Pocket Mouse

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for San Joaquin pocket mouse are presented in the species account in Appendix 13B, Section 13B.103, *San Joaquin Pocket Mouse*.

All Project Alternatives

Construction

The construction of all the project alternatives would affect modeled habitat for San Joaquin pocket mouse. Construction effects would include the permanent and temporary loss of habitat and habitat fragmentation. The loss of habitat would result from most project activities with the largest contributors being levee improvements, the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), the Jones Outlet and Control Structure (Alternatives 2a and 4a), the Bethany Reservoir Discharge Structure (Alternative 5), and the construction of new roads and road improvements (all alternatives) (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on modeled habitat compared to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5) largely because of the levee improvements on Bouldin Island and road improvements required for the central alignment (Table 13-96). The loss of habitat would result from vegetation removal in advance of grading and excavation for the construction of project infrastructure. Construction of all project alternatives would result in the fragmentation of habitat in the area west of Byron Highway. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Table 13-96. Impacts on Modeled Habitat for San Joaquin Pocket Mouse by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
1	170.21	42.03	212.24
2a	238.97	51.75	290.72
2b	153.60	49.29	202.89
2c	161.58	50.18	211.76
3	102.87	34.17	137.04
4a	180.20	35.74	215.94
4b	94.85	33.27	128.12
4c	102.81	34.17	136.98
5	64.70	32.45	97.16

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Construction activities for all project alternatives could result in the injury, mortality, and disruption of feeding, breeding, and dispersal of San Joaquin pocket mouse. These effects could result from project grading, excavation, the use of construction-related vehicles, and exposure of pocket mice to construction-related fluids, such as fuels, oils, and cement. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality by (1) training construction staff on protecting San Joaquin pocket mouse, reporting requirements, and the ramifications for not following these measures; (2) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented; (3) ensuring trenches are covered at the end of the day or escape ramps are installed; (4) limiting construction vehicle traffic to a maximum speed limit of 15 miles per hour on unpaved, non-public construction access roads; (5) properly disposing of trash; (6) reducing the potential for discharge of construction materials in areas of potential habitat; and (7) keeping the work area free of firearms and pets.

One CNDDB occurrence (#101) for San Joaquin pocket mouse overlaps with the footprint for the South Delta Outlet and Control Structure and improvements on the UPRR railroad (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) (California Department of Fish and Wildlife 2020a). This occurrence is from 2002 and is reported along both sides the California Aqueduct where four adults were captured (California Department of Fish and Wildlife 2020a).

Field investigations for all project alternatives would be conducted prior to and during construction to more specifically identify appropriate construction methods and design criteria addressed in the final design documents, verify soil rehabilitation methods, confirm the locations of existing utilities, and address the establishment of geological and groundwater monitoring programs (Delta Conveyance Design and Construction Authority 2022a, 2022b). Field investigations would involve a variety of ground-disturbing activities that would vary in duration from several hours to approximately 6 weeks (Section 3.15; Delta Conveyance Design and Construction Authority 2022a, 2022b) and could result in impacts on habitat, the potential for injury, mortality, and the disruption of normal behaviors of San Joaquin pocket mouse. Geotechnical investigations that would occur in the West Tracy Fault Study area, the main tunnels, the tunnels linking the Southern Forebay to the South Delta Outlet and Control Structure (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), and the tunnel for the Bethany Reservoir Aqueduct (Alternative 5), which include test trenches, CPTs, soil borings, and geophysical arrays, would result in temporary impacts on habitat (Appendix 13C). The Bethany Fault Study geotechnical investigations (Alternative 5) would be completed in a single day and would involve placing approximately 20 ERT probes 0.5 inch in diameter. The study would be conducted entirely on foot, perpendicular to the tunneled portion of the Bethany Reservoir Aqueduct (Delta Conveyance Design and Construction Authority 2022a, 2022b). The Bethany Fault Study could result in minor disruption of normal behaviors, but because of its small footprint and the short (1-day) duration of the disturbance, impacts on modeled habitat are not quantified and are considered negligible. The following field investigations would be conducted within proposed surface construction footprints of project facilities (including portions of tunnel alignments) and would temporarily affect habitat: test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints but could still result in the potential for injury, mortality, and the disruption of normal behaviors of San Joaquin pocket mouse as discussed above for conveyance facility construction. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for injury and mortality by (1) training construction staff on protecting San Joaquin pocket mouse, reporting requirements, and the ramifications for not following these measures; (2) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented; (3) ensuring trenches are covered at the end of the day or escape ramps are installed; (4) limiting construction vehicle traffic to a maximum speed limit of 15 miles per hour; (5) properly disposing of trash; (6) reducing the potential for discharge of construction materials in areas of potential habitat; and (7) keeping the work area free of firearms and pets.

Operations

All project alternatives have the potential for impacts on San Joaquin pocket mouse from vehicle traffic on access roads to project facilities during operations, which could result in the injury, mortality, and disruption of normal behaviors.

Maintenance

The maintenance of aboveground water conveyance facilities for all project alternatives could result in impacts on San Joaquin pocket mouse. Maintenance activities across all facilities that could impact San Joaquin pocket mouse include repaving of access roads every 15 years, semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application), and daily or weekly inspections by vehicle could result in the injury, mortality, and disruption of normal behaviors (i.e., foraging, breeding, and dispersal) of San Joaquin pocket mouse. Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would include annual embankment repair and quarterly animal burrow filling, which could also result in the injury, mortality, and disruption of normal behaviors.

CEQA Conclusion—All Project Alternatives

The construction, operations, and maintenance of all project alternatives would result in impacts on San Joaquin pocket mouse through the permanent and temporary loss of habitat, habitat fragmentation, and the potential for injury, mortality, and the disruption of normal behaviors. The temporary loss of habitat and the potential impacts of injury, mortality, and the disruption of normal behaviors of San Joaquin pocket mouse from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B); however, even with these commitments, the loss of habitat from the construction of the alternatives and the potential for injury, mortality, and disruption of normal behaviors from construction, operations, and maintenance on San Joaquin pocket mouse would be significant. The CMP would offset the loss of modeled habitat by creating and protecting grasslands on Bouldin Island (Appendix 3F, Section 3F.3.3.2) and through the protection of upland grasslands with the purchase of conservation credits at an USFWS- and CDFW--approved mitigation bank for California red-legged frog and California tiger salamander (Appendix 3F, Section 3F.3.3.3 and

Attachment 3F.1, Table 3F.1-3, CMP-13: *California Tiger Salamander Habitat* and CMP-14: *California Red-Legged Frog Habitat*), which could be used by San Joaquin pocket mouse, would reduce the impact associated with habitat loss to less than significant. Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* and BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife* would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. The impacts on San Joaquin pocket mouse from the project alternatives would be less than significant with mitigation because these measures would replace lost habitat and reduce direct effects on the species, including habitat disturbance, by implementing protective measures during maintenance activities, which would include assessing work areas for potential habitat, and by implementing traffic controls on facility access roads during operations, which would minimize the potential for vehicle strikes.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP that DWR would implement (see Impact BIO-1 for a summary discussion of the CMP) does not include specific compensatory mitigation for San Joaquin pocket mouse; however, with the CMP's creation and protection of grasslands on Bouldin Island (Appendix 3F, Section 3F.3.3.2) and through the protection of upland grasslands as part of California red-legged frog and California tiger salamander mitigation, which would involve purchasing conservation credits at a USFWS- and CDFW-approved conservation bank (Appendix 3F, Section 3F.3.3.3 and Attachment 3F.1, Table 3F.1-3, CMP-13: *California Tiger Salamander Habitat* and CMP-14: *California Red-Legged Frog Habitat*), habitat that could be used by San Joaquin pocket mouse would be conserved.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of wetlands and other waters as well as habitat for special-status species on Bouldin Island and at the I-5 ponds under the project's CMP would affect modeled habitat for San Joaquin pocket mouse (Appendix 13C) from vegetation removal and grading to create the appropriate topography and soil conditions to establish or restore habitats. The CMP could also affect San Joaquin pocket mouse through tidal wetland habitat restoration and channel margin enhancement because potential areas identified generally overlap with modeled habitat (Appendix 3F, Section 3F.4.3.4.2).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located and could result in the disturbance of San Joaquin pocket mouse habitat and the potential for disruption of normal behaviors, injury, or mortality of the species. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas could potentially contain grasslands suitable for San Joaquin pocket mouse and management activities could affect this habitat and result in the disruption of normal behaviors, injury, and mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

The CMP and site-specific permitting approvals would ensure no significant loss in habitat or habitat value (Appendix 3F, Section 3F.1, Section 3F.2.4, and Attachment 3F.1, Table 3F.1-2, CMP-0: *General Design Guidelines*) and therefore reduce any habitat losses associated with the CMP to less than significant. These activities would also have the potential for injury, mortality, and the disruption of normal behaviors of individuals. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would be required to avoid and minimize the potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat. These impacts would be less than significant because the aforementioned measures would reduce direct effects on the species, including habitat disturbance, by (1) training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; (2) implementing spill prevention and containment plans that would avoid material spills that could affect the species; (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact, and all other protective measures are being implemented where applicable.

The impact on San Joaquin pocket mouse from the project with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would have impacts on San Joaquin pocket mouse similar to those described for American badger under Impact BIO-47: *Impacts of the Project on American Badger*.

The impacts of ground disturbance and the use of heavy equipment on San Joaquin pocket mouse would be reduced through Mitigation Measure BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife,* and the environmental commitments detailed under Impact BIO-46: *Impacts of* *the Project on San Joaquin Kit Fox*. Therefore, impacts on San Joaquin pocket mouse from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on San Joaquin pocket mouse from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-49: Impacts of the Project on Salt Marsh Harvest Mouse

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for salt marsh harvest mouse are presented in the species account in Appendix 13B, Section 13B.104, *Salt Marsh Harvest Mouse*.

All Project Alternatives

Construction

The construction of the project alternatives, including field investigations, would not affect salt marsh harvest mouse (Table 13-97). The modeled habitat for salt marsh harvest mouse depicted in Figure 13B.104-1 is more than 9 miles from the nearest project infrastructure (i.e., the park-and-ride lot on SR 12), which is approximately 10 miles from the nearest CNDDB record (California Department of Fish and Wildlife 2020a).

Table 13-97. Impacts on Modeled Habitat for Salt Marsh Harvest Mouse by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
All alternatives	0.00	0.00	0.00

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

Operations

Based on model results presented in Chapter 9, *Water Quality,* the operation of the project for all alternatives would be expected to result in increases in salinity levels (measured as electrical conductivity) during the months of October through April at Collinsville, which is close to the eastern extent of salt marsh harvest mouse habitat in the study area, with the greatest changes occurring in March (14% increase) (see Chapter 9, Impact WQ-5: *Effects on Electrical Conductivity Resulting from Facility Operations and Maintenance*); however, these increases are not expected to adversely affect beneficial uses or contribute to impairment and would thus not be expected to change the acreage of brackish marsh supporting salt marsh harvest mouse in the study area. This habitat persists in an environment that experiences natural fluctuations in salinity from tidal ebb and flow. Reduced diversions from the south Delta channels would not create a reduction in this habitat either.

Maintenance

The maintenance of all project alternatives would not result in impacts on salt marsh harvest mouse because of the distance of modeled and known occupied habitat from the infrastructure.

CEQA Conclusion—All Project Alternatives

All project alternatives would result in no impact on salt marsh harvest mouse because no modeled or known habitat for this species occurs in the vicinity of project construction, operations, or maintenance areas.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The implementation of the CMP would not result in impacts on salt marsh harvest mouse or benefits to the species because Bouldin Island and the I-5 ponds, the locations of where tidal wetland habitat restoration and channel margin enhancement, non-bank locations, and site protection instruments could occur, are outside of the known range of the species (Appendix 3F, Section 3F.4.3.4.2).

The project with the CMP would result in no impacts on salt marsh harvest mouse.

Other Mitigation Measures

Other mitigation measures proposed would not have impacts on salt marsh harvest mouse because no modeled or known habitat for this species occurs in the vicinity of project construction areas; modeled habitat for salt marsh harvest mouse depicted in Figure 13B.104-1 is more than 9 miles from the nearest project infrastructure (i.e., the park-and-ride lot on SR 12), which is approximately 10 miles from the nearest CNDDB record (California Department of Fish and Wildlife 2020a).

Overall, the construction of compensatory mitigation and implementation of other mitigation measures combined with project alternatives would have no impact on salt marsh harvest mouse.

Impact BIO-50: Impacts of the Project on Riparian Brush Rabbit

The methods for the analysis of effects on special-status species appear in Section 13.3.1.1 and information on the species life history and habitat suitability model for riparian brush rabbit are presented in the species account in Appendix 13B, Section 13B.105, *Riparian Brush Rabbit*.

All Project Alternatives

Construction

The construction of the project alternatives, including field investigations, would not affect riparian brush rabbit (Table 13-98). The modeled habitat for riparian brush rabbit depicted in Figure 13B.105-1 is approximately 4.5 miles southeast of the nearest project infrastructure (road improvements north of SR 4), which is approximately 10 miles from the nearest CNDDB record (California Department of Fish and Wildlife 2020a).

Table 13-98. Impacts on Modeled Habitat for Riparian Brush Rabbit by Alternative

Alternative	Permanent Impacts (acres) [a]	Temporary Impacts (acres)	Total (acres)
All alternatives	0.00	0.00	0.00

[a] Permanent impacts presented in this table include both permanent and long-term temporary impact acreages; see discussion in Section 13.3.1.2.

<u>Operations</u>

The operations of all project alternatives would not result in impacts on riparian brush rabbit. because of the distance of modeled and known occupied habitat from the infrastructure and because any changes to Delta flows and water quality would not likely affect the species or its habitat.

<u>Maintenance</u>

The maintenance of all project alternatives would not result in impacts on riparian brush rabbit because of the distance of modeled and known occupied habitat from the infrastructure.

CEQA Conclusion—All Project Alternatives

All project alternatives would result in no impact on riparian brush rabbit because no modeled or known habitat for this species occurs in the vicinity of project construction, operations, or maintenance areas.

Mitigation Impacts

<u>Compensatory Mitigation</u>

The implementation of the CMP would not result in impacts on riparian brush rabbit because Bouldin Island and the I-5 ponds, the locations of where tidal wetland habitat restoration and channel margin enhancement could occur are outside of the known range of the species (Appendix 3F, Section 3F.4.3.4.2).

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located, which generally do not provide habitat for riparian brush rabbit. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Protected areas could contain habitat for riparian brush rabbit if they are within the range of the species; however, these habitats would be managed like easements for agricultural areas where farming activities are ongoing and would continue for the benefit of target species (e.g., growing alfalfa and managing for Swainson's hawk).

The project with the CMP would result in no impacts on riparian brush rabbit.

Other Mitigation Measures

Other mitigation measures proposed would not have impacts on riparian brush rabbit because no modeled or known habitat for this species occurs in the vicinity of project construction areas; modeled habitat for riparian brush rabbit depicted in Figure 13B.105-1 is approximately 4.5 miles southeast of the nearest project infrastructure (road improvements north of SR 4), which is approximately 10 miles from the nearest CNDDB record (California Department of Fish and Wildlife 2020a).

Overall, the construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives would have no impact on riparian brush rabbit.

13.3.3.5 Impacts of the Project Alternatives on General Terrestrial Biological Resources

Impact BIO-51: Substantial Adverse Effect on State- or Federally Protected Wetlands and Other Waters through Direct Removal, Filling, Hydrological Interruption, or Other Means

The methods for the analysis of effects on state and federally protected wetlands and other waters appear in Section 13.3.1, *Methods for Analysis*, and information on these resources in the study area is presented in Section 13.1.4, *Wetlands and Other Waters of the United States*. The analysis below includes a quantitative analysis of impacts on these aquatic resources (permanent and temporary discharge of dredged or fill material) and a qualitative discussion of potential indirect effects on these waters, including hydrologic changes associated with the project alternatives (permanent and temporary).

All Project Alternatives

Construction

The construction of each of the alternatives would result in temporary (those lasting less than 1 year), long-term temporary (those lasting longer than 1 year), and permanent impacts on aquatic resources considered to be waters of the United States pursuant to Section 404 of the CWA or waters of the State under the Porter-Cologne Act. As described in Section 13.3.1.2, *Evaluation of Construction Activities*, temporary impacts were defined as construction-related impacts on aquatic resources that would persist for a period of less than 1 year and that would be addressed through restoration of the affected area to pre-disturbance conditions within 1 year of the initial impact. The estimated discharge of dredged or fill material into aquatic resources associated with the alternatives is provided in Table 13-99, which sets out totals for permanent, long-term temporary, and temporary impacts. Construction may result in the permanent, long-term temporary, or temporary conversion or degradation of such aquatic resources through direct removal, filling, dredging, hydrological interruption (e.g., cofferdams, dewatering), and changes to water quality resulting from accidental discharges of construction-related materials. Construction impacts related to water quality are addressed in Chapter 9, *Water Quality.* Most of the impacts on aquatic resources associated with the alternatives would occur within agricultural areas, usually involving agricultural ditches and seasonal wetlands found in agricultural fields (Appendix 13C, *Impact Tables*). Under the central and eastern alignment alternatives (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), permanent impacts and long-term temporary impacts would occur primarily as a result of the construction of the Southern Complex on Byron Tract and Southern Complex west of Byron Highway and the temporary impacts would occur as a result of road construction. Under the Bethany Reservoir alignment (Alternative 5), permanent impacts and long-term temporary impacts would be primarily due to deposition of material at an RTM storage area and construction of shafts at all tunnel shafts except for the one on New Hope Tract and temporary impacts would result from road construction (Appendix 13C). The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would result in greater impacts on aquatic resources than the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5), largely as a consequence of levee improvements and access road improvements on Bouldin Island. Alternative 5 would result in substantially fewer impacts because the alternative would not require the construction of a new forebay.

Table 13-99. Estimated Discharge of Dredged or Fill Material into Aquatic Resources Associated with the Construction of Project Facilities (acres [a])

	Alt. 1	Alt. 2a	Alt. 2b	Alt. 2c	Alt. 3	Alt. 4a	Alt. 4b	Alt. 4c	Alt. 5
Wetlands									
Alkaline Wetland [b]	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	0.98
Seasonal Wetland	59.13	59.13	59.11	59.13	30.54	30.54	30.53	30.54	5.00
Vernal Pool	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Forested Wetland	4.02	3.86	3.56	3.87	3.06	3.10	2.80	3.10	3.23
Scrub Shrub Wetland	4.45	4.97	4.39	4.46	1.53	2.04	1.47	1.53	2.21
Freshwater Emergent Wetland	10.67	10.44	9.92	10.44	1.25	1.25	0.73	1.25	1.32
Wetlands Subtotal	84.57	84.70	83.28	84.20	42.68	43.23	41.83	42.72	12.94
Other Waters									
Agricultural Ditch	86.04	87.50	82.16	85.12	81.96	84.81	77.09	80.22	35.22
Conveyance Channel	22.42	34.00	22.42	22.42	22.42	34.00	22.42	22.42	0.40
Tidal Channel	31.88	33.07	28.03	30.63	20.56	22.25	17.20	19.81	10.74
Natural Channel	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.25
Depression	0.83	1.21	0.55	0.73	0.65	1.03	0.37	0.55	1.43
Other Waters Subtotal	141.76	156.37	133.75	139.49	126.18	142.68	117.67	123.59	48.04
Total	226.33	241.07	217.03	223.69	168.86	185.91	159.50	166.31	60.98

[a] Acres include permanent, long-term temporary, and temporary impacts.

[b] The alkaline wetland acreage includes alkaline wetlands that fall within vernal pool complexes. As explained in Section 13.1.2.1, *Vernal Pool Complex*, the southwestern portion of the delineation study area near Clifton Court Forebay consists of a mosaic of vernal pools, alkaline seasonal wetlands, and grasslands that fall within vernal pool complexes mapped by Witham et al. (2014); therefore, some of these wetlands fall under the vernal pool complex natural community.

Construction-related grading, excavation, work area silt fencing, and material staging areas could result in permanent, long-term temporary, and temporary impacts on aquatic resources through hydrological changes. The construction of facilities could permanently alter the topography or subsurface conditions, and, thus, the supporting hydrology of nearby aquatic resources, resulting in changes in the natural hydroperiods, which could alter the size and condition of aquatic resources. Activities that may occur within construction work areas, such as the installation of silt fences, excavation of temporary borrow areas, and stockpiling of construction materials and spoils could also temporarily alter surface and subsurface hydrology of aquatic resources in the vicinity of work areas.

Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-4a: *Develop and Implement Erosion and Sediment Control* Plan; EC-4b: *Develop and Implement Storm Water Pollution Prevention Plan*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce potential impacts. The reduction would be achieved by (1) training construction staff regarding steps necessary to protect aquatic resources and the ramifications of non-compliance regarding the implementation of these protective measures; (2) implementing hazardous materials, spill prevention, erosion, sediment, and stormwater pollution plans to ensure that construction sites do not create conditions that would allow the transport of hazardous materials, sediment, and other materials into wetlands and other waters or alter the hydrology of these features; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented, where applicable.

Field investigations for each alternative would be conducted prior to and during construction and would involve a variety of ground-disturbing activities (Section 3.15, *Field Investigations*), which could result in direct impacts on aquatic resources. Geotechnical investigations of areas in which tunnels would be constructed, including the West Tracy Fault, and which include test trenches, CPTs, and soil borings, would result in temporary impacts on aquatic resources. These impacts are included in the impact totals in Table 13-99. Specific impacts that would occur in the West Tracy Fault Study area and over the tunnel alignment footprints are set out in Appendix 13C. Field investigations within proposed surface construction footprints (including portions of tunnel alignments), which include test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing, would temporarily affect aquatic resources. These temporary impacts are not characterized as an additional discharge of dredged or fill material because impacts for these locations have already been quantified within the construction footprints. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-4a: *Develop and Implement Erosion and Sediment Control Plans*; EC-4b: *Develop and Implement Stormwater Pollution Prevention Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce potential impacts by training construction staff on protecting aquatic resources, and the ramifications for not following protective measures; implementing hazardous material, spill prevention, erosion, sediment, and stormwater pollution plans to ensure that construction sites do not result in the transport of sediment and other materials into wetlands and waters or alter the hydrology of these features; by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable, and to the extent practicable geotechnical investigations over tunnel alignments would avoid wetlands and waters, except for overwater borings planned in tidal channels.

Operations

Project operations of aboveground water conveyance facilities are not anticipated to result in any discharge of fill material into jurisdictional aquatic resources. The effects of operations on surface waters are addressed in Chapter 5, *Surface Water*, and effects of operations on water quality are addressed in Chapter 9.

Maintenance

The maintenance of water conveyance facilities for all project alternatives could result in the periodic temporary disturbance of jurisdictional aquatic resources. No permanent loss or discharge of dredged or fill material would result from these activities. Maintenance activities across all facilities that could affect aquatic resources include repaving of access roads every 15 years and semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application) if these activities occur within or adjacent to aquatic resources. Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would include annual embankment repair, which could also result in the periodic disturbance of jurisdictional aquatic resources.

CEQA Conclusion—All Project Alternatives

The construction and maintenance of all project alternatives would result in the permanent and temporary discharge of dredged or fill material into jurisdictional aquatic resources and potentially cause permanent and temporary impacts on hydrologic conditions associated with aquatic resources.

The discharge of fill material and impacts on the hydrology of jurisdictional aquatic resources would be avoided and minimized by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-4a*: Develop and Implement Erosion and Sediment Control Plans*; EC-4b*: Develop and Implement Stormwater Pollution Prevention Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). However, even with these commitments, the direct removal, filling, and hydrological interruption caused by project construction and maintenance would result in a substantial adverse effect on aquatic resources. Consequently, permanent and temporary impacts on jurisdictional aquatic resources associated with each of the project alternatives would be significant.

The CMP, which includes creation and enhancement of aquatic resources at mitigation banks and Bouldin Island and the I-5 ponds, would ensure that there would be no net loss in the overall abundance, diversity, and condition of aquatic resources within the study area (Appendix 3F, Section 3F.3.2, *Approach to Aquatic Resources Mitigation*), which would mitigate for the impacts associated with the construction-related discharge of fill material into aquatic resources to less than significant. Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would be required to avoid and minimize the potential for periodic, temporary discharges of fill material into aquatic resources during maintenance activities. The impact of discharge of fill into aquatic resources would be reduced to less than significant because the aforementioned measures would avoid a net loss in aquatic resources and avoid and minimize periodic, temporary discharges of fill material into aquatic resources by assessing maintenance work areas for aquatic resources, establishing non-disturbance buffers around aquatic resources, training maintenance staff on the need to avoid the discharge of fill material into aquatic resources, and having a biological monitor present, where applicable.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP), which would ensure no net loss, in the overall abundance, diversity, and condition of aquatic resources within the study area through the creation and protection of aquatic resources on Bouldin Island, the purchase of mitigation credits for vernal pools and alkaline wetlands at an agency-approved mitigation bank, and through tidal marsh and channel margin mitigation either through restoration in the study area or through the purchase of mitigation credits at an agency-approved mitigation bank (Appendix 3F, Section 3F.3.2).

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation Impacts

The creation and enhancement of aquatic resources, as well as habitat for special-status species, under the CMP (Appendix 3F) on Bouldin Island and at the I-5 ponds would result in the permanent and temporary discharges of fill material into existing jurisdictional aquatic resources (Appendix 13C) and the permanent and temporary alteration of hydrology from grading to create the appropriate topography and soil conditions to establish and enhance habitats.

The CMP also includes a framework for channel margin enhancement and tidal wetland habitat creation. The activities to enhance channel margins would generally include removal of existing riprap, modification of the existing channel margin with heavy equipment, and placement of large woody debris on the channel margin, which would result in the permanent and temporary discharge of fill material into aquatic resources. Channel margin enhancement sites would be targeted within the same general geography of the project, including the north Delta along the Sacramento River mainstem, north Delta along Sacramento River tributaries (e.g., Steamboat, Sutter, and Elk Sloughs), lower Yolo Bypass, and Cache Slough Complex. Tidal restoration activities would include grading, creating setback levees, planting, and breaching of existing levees, which would result in the permanent and temporary discharge of fill material into aquatic resources and permanent changes to hydrological conditions. Potential areas for tidal restoration would be within the lower Yolo Bypass and Cache Slough Complex.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities could result in the temporary discharge of fill into aquatic resources enhanced or created adjacent to existing aquatic resources. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas may contain aquatic resource and management activities in agricultural areas could result in the temporary discharge of fill into these resources. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

As stated in Appendix 3F, Section 3F.4, *Mitigation Work Plan,* the compensatory mitigation actions at Bouldin Island would be designed to provide compensatory mitigation for aquatic resources under both federal and state mitigation standards and ensures a net gain in aquatic resources, accounting for any conversions of existing aquatic resources (e.g., agricultural ditches converted to freshwater emergent wetland). Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-4a*: Develop and Implement Erosion and Sediment Control Plans*; EC-4b*: Develop and Implement Stormwater Pollution Prevention Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential temporary impact on aquatic resources by training construction staff on protecting aquatic resources and the ramifications for not following protective measures; implementing spill prevention, erosion, sediment, and stormwater pollution plans to ensure that grading for sites do not result in the transport of sediment and other materials into adjacent aquatic resources; and by having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

The impact on aquatic resources from the project alternatives with the CMP would be less than significant with mitigation.

<u>Other Mitigation Measures</u>

Some other mitigation measures may affect wetlands and other waters. Impacts may be caused by activities such as grading, excavations, dredging, construction of structures, placement and salvage of top soils, plantings, irrigation system installation, and construction of swales. Impacts of these measures may include hydrological changes, altered drainage patterns, sedimentation, and excavation and would be similar to construction effects of the project alternatives on wetland and waters.

These impacts would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-4a: *Develop and Implement Erosion and Sediment Control Plans*; EC-4b: *Develop and Implement Stormwater Pollution Prevention Plans*; and EC-14: *Construction Best Management Practices for Biological Resources*; and Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities.* Therefore, impacts on wetlands and other waters from other mitigation measures would be reduced to less than significant.

Overall, the impacts on wetlands and other waters from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-52: Impacts of Invasive Species Resulting from Project Construction and Operations on Established Vegetation

All Project Alternatives

Construction

Constructing the water conveyance facilities would remove established vegetation, which could create opportunities for the introduction and spread of invasive and noxious plant species into the study area. As noted in Section 13.1.5.3, invasive species are currently present in all of the natural communities and agricultural areas in the study area. Also, work conducted in aquatic habitat has the potential to result in the introduction and spread of aquatic invasive plant species. These opportunities would be directly proportional to the level of disturbance associated with project construction. With permanent disturbance, no habitat would remain that would be subject to substantial invasion. With temporary disturbance, minimal invasion would be expected, because the sites would be restored within 1 year. Areas with long-term disturbance would provide the greatest opportunities for invasion. The magnitude of long-term temporary natural community disturbance would be similar under all project alternatives, although the amount of disturbance would vary by alternative, with the greatest amount of disturbance associated with Alternative 4a and the least amount of disturbance associated with Alternative 2b (Table 13-100). About 90% of the disturbance would be associated with agricultural or developed lands, but substantial disturbance would also occur in grassland, wetland, and riparian natural communities. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for the introduction and spread of invasive plants by restoring temporarily disturbed areas, reseeding areas with noninvasive species, and ensuring equipment is cleaned and inspected before entering new areas.

Table 13-100. Summary of Temporary Disturbance in Natural Communities under All Alternatives from Invasive Plant Species (long-term temporary impact acres)

Natural Community	Alt. 1	Alt. 2a	Alt. 2b	Alt. 2c	Alt. 3	Alt. 4a	Alt. 4b	Alt. 4c	Alt. 5
Agricultural	830.16	968.84	675.08	825.56	971.07	1,005.99	807.60	952.70	937.10
Alkali Seasonal Wetland Complex	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.00
Grassland	16.15	35.18	15.60	16.29	15.98	35.01	15.44	16.13	9.66
Nontidal Brackish Emergent Wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nontidal Freshwater Perennial Emergent Wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nontidal Perennial Aquatic	0.29	0.29	0.10	0.19	0.29	0.29	0.10	0.19	0.83
Other Seasonal Wetlands	0.92	0.92	0.92	0.92	0.00	0.00	0.00	0.00	0.00
Tidal Brackish Emergent Wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tidal Freshwater Emergent Wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Natural Community	Alt. 1	Alt. 2a	Alt. 2b	Alt. 2c	Alt. 3	Alt. 4a	Alt. 4b	Alt. 4c	Alt. 5
Tidal Perennial Aquatic	4.73	8.42	4.28	4.68	4.73	8.42	4.28	4.65	1.10
Valley/Foothill Riparian	2.61	3.82	1.63	2.90	2.79	3.82	1.63	2.90	4.05
Vernal Pool Complex	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.61
Total	912.74	1,082.29	751.6	911.27	1,061.07	1,122.68	889.19	1,041.10	1,028.68

Alt. = Alternative.

Field investigations for all alternatives would be conducted prior to and during construction and would involve a variety of ground-disturbing activities (Section 3.15, *Field Investigations*), which could result in the spread of invasive plant species as equipment is move from place to place. Geotechnical investigations associated with the West Tracy Fault and the tunnels for all alternatives, which include test trenches, CPTs, and soil borings, would result in temporary impacts on agricultural and natural habitat that could result in the introduction of invasive plants. Field investigations within proposed surface construction footprints (including portions of tunnel alignments), which include test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing could result in the introduction of invasive plants. These temporary impacts are not characterized as an additional loss in habitat because impacts for these locations have already been quantified within the construction footprints. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for the introduction and spread of invasive plants by ensuring that equipment used is cleaned and inspected before entering new areas.

Operations

Project operations would not disturb terrestrial natural communities nor create opportunities for invasion and spread of invasive plant species into terrestrial natural communities. Chapter 9, Impact WQ-7: *Effects on Nutrients Resulting from Facility Operations* assessed the potential for increased nutrients as a result of project operation and whether that could lead to an expansion of invasive aquatic macrophytes in the study area. This analysis determined that invasive aquatic macrophyte growth rates are not phosphorus- or nitrogen-limited in the Delta, because these nutrients are available in excess. Thus, potential minor increases or decreases in these nutrient concentrations that may occur at some locations and times within the Delta would have negligible, if any, effects on macrophyte growth in the Delta.

Maintenance

Maintenance activities would take place in existing or developed facilities and would include management of invasive plants. Vegetation management would take place along the sedimentation basins, sediment drying lagoons, and Southern Forebay. Management actions would include removal of aboveground plants by mowing or trimming and would not include ground disturbance. Therefore, maintenance activities would not promote the invasion and spread of invasive plant species into terrestrial natural communities.

CEQA Conclusion—All Project Alternatives

Constructing the project alternatives would result in the long-term and temporary disturbance of natural communities in the study area. This disturbance has the potential to facilitate the introduction and spread of invasive plant species into natural communities, which could threaten the diversity or abundance of native plant and wildlife species in the study area. However, Environmental Commitments EC-4a: *Develop and Implement Erosion and Sediment Control Plans* and EC-14: *Construction Best Management Practices for Biological Resources* would reduce the potential for the introduction and spread of invasive plants and avoid or minimize the potential effects on natural communities and special-status species by restoring temporarily disturbed areas, reseeding areas with noninvasive species, and ensuring equipment is cleaned and inspecting before entering new areas. Therefore, this impact would be less than significant.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>*Compensatory Mitigation*</u>

The creation and enhancement of wetlands and other waters, as well as habitat for special-status species on Bouldin Island and at the I-5 ponds, potential locations of tidal restoration and channel margin enhancement, and potential non-bank sites under the project CMP, could result in the spread of invasive plant species from equipment used to grade and excavate areas for restoration.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). Protected and managed areas would not result in an increased risk of the spread of invasive plant species relative to baseline conditions because these areas will either continue as agricultural areas or be protected as natural habitat.

Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential for the spread of invasive plant species by requiring the cleaning and inspecting equipment used for grading and excavation. In addition, the CMP's long-term management plan (Section 3F.6.3) includes mapping and control of invasive species, as do the site-specific maintenance and management plans (Section 3F.7.1) and monitoring and adaptive management plan (Section 3F.7.2).

The impact from the potential spread of invasive plant species from the project alternatives with the CMP would be less than significant.

<u>*Other Mitigation Measures*</u>

Some other mitigation measures could result in the spread of invasive plant species. Impacts may be caused by activities such as vegetation removal, ground disturbance including grading, excavations, and dredging. Impacts of these measures may include the spread of invasive plant species through equipment used for grading and excavation to disturbed sites.

These impacts would be reduced through the CMP and Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources*, which would reduce the potential for the introduction and spread of invasive plants by restoring temporarily disturbed areas, reseeding areas with noninvasive species, and ensuring that equipment is cleaned and inspected before entering new areas. Therefore, impacts of spreading of invasive plant species from other mitigation measures would be reduced to less than significant.

Overall, the impacts of spreading of invasive plant species from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant.

Impact BIO-53: Interfere Substantially with the Movement of Any Native Resident or Migratory Fish or Wildlife Species or with Established Native Resident or Migratory Wildlife Corridors, or Impede the Use of Native Wildlife Nursery Sites

The analysis presented below focuses on terrestrial wildlife connectivity and movement. Fish movement is presented in Chapter 12, *Fish and Aquatic Resources*. An analysis of wildlife nursery sites is limited to potential impacts on rookeries, which is discussed in Impact BIO-35: *Impacts of the Project on Cormorants, Herons, and Egrets.* The analysis presented below includes connectivity-related impacts on terrestrial wildlife species, which includes common as well as special-status species; however, the specific impact analyses on terrestrial special-status species are presented in Impacts BIO-14 through BIO-50.

The methods for the analysis of effects on wildlife movement, connectivity, and corridors appear in Section 13.3.1.1.

All Project Alternatives

<u>*Construction*</u>

The construction of all of the alternatives would result in permanent and temporary impacts on terrestrial wildlife connectivity and existing connectivity resources (see Section 13.1.6 for a complete list of existing connectivity resources), including potential indirect effects on habitat and species movement. These impacts would occur as a result of construction of access roads, rail lines, forebays, intake structures, levee improvements, outlet and control structures, park-and-ride facilities, transmission lines, switching stations, RTM areas, and tunnel shafts. Construction-related grading, excavation, vegetation removal and habitat modifications (e.g., loss of vegetative structure, contiguity, cover, or canopy) would result in the permanent and temporary loss of or alteration of habitat and associated connectivity function or create new wildlife movement barriers. Construction noise and disturbances from increased human presence and lighting during night work could disrupt species movement and habitat selection, habitat access, and wildlife behavior potentially, resulting in impacts on wildlife connectivity. Species affected by construction impacts include a wide variety of mammals, birds, reptiles, amphibians, and invertebrates inhabiting the study area and includes all of the WCGs included in this evaluation (i.e., low-mobility small fauna, semi-aquatic obligate, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna). See Section 13.1.1 for a full description and summary of WCGs used in this analysis. Table 13-101 provides a summary of terrestrial wildlife species occurring in study area with potential movement/connectivity impacts. These potential impacts would be reduced by Environmental Commitments EC-1: *Conduct Worker*

Awareness Training; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-4a: *Develop and Implement Erosion and Sediment Control Plans*; EC-4b: *Develop and Implement Stormwater Pollution Prevention Plans*; EC-11: *Fugitive Dust Control*; EC-12: *On-Site Concrete Batching Plants*; and EC-14: *Construction Best Management Practices for Biological Resources*. These measures would avoid and minimize habitat and species impacts that could cause potential for injury, mortality, disruption of normal behaviors, and disturbances to habitat that potentially may disrupt species movement, habitat selection, habitat access, and wildlife behavior, resulting in impacts on wildlife connectivity, by training construction staff on protecting habitat and species, reporting requirements, and the ramifications for not following these measures; implementing spill prevention and containment plans that would avoid material spills that could affect habitat and wildlife; preventing erosion and sedimentation of habitats and stormwater pollution that may affect habitat and wildlife; preventing dust emissions that may affect habitat and wildlife; implementing construction BMPs and having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable to protect habitat and wildlife.

Table 13-101 provides a summary of WCGs and associated terrestrial wildlife species occurring in the study area with potential movement/connectivity impacts. General discussions of impacts on existing terrestrial wildlife connectivity associated with construction for each alternative are discussed below and a more detailed discussion of impacts on all identified existing connectivity resources for each alternative is provided in Appendix 13E, *Terrestrial Wildlife Connectivity*.

Table 13-101. Summary of Terrestrial Wildlife Species Occurring in Study Area with Potential Movement/Connectivity Impacts

Wildlife Crossing Guild	Species Occurring in Study Area with Potential Movement/Connectivity Impacts
Low-mobility small fauna	Mammals: San Joaquin pocket mouse Reptiles and Amphibians: California tiger salamander, *western spadefoot toad*, California red-legged frog, *coast horned lizard, Northern California legless lizard, California glossy snake*, *San Joaquin coachwhip* Invertebrates: Valley elderberry longhorn beetle
Semi-Aquatic Obligate	Mammals: River otter, mink, beaver Reptiles and Amphibians: Giant garter snake, *western pond turtle*
Moderate-mobility small fauna	Mammals: *American badger*, squirrels, raccoon, weasels
Adaptive high-mobility fauna	Mammals: Bobcat, coyote
High-openness, high-mobility carnivores	Mammals: Mountain lion
Adaptive ungulates	Mammals: Mule deer
Very high-openness fauna	Mammals: San Joaquin kit fox

Wildlife Crossing Guild	Species Occurring in Study Area with Potential Movement/Connectivity Impacts
Aerial fauna	Mammals (bats): *pallid bat*, *Townsend's big-eared bat*, big brown bat, silver-haired bat, *western red bat*, hoary bat, California myotis, little brown bat, western small footed myotis, Yuma myotis, western pipistrelle, *western mastiff bat*, Mexican free-tailed bat Birds: **California black rail**, Swainson's hawk, tricolored blackbird, **golden eagle**, ferruginous hawk, *Northern harrier, short-eared owl, Modesto song sparrow,* osprey, **white-tailed kite**, Cooper's hawk, cormorants, herons, egrets, *burrowing owl, yellow-headed blackbird, grasshopper sparrow, yellow-breasted chat, loggerhead shrike, least bittern*

Note: Species in underline are state or federally listed/candidates; species in **bold** are California fully protected species; species in *italics* are Species of Special Concern.

Intake facilities constructed under all alternatives would remove and fragment riparian habitat along the banks of the Sacramento River, creating movement barriers and potentially increasing wildlife road crossings and wildlife-vehicle collision risk as species attempt to navigate around the facilities; however, the degree of impact varies by the number of intakes used under the alternatives, with Alternatives 2b and 4b having a relatively smaller effect due to having only one intake and Alternatives 2a and 4a having the greatest effect due to having three intakes. WCG potentially affected include low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

Access roads constructed under all alternatives would result in loss of habitat (from new roads and intersections and roadway widenings), increase traffic volumes, cause habitat fragmentation, create potential movement barriers, and potentially result in increased wildlife mortality from vehicle collisions. All WCGs have potential to be affected. The new intersection for Byron Highway and the extension of Armstrong Road for central and eastern alignment alternatives (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would create new upland, wetland, and stream habitat fragmentation (e.g., Brushy Creek), barriers to wildlife movement, and sources of wildlife mortality from increased risk of vehicle collisions with WCGs, including low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

Access roads servicing facilities on Bouldin Island for the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would cross a culvert on SR 12 that has been identified by CDFW (2020d:11) as a priority barrier to wildlife movement in the region, defined as a barrier to wildlife movement that is high priority for remediation. Widening the road above this culvert would reduce the culvert openness and worsen this culvert as a wildlife movement barrier and increase the risk of vehicle collisions with WCGs, including low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

A new interchange on Bouldin Island for the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would create new habitat fragmentation and sources of wildlife mortality from vehicle collisions. WCGs potentially affected include low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

On roads with traffic volumes below 2,500 annual average daily traffic (ADT) volume, the wildlife movement/connectivity barrier effects may be generally low and can also be associated with lower risk of wildlife-vehicle collisions, although depending on road conditions, traffic speeds, WCG/species under consideration, and other factors, the risk of barrier effects and wildlife-vehicle collisions may still be high, even at much lower traffic volumes (Jacobson et al. 2016:4, 6, 8–10; Clevenger and Huijser 2011:14-17). Further, any increase in traffic volume may result in an increased risk of wildlife-vehicle collisions or wildlife movement barrier risks (Jacobson et al. 2016:4–6, 8). For the purposes of this assessment, 2,500 ADT will be used to differentiate low versus high baseline traffic volumes. Existing roads with greater than 2,500 existing ADT across all of the alternatives include I-5, I-205, SR 12, SR 4, Byron Highway, Twin Cities Road, West Peltier Road, Tracy Boulevard, and Walnut Grove Road (Chapter 24, Section 24.3.3.2, *Impacts of the Project Alternatives Related to Noise and Vibration*). Proposed project ADT on these roads across all of the alternatives would have increases ranging between 70 and 600 ADT in each direction (Chapter 24, Section 24.3.3.2). On existing roads with less than 2,500 ADT across all alternatives, the proposed project construction ADT is not expected to increase above 2,500, the existing ranges are 27 to 1,000 ADT and increases would range between 70 and 600 ADT across all alternatives (Chapter 24, Section 24.3.3.2). In general, any increased ADT can increase wildlife-vehicle collision and wildlife movement barrier risks, although none of the proposed/projected construction increases in ADT are expected to result in substantial increased risks to wildlife movement, connectivity, or mortality. WCGs potentially affected include low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

Rail spurs would be constructed to support the rail-served material depot at the Twin Cities Complex double launch shaft site, serve the Southern Complex tunnel launch shaft site, and transport RTM from the Twin Cities Complex to the Southern Complex under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c. A rail-served material depot would be constructed on Lower Roberts Island under Alternatives 3, 4a, 4b, 4c, and 5. It is assumed that up to three trains may use each of the new rail spurs per day, with each train consisting of an average of two locomotives and 50 rail cars. New rail spurs and associated increased rail traffic would result in potential habitat connectivity and wildlife movement barriers and increased wildlife mortality risk from train collisions. WCGs potentially affected include low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

The Southern Forebay would be constructed to support the Southern Complex on Byron Tract for central and eastern alignment alternatives (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c). The forebay would remove and fragment habitat and create a potential movement barrier around Italian Slough. Wildlife would have to navigate around the facility or cross over rail and roads, thus increasing the potential for wildlife mortality from vehicle or rail collision. WCGs potentially affected include low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

Levee improvement construction would occur under at Bouldin Island under Alternatives 1, 2a, 2b, and 2c; at Lower Roberts Island at Turner Cut under Alternatives 3, 4a, 4b, 4c, and 5, and a ring levee would be constructed at the Twins Cities Complex under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, 4c, and 5. Levee modifications have the potential to temporarily and permanently remove and alter habitat, resulting in barriers to species movement and habitat access and reduced species movement abilities. WCGs potentially affected include low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

Transmission line and SCADA line construction would take place where existing lines do not support the projected load needs; new lines would be placed on existing infrastructure, to the extent possible. New aboveground transmission lines would be constructed for the Southern Complex under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c and for the Bethany Complex under Alternative 5. New lines would not substantially alter the existing landscape. The potential for aerial strike with new transmission and SCADA line varies by wildlife species, level of exposure, and the species sensitivity. The potential for avian collision/electrocution risk is analyzed in Section 13.3.3.3, *Impacts of the Project Alternatives on Special-Status Wildlife Species*. WCGs potentially affected include aerial fauna.

Outlet and control structures, park-and-ride facilities, switching stations, RTM areas, and shaft facility construction would occur across all project alternatives. Such facilities would temporarily and permanently remove habitat, resulting in barriers to species movements and habitat access, and reduced species movement abilities. Such facilities may create wildlife movement barriers and potentially increase wildlife road crossings and wildlife-vehicle collision risk as species attempt to navigate around the facilities. WCGs potentially affected include low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

Field investigations for all alternatives would be conducted prior to and during construction under all alternatives and would involve a variety of ground-disturbing activities (Section 3.15), some of which could result in impacts on habitat, existing wildlife connectivity resources, and wildlife movement. Geotechnical investigations associated with the West Tracy Fault and tunnels for all alternatives, which include test trenches, CPTs, and soil borings, would result in temporary impacts on habitat (Appendix 13C). Field investigations within proposed surface construction footprints (including portions of tunnel alignments), which include test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing, would temporarily affect habitats. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints, but could still result in the disturbances and effects on wildlife movement and connectivity, as discussed above for facility construction. WCGs potentially affected include low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna. Environmental Commitments EC-1: C*onduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by implementing worker awareness training, which would alert staff on the need to avoid disturbing wildlife and of the various measures that would avoid and minimize these disturbances; and establishing non-disturbance buffers using construction fencing, which would minimize wildlife disturbance, and the restoration of temporarily disturbed areas.

Operations

All project alternatives have the potential for impacts on wildlife connectivity resources and wildlife movement from operations at project facilities, which includes impacts associated with new access roads, increased vehicle traffic volumes on access roads, potential increased night vehicle traffic volumes, increased human presence, and permanent project lighting. Lighting at facilities associated with the Southern Complex on Byron Tract and west of Byron Highway (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the Bethany Complex (Alternative 5) could disrupt wildlife movement if lighting at these facilities spills over into adjacent habitats. However, as stated in Chapter 3, Section 3.4.12, *Fencing and Lighting*, permanent lighting at project facilities would be motion activated, downcast, cut-off type fixtures with non-glare finishes, which would minimize the potential for this impact. Species affected by operations include a wide variety of mammals, birds, reptiles, amphibians, and invertebrates inhabiting the study area. WCGs potentially affected include low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

New aboveground high-voltage transmission lines would be constructed to power the Southern Complex under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, and the Bethany Complex under Alternative 5. The potential for collisions with new project lines varies by species and depends primarily on the species' level of exposure (i.e., proximity of the bird's habitat and resources to the transmission line) and its sensitivity (i.e., morphological and behavioral characteristics that influence the bird's propensity to collide with a line). Modeled habitat for special-status birds and natural communities that are suitable for nesting are present in the vicinity of proposed lines and therefore some potential for collision risk exists. Transmission line towers also provide perching substrate for raptors, which are predators of many special-status and non–special-status bird species. The existing network of transmission lines in the study area currently poses these risks, and any incremental risk associated with the new power line corridors would be expected to be low. WCGs potentially affected include low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

Maintenance

The maintenance of facilities under all alternatives could result in impacts on wildlife connectivity resources. Maintenance for facilities under all alternatives would include annual embankment repair, quarterly animal burrow filling, quarterly weed management (e.g., mechanical removal and herbicide application), and semiannual general and ground maintenance (e.g., mowing, vegetation trimming), daily or weekly inspections by vehicle, and annual cleaning (pressure washing) and would also include repaving of access roads every 15 years. These maintenance activities could cause disturbances, vegetation cover loss, and habitat avoidance during these activities which could result in reduced or altered wildlife movement ability. Species affected by maintenance impacts include a wide variety of mammals, birds, reptiles, amphibians, and invertebrates inhabiting the study area. WCGs potentially affected include low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

CEQA Conclusion—All Project Alternatives

Construction, operations, and maintenance of all project alternatives would result in impacts on wildlife connectivity resources and wildlife movement through the permanent and temporary loss of habitat, habitat fragmentation, new roads and railways, increased traffic volume, increased human presence and associated disturbances such as noise, light, increased vehicular and rail traffic, increased transmission line collision risks, and the potential for injury, mortality, and the disruption of normal wildlife movement behaviors and habitat connectivity.

Although a variety of existing terrestrial wildlife connectivity resources would be affected, most would not be completely or substantially fragmented or affected. In a few locations, habitat fragmentation, wildlife movement barriers, increased risk of wildlife collisions and mortality, and disturbances that may alter or obstruct wildlife connectivity and movement would result in significant impacts under all alternatives.

The potential impacts on wildlife connectivity resources, habitat connectivity, and wildlife movement from project construction, operations, and maintenance would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-4a: *Develop and Implement Erosion and Sediment Control Plans*; EC-4b: *Develop and Implement Stormwater Pollution Prevention Plans*; EC-11: *Fugitive Dust Control*; EC-12: *On-Site Concrete Batching Plants*; and EC-14: *Construction Best Management Practices for Biological Resources*. Even with these commitments, however, impacts on wildlife connectivity resources, habitat connectivity, and wildlife movement from project construction, operations, and maintenance would be significant. The CMP and Mitigation Measures AES-4b: *Minimize Fugitive Light from Portable Sources Used for Construction*; AES-4c: *Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences*; BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*; BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife*; and BIO-53: *Avoid and Minimize Impacts on Terrestrial Wildlife Connectivity and Movement* would be required to avoid, minimize, and mitigate impacts on wildlife connectivity resources, habitat connectivity, and wildlife movement. The impacts on wildlife connectivity resources, habitat connectivity, and wildlife movement from the project alternatives would be less than significant with mitigation because the aforementioned measures would compensate for impacts on wildlife habitat and avoid and minimize habitat and species impacts that potentially could disrupt species movement and habitat selection, habitat access, and wildlife behavior, resulting in impacts on wildlife connectivity. These measures would avoid and minimize habitat and species impacts that could cause potential for injury, mortality, disruption of normal behaviors and disturbances to habitat that potentially may disrupt species movement, habitat selection, habitat access, and wildlife behavior, resulting in impacts on wildlife connectivity, by training construction staff on protecting habitat and species, reporting requirements, and the ramifications for not following these measures; implementing spill prevention and containment plans that would avoid material spills that could affect habitat and wildlife; preventing erosion and sedimentation of habitats and stormwater pollution, which may affect habitat and wildlife; preventing dust emissions that may impact habitat and wildlife; implementing construction BMPs and having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable to protect habitat and wildlife; reducing fugitive light and lighting impacts that may disrupt nocturnal wildlife behavior and habitat selection; implementing environmental review and avoidance of habitat and wildlife impacts during maintenance activities; limiting vehicle speeds and implementing traffic control measures on DWR roads during operations to reduce species movement disruptions and vehicle-related mortality; and ensuring that the project prevents impacts on and facilitates habitat connectivity and safe wildlife movement.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR will implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of wetlands, waters, and habitat for several special-status species through the creation of habitat on Bouldin Island and at the I-5 ponds, and managing these areas in perpetuity, as well as purchasing mitigation credits within the region for species requiring alkaline seasonal wetland, vernal pool complex, and grassland habitat (Appendix 3F, Section 3F.3). This mitigation will create habitat in perpetuity within areas identified as important core habitat and regional wildlife corridors and will support live-in, movement, migratory, and stopover habitat for a wide variety of species inhabiting the region.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

See description of Mitigation Measure AES-4b under Impact AES-4 in Chapter 18.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

See description of Mitigation Measure AES-4c under Impact AES-4 in Chapter 18.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-ab under Impact BIO-2.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

See description of Mitigation Measure BIO-22b under Impact BIO-22.

Mitigation Measure BIO-53: Avoid and Minimize Impacts on Terrestrial Wildlife Connectivity and Movement

All Alternatives

Design and Construction

The following measures will be implemented during project design and construction to avoid and minimize impacts on terrestrial wildlife connectivity and movement. The design of the wildlife crossing structure will include wildlife fencing and will be developed in coordination with a biologist qualified and experienced in wildlife crossing planning and design.

1. As part of project access road improvement planning, design, and construction, the project will upgrade the existing culvert on SR 12 (identified by CDFW [2020d:11] as a priority barrier to wildlife movement in the region; Barrier ID W031) to a dedicated wildlife crossing structure to facilitate movement of both aquatic and terrestrial wildlife. The wildlife crossing structure will span the banks of the channel to the maximum extent possible and will incorporate design elements to facilitate movement and connectivity of giant garter snake, western pond turtle, mink, river otter, beaver, all other reptiles and mammals inhabiting the area.

2. The new intersection for Byron Highway and the extension of Armstrong Road (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) will include wildlife crossing structures where the new road intersects with Brushy Creek. The wildlife crossing structure will span the banks of the channel to the maximum extent possible and will incorporate design elements to facilitate movement and connectivity of California red-legged frog, western pond turtle, and other aquatic, semi-aquatic, and terrestrial wildlife species inhabiting the area.

3. Contiguous habitat connectivity along riparian banks and corridors will be maintained during construction, to the extent practicable, to maintain connectivity at riparian banks and corridors at levees, intakes, and other facilities located along or within riparian banks and corridors. Riparian vegetation and canopy will be avoided and maintained to the maximum extent possible during construction. Design will include wildlife fencing where applicable to prevent wildlife access to construction areas that may be dangerous for wildlife, such as roads and other facilities. Fencing will also be designed and placed in a manner that facilitates wildlife movement through or between the riparian banks and corridors during constriction. Design and maintenance of habitat contiguity and fencing will be developed and overseen in coordination with a biologist qualified and experienced in wildlife crossing planning and design and will be managed in coordination with the qualified biologist during construction phasing.

Operations

4. Contiguous habitat connectivity along riparian banks and riparian corridors will be maintained during operations to maintain connectivity at riparian banks and corridors at levees, intakes, and other facilities located along/within riparian banks and corridors. The native riparian vegetation and canopy in these areas will be maintained to the maximum extent possible during operation. Where maintaining and reestablishing the riparian vegetation and canopy is not possible, plans will include landscaping with native plants that will provide the maximum amount of cover and heterogeneity possible and will also consider the use of other non-vegetative options to provide cover and heterogeneity to facilitate wildlife movement such as rock piles, snags, and human-made materials, such as faux rocks and trees that provide cover, yet are lightweight and not load-bearing. Design will include wildlife fencing where applicable to prevent wildlife access to roads and facilities. Fencing will also be designed and placed in a manner that facilitates wildlife movement through or between the riparian banks and corridors during constriction. Design of habitat contiguity, revegetation, and fencing will be developed in coordination with a biologist qualified and experienced in wildlife crossing planning and design.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

<u>Compensatory Mitigation</u>

The creation and enhancement of wetlands and other waters, as well as habitat for special-status species on Bouldin Island and at the I-5 ponds, and tidal wetland habitat restoration and channel margin enhancement under the project CMP, would temporarily affect wildlife connectivity resources and wildlife movement from direct vegetation removal, grading, noise, and other disturbances to create the appropriate topography and soil conditions to establish or restore habitats. These activities would also have the potential for injury, mortality, habitat avoidance, and the disruption of normal behaviors and movements of individuals, which may have a temporary adverse impact on habitat connectivity and wildlife movement. WCGs potentially affected include low-mobility small fauna, semi-aquatic obligates, moderate-mobility small fauna, adaptive high-mobility fauna, high-openness, high-mobility carnivores, adaptive ungulates, very high-openness fauna, and aerial fauna.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located and could result in the temporary impacts on wildlife movement but would generally improve conditions for wildlife movement in the long term. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas being managed and protected for wildlife would generally benefit wildlife movement through the study area. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce potential impacts on wildlife connectivity resources and wildlife movement by avoiding and minimizing construction direct and indirect impacts on habitats and species.

Other Mitigation Measures

Some other mitigation measures may affect wildlife connectivity resources and wildlife movement. Impacts may be caused by activities such as vegetation removal, grading, excavations, dredging, and construction of structures. Impacts of these measures may include habitat loss, ground disturbances, and noise causing disruption of normal movement abilities and behaviors and would be similar to construction effects of the project alternatives on wildlife connectivity resources and wildlife movement.

These impacts would be reduced through the CMP, Environmental Commitment EC-1: *Conduct Worker Awareness Training*, and Mitigation Measures BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities*, BIO-22b: *Avoid and Minimize Operational Traffic Impacts on Wildlife*, and BIO-53: *Avoid and Minimize Impacts on Terrestrial Wildlife Connectivity and Movement*. Therefore, impacts on wildlife connectivity resources and wildlife movement from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on wildlife connectivity resources and wildlife movement from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-54: Conflict with the Provisions of an Adopted Habitat Conservation Plan, Natural Community Conservation Plan, or Other Approved Local, Regional, or State Habitat Conservation Plan

To comply with CEQA, potential conflicts with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan must be analyzed. Within or near the study area, numerous HCPs, NCCPs, and other regional conservation plans have been permitted or are in process, including those listed below.

- *Natomas Basin HCP* (City of Sacramento et al. 2003).
- *Yolo HCP/NCCP* (Yolo Habitat Conservancy 2018).
- *Solano County Multispecies HCP* (Solano County MSHCP) (Solano County Water Agency 2012).
- *South Sacramento HCP* (SSHCP) (County of Sacramento et al. 2018).
- *East Contra Costa County HCP/NCCP* (ECCC HCP/NCCP) (East Contra Costa County Habitat Conservation Plan Association 2006).
- *San Joaquin County Multi-Species HCP and Open Space Plan* (SJC MSHCP) (Jones & Stokes 2000).
- *East Alameda County Conservation Strategy* (EACCS) (East Alameda County Conservation Strategy Steering Committee 2010).

The Natomas Basin HCP is located in northwestern Sacramento and southern Sutter Counties, approximately 0.5 mile north of and upstream of the study area, but does not border or overlap with it. Because of the lack of overlap and the location of the Natomas Basin HCP upstream of the study area, it is not discussed further in this section.

The Yolo HCP/NCCP and Solano County MSHCP overlap the northwestern portion of the study area, but no construction would take place in the plan areas of these plans (Table 13-102, Figure 13-99). The north Delta intake locations are across the Sacramento River from the Yolo HCP/NCCP southeastern border, and the Solano County MSHCP is located approximately 3.4 miles southeast of the nearest project feature. Because no construction impacts would take place in the plan areas, and no existing preserves are located immediately adjacent to project construction, these plans are not discussed further in this section.

Table 13-102. Summary Table of Conservation Plans that Overlap with the Project Study Area

Conservation Plan	Plan Status	Permit Term (years)	Plan Area (acres)	Boundary Overlap with Study Area (acres)	Proportion of Conservation Plans That Overlap Study Area
East Contra Costa County HCP/NCCP	Approved in 2007	30	174,018	63,002	36%
San Joaquin County MSHCP and Open Space Plan	Approved in 2001	50	912,386	318,898	35%

Conservation Plan	Plan Status	Permit Term (years)	Plan Area (acres)	Boundary Overlap with Study Area (acres)	Proportion of Conservation Plans That Overlap Study Area
South Sacramento HCP	Approved in 2019	50	317,655	43,958	14%
East Alameda County Conservation Strategy	Approved in 2011	N/A	271,486	6,470	2%

Sources: TRA Environmental Services 2011; County of Sacramento et al. 2000, 2018; East Alameda County Conservation Strategy Steering Committee 2010; East Contra Costa County Habitat Conservation Plan Association 2006.
HCP = habitat conservation plan; NCCP = natural communities conservation plan; MSHCP = multi-species habitat conservation plan; N/A = not applicable.

The remaining three HCPs and one conservation strategy overlap with the study area and the project construction footprint to varying extents (Table 13-102, Figure 13-99) and are described in Section 13.1, *Environmental Setting*.

All Project Alternatives

Construction

Construction of water conveyance facilities would result in permanent surface impacts within the boundaries of the three overlapping conservation plans and the EACCS that could reduce the availability of land for acquisition, cause temporary impacts that could affect quality of habitats and agricultural lands, and cause impacts on species and natural communities covered by these plans (Figure 13-99). To quantify the potential effects of construction of the project on overlapping plans, the permanent surface impacts of all project alternatives were identified (Table 13-103).

Table 13-103. Impacts from Construction of Water Conveyance Facilities under the Alternatives Relative to Total Area of Overlap With Conservation Plans

Alternative	Permanent Surface Impacts (acres)	Proportion of Surface Impacts Relative to Plan Area (% of plan area)
Plan: South Sacramento HCP Plan Area: 317,655 acres		
1	488.80	0.1%
2a	564.38	0.2%
2b	192.82	0.1%
2c	352.76	0.1%
3	483.33	0.2%
4a	698.93	0.2%
4b	192.82	0.1%
4c	384.79	0.1%
5	542.41	0.2%
Plan: San Joaquin County MSHCP Plan Area: 912,386 acres		
1	895.26	0.1%
2a	905.98	0.1%

Alternative	Permanent Surface Impacts (acres)	Proportion of Surface Impacts Relative to Plan Area (% of plan area)
2b	798.33	0.1%
2c	841.12	0.1%
3	338.50	<0.1%
4a	369.71	<0.1%
4b	298.02	<0.1%
4c	319.53	<0.1%
5	425.92	<0.1%
Plan: East Contra Costa County HCP/NCCP Plan Area: 174,018 acres		
1, 2b, 2c, 4b	1,392.64	0.8%
2a	1,400.40	0.8%
3	1,423.70	0.8%
4a	1,455.36	0.8%
4c	1,410.59	0.8%
5	0.16	<0.01%
Plan: East Alameda County Conservation Strategy Plan Area: 271,486 acres		
1, 2b, 2c, 3, 4b, 4c	33.68	<0.1%
2a, 4a	118.19	<0.1%
5	326.39	0.1%

HCP = habitat conservation plan; NCCP = natural community conservation plan; MSHCP = multispecies habitat conservation plan.

The surface impacts of all project alternatives represent less than 1% of the plan areas of each of the overlapping conservation plans. In general, the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would have greater surface impacts within the overlapping conservation plans than the eastern or Bethany Reservoir alignment alternatives (Alternatives 3, 4a, 4b, 4c, and 5), primarily due to the larger disturbance area on Bouldin Island. Alternative 5 would have the least surface impacts across all overlapping conservation plans because it does not include construction of the Southern Complex (Table 13-103). No permanent surface impacts would occur within existing or planned preserves for any of the overlapping conservation plans. For all alternatives, Mitigation Measure AG-1: *Preserve Agricultural Land* would reduce the extent of impacts on Important Farmland by mitigating at a ratio of at least 1:1 for permanent loss of Important Farmland. Appendix 15B, *Agricultural and Land Stewardship Considerations*, describes the methodology employed during the initial siting and design process to greatly minimize the extent of farmland that would be permanently converted as a result of the project alternatives. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that temporarily disturbed areas are restored within 1 year. Environmental Commitments EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B), and applicable biological resources mitigation measures found in this chapter would avoid and minimize construction-related impacts on species covered under the conservation plans. The CMP would ensure that impacts due to loss of habitat for covered special-status species, natural communities, and aquatic resources are mitigated through habitat protection (Appendix 3F).

For all project alternatives, the intakes and Twin Cities Complex would occur within the SSHCP plan area in PPU 6. The difference in impact magnitude between these alternatives within the SSHCP reflects differences between the number and size of intake structures (Table 13-103). Alternatives 2a and 4a would have the greatest impacts due to the construction of three intake facilities. Alternatives 1, 3, and 5 would have slightly greater impacts than Alternatives 2c and 4c due to the slightly larger footprint of Intake C; a larger RTM area at the Twin Cities Complex would result in greater impacts under Alternative 5 than Alternatives 1 or 3. Alternatives 2b and 4b would have the smallest impacts due to the use of one intake facility. The alternative with the greatest surface impacts in the SSHCP (Alternative 4a) would permanently remove up to 589 acres of agricultural, 16 acres of grassland, 7 acres of riparian, and less than 0.1 acre of vernal pool habitats targeted for preservation, but for all alternatives this would represent a small proportion of land available within the overlap area (Appendix 13D, *Overlapping Habitat Conservation Plan Permanent Surface Impacts*). Improvements to existing roads would take place within existing SSHCP cropland preserves but no new permanent surface impacts would occur within these preserves (County of Sacramento et al. 2018:Figure 7-4) and temporarily disturbed areas would be restored within 1 year.

Alternatives 1, 2a, 2b, and 2c would have substantially greater impacts in the SJC MSHCP plan area relative to Alternatives 3, 4a, 4b, 4c, and 5, primarily because of the larger area for access roads and levee improvements on Bouldin Island, as well as access roads to tunnel shafts on Bacon and Mandeville Islands. Among the central and eastern alignment alternatives, those with a higher flow capacity require larger RTM footprints and, therefore, would have larger permanent surface impacts; Alternatives 2a and 4a (7,500 cfs) would have the greatest impact of the central and eastern alignments, respectively, and Alternative 2b and 4b (3,000 cfs) would have the least impact (Table 13-103). Because construction on Bouldin Island would take place on private property, the larger surface impact from Alternatives 1, 2a, 2b, and 2c would not result in increased reduction of land available for preservation under the SJC MSHCP, relative to the eastern alignment alternatives. Although all project alternatives would result in the removal of lands available for conservation in the Delta Zone, this area represents only a small proportion of the total lands available in the Delta Zone (Appendix 13D), and no new permanent surface impacts would occur within existing or planned SJC MSHCP preserves (San Joaquin Council of Governments 2020:Attachment C, Figure 1, page 48).

Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would have similar surface impacts in the ECCC HCP/NCCP plan area from the construction of the Southern Complex on Byron Tract and west of Byron Highway (Table 13-103), including permanently removing approximately 1,285 acres of agriculture and 1.6 acres of alkali seasonal wetland (Appendix 13D). Alternatives 2a and 4a would have slightly greater permanent impacts than Alternatives 1, 2b, 2c, 3, 4b, and 4c because of the larger RTM area at the Southern Complex on Byron Tract. Alternative 5, which does not involve construction of the Southern Complex on Byron Tract or west of Byron Highway, would have minimal impacts within the ECCC HCP/NCCP plan area and would not remove agricultural or alkali seasonal wetland habitats targeted for preservation by the plan (Appendix 13D). Although all project alternatives would result in the removal of lands available for conservation, this land represents only a small proportion of the total lands available (Appendix 13D) and no new permanent surface impacts would occur within existing or planned ECCC HCP/NCCP preserves (East Contra Costa County Habitat Conservancy 2020:Figure 7).

Construction of all project alternatives would affect habitat for species identified as conservation priorities in the EACCS Conservation Zones 6 and 7, specifically, San Joaquin kit fox and California red-legged frog (Table 13-103). Alternative 5 would result in the greatest surface impacts that would remove lands available for conservation in the EACCS study area relative to the other alternatives because of construction of the Bethany Complex, which would only be constructed under Alternative 5. Alternatives 2a and 4a would have similar impacts resulting construction of an additional outlet and control structure on the Delta-Mendota Canal. Alternatives 1, 2b, 2c, 3, 4b, and 4c would have minimal surface impacts in the EACCS plan area. Although all project alternatives would result in the removal of lands available for conservation, this land represents only a small proportion of the total lands available (Appendix 13D) and impacts on species included in the EACCS would be mitigated.

Field investigations for all project alternatives would be conducted prior to and during construction and would involve a variety of ground-disturbing activities (Section 3.15), some of which could result in impacts on biological resources covered under overlapping conservation plans. Geotechnical investigations associated with the West Tracy Fault and the tunnels for all alternatives, which include test trenches, CPTs, and soil borings, would result in impacts on riparian and species habitat (Appendix 13C). Geotechnical investigations associated with all the tunnels for all alternatives would avoid impacts on wetlands as specified in Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Field investigations within proposed surface construction footprints (including portions of tunnel alignments), which include test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing, would temporarily impact habitats. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on the needs of protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; implementing spill prevention and containment plans that would avoid material spills that could affect the viability of habitats; having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable; and ensuring that temporarily disturbed areas are restored within one year. Generally, field investigation impacts would be minimal and not result in a conflict with approved conservation plans.

Operations & Maintenance

The operation and maintenance of project facilities would not result in additional surface impacts within the overlapping conservation plans for all project alternatives. These activities would take place within the permanent surface impact construction footprint, so there would be no additional impacts on the overlapping conservation plans. Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities,* would reduce the impacts on species covered under the conservation plans.

CEQA Conclusion—All Project Alternatives

Construction of all project alternatives would result in permanent and temporary surface impacts on landcover types covered by the plans and reduce the availability of lands for conservation for the three HCPs that overlap with the study area. Because the temporary impacts and permanent loss of potential conservation lands represents a small proportion of the lands available for conservation, these impacts are not anticipated to affect implementation of the overlapping plans. Permanent impacts on covered species habitat and natural communities would be mitigated with the CMP (Appendix 3F), and Mitigation Measure AG-1: *Preserve Agricultural Land* would reduce the extent of impacts on Important Farmland by mitigating at a ratio of at least 1:1 for permanent loss of Important Farmland. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure temporary impacts on covered species habitat and natural communities would be restored within one year. The CMP habitat creation and enhancement sites at Bouldin Island and the I-5 ponds are within the SJC MSHCP plan area; purchase of agency-approved mitigation bank credits or other site protection instruments would offset impacts on emergent wetland, vernal pool, California red-legged frog, California tiger salamander, greater sandhill crane, tricolored blackbird, San Joaquin kit fox, Swainson's hawk, and vernal pool branchiopods at sites approved by regulatory agencies. The Tidal Habitat Mitigation Framework would offset habitat loss of emergent wetland, tidal channel, and habitat for California black rail using a programmatic approach at appropriate sites that would provide suitable habitat (Appendix 3F, Section 3F.4.3, *Tidal Habitat Mitigation Framework*).

Construction of all project alternatives could have impacts on special-status species that conflict with covered species goals and objectives of the overlapping conservation plans, which would be a significant impact. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that temporarily disturbed areas are restored. The following environmental commitments would avoid the impacts on special-status species in overlapping areas of adopted HCPs and NCCPs and other conservation plans: EC-1: *Conduct Worker Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). The following mitigation measures specific to terrestrial biological resources would also avoid and minimize construction-related impacts on species that are covered under the conservation plans: Mitigation Measures BIO-2b: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants*, BIO-14: *Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp*, BIO-18a: *Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle*, BIO-22a: *Avoid and Minimize Impacts on California Tiger Salamander*, BIO-24a: *Avoid and Minimize Impacts on California Red-Legged Frog and Critical Habitat*, BIO-25: *Avoid and Minimize Impacts on Western Pond Turtle*, BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles*, BIO-30: *Avoid and Minimize Impacts on Giant Garter Snake*, BIO-31: *Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo*, BIO-32: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail*, BIO-33: *Minimize Disturbance of Sandhill Cranes*, BIO-36a: *Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors*, BIO-35: *Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries*, BIO-36b: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite*, BIO-39: *Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk*, BIO-40: *Conduct Surveys and Minimize Impacts on Burrowing Owl*, BIO-44a: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird*, and BIO-47: *Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures*.

Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Biological Resources from Maintenance Activities* would reduce impacts on covered species during maintenance activities.

Because the project alternatives would only remove a small proportion of available lands for conservation, and thus not obstruct the plans' conservation goals, and with implementation of the above measures to avoid and minimize impacts on covered species and habitats, the impact on an adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan would be less than significant with mitigation.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR will implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss habitat for species and natural communities covered by the overlapping habitat conservation plans (Appendix 3F, Sections 3F.3.2 and 3F 3.3, and Attachment 3F.1, Tables 3F.1-2 and 3F.1-3) by providing compensatory mitigation. The mitigation approach includes initial mitigation actions at specific sites, purchase of mitigation credits at existing or proposed mitigation banks, and proposing a mitigation framework for future compensatory mitigation actions for tidal habitats.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure BIO-14: Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp

See description of Mitigation Measure BIO-14 under Impact BIO-14.

Mitigation Measure BIO-18: Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle

See description of Mitigation Measure BIO-18 under Impact BIO-18.

Mitigation Measure BIO-22a: Avoid and Minimize Impacts on California Tiger Salamander

See description of Mitigation Measure BIO-22a under Impact BIO-22.

Mitigation Measure BIO-24a: Avoid and Minimize Impacts on California Red-Legged Frog and Critical Habitat

See description of Mitigation Measure BIO-24a under Impact BIO-24.

Mitigation Measure BIO-25: Avoid and Minimize Impacts on Western Pond Turtle

See description of Mitigation Measure BIO-25 under Impact BIO-25.

Mitigation Measure BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles

See description of Mitigation Measure BIO-26 under Impact BIO-26.

Mitigation Measure BIO-30: Avoid and Minimize Impacts on Giant Garter Snake

See description of Mitigation Measure BIO-30 under Impact BIO-30.

Mitigation Measure BIO-31: Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo

See description of Mitigation Measure BIO-31 under Impact BIO-31.

Mitigation Measure BIO-32: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail

See description of Mitigation Measure BIO-32 under Impact BIO-32.

Mitigation Measure BIO-33: Minimize Disturbance of Sandhill Cranes

See description of Mitigation Measure BIO-33 under Impact BIO-33.

Mitigation Measure BIO-35: Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries

See description of Mitigation Measure BIO-35 under Impact BIO-35.

Mitigation Measure BIO-36a: Conduct Nesting Surveys for Special-Status and Non-Special-Status Birds and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors

See description of Mitigation Measure BIO-36a under Impact BIO-36.

Mitigation Measure BIO-36b: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite

See description of Mitigation Measure BIO-36b under Impact BIO-36.

Mitigation Measure BIO-39: Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk

See description of Mitigation Measure BIO-39 under Impact BIO-39.

Mitigation Measure BIO-40: Conduct Surveys and Minimize Impacts on Burrowing Owl

See description of Mitigation Measure BIO-40 under Impact BIO-40.

Mitigation Measure BIO-44: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird

See description of Mitigation Measure BIO-44 under Impact BIO-44.

Mitigation Measure BIO-47: Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures

See description of Mitigation Measure BIO-47 under Impact BIO-47.

Mitigation Measure AG-1: Preserve Agricultural Land

See description of Mitigation Measure AG-1 under Chapter 15, *Agricultural Resources*, Impact AG-1.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The CMP (Appendix 3F) would include creation and enhancement of wetlands on Bouldin Island and ponds west of I-5, which would occur within the plan area of the SJC MSHCP. These activities would occur on private and state-owned property and would not reduce the availability of conservation lands for the SJC MSHCP.

The CMP commitments to create and enhance wetlands and other special-status species habitat and purchase mitigation credits would increase availability of suitable habitat for several species covered under the conservation plans, which would offset impacts on these species and assist the plans in achieving their covered species conservation goals.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would take place in areas where vernal pool complexes, alkaline seasonal wetlands, or associated grasslands are located. Construction and maintenance activities at the non-bank sites could result in the temporary disturbance of existing habitat and the potential for injury or mortality of vernal pool and grassland species covered by the conservation plans but would ultimately provide benefits for these species. The overlapping conservation plans include land conservation goals to protect these habitat types. Non-bank mitigation sites would be prioritized in the Altamont Hills recovery area (Appendix 3F, Attachment 3F.1, Table 3F.1-3), which is outside of the plan areas of any adopted conservation plans, therefore using non-bank sites would not conflict with the conservation goals and objectives of adopted conservation plans. The Altamont Hills recovery area is located within the EACCS study area. While the EACCS is not an adopted conservation plan, it contains habitat conservation goals used as a guide to facilitate species conservation. Implementing non-bank sites in this area would contribute to the EACCS conservation goal of protecting 90% of alkali wetland and seasonal wetland habitat within the EACCS study area (East Alameda County Conservation Strategy Steering Committee 2010:3.32). Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would consist of the protection and management of agricultural areas and natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These protected areas could also contain habitat for species covered under the conservation plans and management activities could affect this habitat and result in the disruption of normal behaviors, injury, and mortality. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

Implementing site protection instruments within the plan areas of adopted conservation plans has the potential to reduce the availability of suitable lands to meet the conservation goals and objectives of those plans. Approximately 50% of the SSHCP PPU 6 overlaps with the study area (County of Sacramento et al. 2020:Figure 7-2). The SSHCP habitat conservation goal for PPU 6 of 8,465 acres of agriculture represents 14% of available agricultural land cover and 623 acres of grassland represents 4% of available grassland habitat in PPU 6 (County of Sacramento et al. 2018:7-87–7-88, Table 7-6). The study area overlaps with approximately 25% of ECCC HCP/NCCP Zone 2, 20% of Zone 5, and 100% of Zone 6. The ECCC HCP/NCCP habitat conservation goal for Zone 2 is 4,900 acres of annual grassland, which represents 48% of the annual grassland in Zone 2 (East Contra Costa County Habitat Conservation Plan Association 2006:Table 5-14). The goal for Zone 6 is 250 to 400 acres of cropland or irrigated pasture, which represents 1% to 2% of the available cropland or irrigated pasture in Zone 6 (East Contra Costa County Habitat Conservation Plan Association 2006:5-41–5-43). Zone 5 of the ECCC HCP/NCCP has a goal of 5,300 to 8,100 acres of annual grassland conservation, which represents 49% to 75% of the available annual grassland in Zone 5 (East Contra Costa County Habitat Conservation Plan Association 2006: Table 5-11). The Delta Zone of the SJC MSHCP is entirely within the study area (San Joaquin Council of Governments 2020:48). The SJC MSHCP does not have habitat conservation targets; however, the Delta Zone contains 210,488 acres of agricultural land (Appendix 13D and the current Delta Zone preserve system consists of 5,100 acres of agricultural land (San Joaquin Council of Governments 2020:21, Table 6), which represents 2% of the available agricultural land in the Delta Zone. Site protection for greater sandhill crane roosts would require minimum patches of 40 acres and minimum patches of 160 acres of foraging habitat within 2 miles of roosts, which would fall within the SSHCP and SJC MSHCP plan areas (Appendix 3F, Attachment 3F.1, Table 3F.1-3). Swainson's hawk site protection would occur in patches of at least 40 acres within 50 miles of the study area (Appendix 3F, Attachment 3F.1, Table 3F.1-3), which provides a large area where the sites could be located. For most zones of the overlapping conservation plans, the large area of available agricultural land and annual grassland, relative to land conservation goals, indicates that site protection instruments would not encumber conservation lands such that the CMP would conflict with the land conservation goals of the adopted conservation plans. In addition, the CMP includes a commitment to coordinate with applicable conservation plans prior to acquiring site protection instruments within a plan area to ensure they do not conflict with the plans or their ability to achieve their biological goals and objectives (Appendix 3F, Section 3F.4.2.2, *Site Protection Instruments*).

The creation and enhancement of wetlands and other waters, as well as habitat for special-status species, non-bank mitigation, and management of site protection instruments under the CMP could result in injury, mortality, or disruption of normal behaviors of these species that conflict with covered species goals and objectives of the overlapping conservation plans, which would be a significant impact. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would ensure that temporarily disturbed areas are restored within 1 year. The following environmental commitments and general mitigation measures would avoid the impacts on covered special-status species in overlapping areas of adopted HCPs and NCCPs and other conservation plans: EC-1: *Conduct Worker Environmental Awareness Training* and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). The following mitigation measures specific to terrestrial biological resources would also avoid and minimize construction-related impacts on species that are covered under the conservation plans: Mitigation Measures BIO-2b: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants*, BIO-18a: *Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle*, BIO-25: *Avoid and Minimize Impacts on Western Pond Turtle*, BIO-26: *Avoid and Minimize Impacts on*

Special-Status Reptiles, BIO-30: *Avoid and Minimize Impacts on Giant Garter Snake*, BIO-31: *Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo*, BIO-32: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail*, BIO-33: *Minimize Disturbance of Sandhill Cranes*, BIO-36a: *Conduct Nesting Surveys for Special-Status and Non-Special-Status Birds and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors*, BIO-35: *Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries,* BIO-36b: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite*, BIO-39: *Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk,* BIO-40: *Conduct Surveys and Minimize Impacts on Burrowing Owl,* BIO-44a: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird*, and BIO-47: *Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures*.

Because habitat creation and enhancement, non-bank mitigation, and site protection instruments under the CMP would not significantly reduce the availability of conservation lands for the SJC MSHCP, the CMP commitment to protect habitat would offset habitat loss for covered species and natural communities, and the environmental commitments and mitigation measures listed above would reduce impacts on covered species; the CMP would not conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plans.

The potential for the project alternatives with the CMP to conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state plan would be less than significant with mitigation.

Other Mitigation Measures

Some other mitigation measures may cause impacts on habitat and species covered by overlapping adopted HCPs and NCCPs and other conservation plans and reduce the availability of lands for conservation for the three habitat conservation plans that overlap with the study area. Impacts may be caused by activities such as grading, excavations, dredging, fill, and construction of structures. Impacts of these measures may include habitat degradation, habitat loss, ground disturbances, and noise that may cause disruption of normal wildlife behaviors, hydrological changes, altered drainage patterns, and sedimentation, which may affect habitat for covered special-status species, natural communities, and aquatic resources. Impacts would be similar to construction effects of the project alternatives on habitat conservation plans.

These impacts would be reduced through the CMP; Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources*; and Mitigation Measures BIO-2b: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants*; BIO-14: *Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp*; BIO-18a: *Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle*; BIO-22a: *Avoid and Minimize Impacts on California Tiger Salamander*; BIO-24a: *Avoid and Minimize Impacts on California Red-Legged Frog and Critical Habitat*; BIO-25: *Avoid and Minimize Impacts on Western Pond Turtle*; BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles*; BIO-30: *Avoid and Minimize Impacts on Giant Garter Snake*; BIO-31: *Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo*; BIO-32: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail*; BIO-33: *Minimize Disturbance of Sandhill Cranes*; BIO-36a: *Conduct Nesting Surveys for Special-Status and Non-Special-Status Birds and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors*; BIO-35: *Avoid and Minimize Impacts on*

Cormorant, Heron, and Egret Rookeries; BIO-36b: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite*; BIO-39: *Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk*; BIO-40: *Conduct Surveys and Minimize Impacts on Burrowing Owl*; BIO-44a: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird*; BIO-47: *Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures*; and AG-1: *Preserve Agricultural Land*. Therefore, impacts on adopted HCPs and NCCPs and other conservation plans from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on adopted HCPs and NCCPs and other conservation plans from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

Impact BIO-55: Conflict with Any Local Policies or Ordinances Protecting Biological Resources, Such as a Tree Preservation Policy or Ordinance

All Project Alternatives

Construction

The construction of all of the project alternatives would result in impacts on terrestrial biological resources identified for protection in goals and polices of general plans and ordinances for local jurisdictions overlapping with the project footprint. The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would affect biological resources identified for protection in the general plans for Sacramento, San Joaquin County, Contra Costa, and Alameda Counties (County of Sacramento 2017:1–88; County of San Joaquin 2016:3.4-1–3.4-21; County of Contra Costa 2005:33–35; County of Alameda 2000:33–35), which includes general policies for the protection of riparian habitat, wetlands, and special-status species habitat. The eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5) would similarly affect the same resources in those counties, in addition to affecting biological resources identified in policies in the City of Stockton *Envision Stockton 2040 General Plan* (2018). Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

All project alternatives would result in impacts on riparian habitat that likely meet the criteria for protection under Sacramento, San Joaquin, and Contra Costa County ordinances. Tree protection ordinances for the City of Stockton and Alameda County are limited to those in local rights-of-way or parks, and none of the alternatives would affect habitat supporting trees in these areas. All project alternatives would include the construction of a portion of a new SCADA line within the City of Sacramento; however, the line would be attached to existing poles located in grassland or developed areas lacking trees. Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* would ensure that temporarily disturbed areas are restored (Appendix 3B).

Field investigations for all project alternatives would be conducted prior to and during construction and would involve a variety of ground-disturbing activities (Section 3.15), some of which could result in impacts on biological resources identified for protection by local policies and ordinances. Geotechnical investigations associated with the West Tracy Fault and the tunnels for all alternatives, which include test trenches, CPTs, and soil borings, would result in impacts on riparian and species habitat (Appendix 13C). Geotechnical investigations associated with all tunnels for all alternatives would avoid impacts on wetland as specified in Environmental Commitment EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Field investigations within proposed surface construction footprints (including portions of tunnel alignments), which include test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing, would temporarily affect habitats. These temporary impacts are not characterized as an additional loss of habitat because impacts in these locations have already been quantified within the construction footprints. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; implementing spill prevention and containment plans that would avoid material spills that could affect the viability of habitats; and having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

Operations

None of the project alternatives would result in operational impacts on biological resources identified for protection in local policies and ordinances because operating conveyance facilities would not involve disturbance or removal of wetlands, trees, or species habitat.

Maintenance

None of the project alternatives would result in impacts on biological resources identified for protection in local policies and ordinances resulting from maintenance activities because even though some vegetation management would occur, it would be limited to mowing of grasses and trimming of shrubs and trees planted within DWR facilities and not removal of habitats or protected trees.

CEQA Conclusion—All Project Alternatives

Construction of all project alternatives would result in impacts on biological resources identified for protection in local policies and ordinances through the permanent and temporary loss of wetlands, riparian, and habitat for special-status species.

The temporary loss of habitats from project construction would be reduced by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). Even with these commitments, however, the permanent loss of habitat from the construction of the alternatives would be significant. The implementation of the CMP would be required to offset the loss of wetlands, riparian, and habitat for special-status species (Appendix 3F), which would reduce impacts on these resources and thus the conflicts with local policies and ordinances to less than significant.

Mitigation Measure CMP: Compensatory Mitigation Plan

The CMP that DWR will implement (see Impact BIO-1 for a summary discussion of the CMP) will result in creation and protection of wetlands, riparian, and habitat for special-status species on Bouldin Island and at the I-5 ponds in San Joaquin County and the purchase mitigation bank credits for vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, and California red-legged frog, which likely would take place in Contra Costa, Alameda, or San Joaquin County (Appendix 3F).

Mitigation Impacts

Compensatory Mitigation

The creation and enhancement of wetlands and other waters, as well as habitat for special-status species on Bouldin Island and at the I-5 ponds, tidal wetland habitat restoration, channel margin enhancement, non-bank habitat creation, and site protection instruments under the project's CMP, would affect biological resources identified for protection in local policies and ordinances through the removal of trees and temporary disturbances to habitat and the displacement of wildlife. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce these potential impacts by training construction staff on protecting sensitive biological resources, reporting requirements, and the ramifications for not following these measures; implementing spill prevention and containment plans that would avoid material spills that could affect the viability of habitats; and having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

The impact on local policies and ordinances from the project with the CMP would be less than significant.

Other Mitigation Measures

Some other mitigation measures may cause impacts on terrestrial biological resources identified for protection in goals and polices of general plans and ordinances for local jurisdictions overlapping with the project footprint. Impacts may be caused by activities such as grading, excavations, dredging, fill, and construction of structures. Impacts of these measures may include habitat degradation, habitat loss, ground disturbances and noise that may cause disruption of normal wildlife behaviors, hydrological changes, altered drainage patterns, and sedimentation which may affect habitat for covered special-status species, natural communities, and aquatic resources. Impacts would be similar to construction effects of the project alternatives on terrestrial biological resources identified for protection in goals and polices of general plans and ordinances for local jurisdictions overlapping with the project footprint.

These impacts would be reduced through the CMP, Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-14: *Construction Best Management Practices for Biological Resources*. Therefore, impacts on general plans and ordinances for local jurisdictions overlapping with the project footprint from other mitigation measures would be reduced to less than significant.

Overall, the impacts on general plans and ordinances for local jurisdictions overlapping with the project footprint from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the less than significant with mitigation impact conclusion.

Impact BIO-56: Substantial Adverse Effects on Fish and Wildlife Resources Regulated under California Fish and Game Code Section 1600 *et seq*.

The methods for the analysis of effects on rivers, streams, and lakes, including associated communities, regulated under California Fish and Game Code Section 1600 *et seq.*, and the fish, wildlife, and plant species that use such aquatic habitats and associated communities, appear in Section 13.3.1.2. Information on these resources in the study area is presented in Section 13.1. The analysis below includes an assessment of project activities that may substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or deposit or dispose of debris, waste, or other material into any river, stream, or lake. Where the aforementioned activities have a potential to occur, a quantitative analysis has been conducted of impacts associated with the construction and operation (fish only) of the alternatives on these resources, associated communities, and on fish and wildlife resources, as well as special-status plants, that use these rivers, streams, and lakes as habitat. With respect to operations and maintenance effects on plants and wildlife, a qualitative analysis of impacts on these resources is included below.

All Project Alternatives

<u>Construction</u>

The construction activities associated with each of the alternatives would occur within rivers, streams, and lakes, including communities associated with these resources, subject to notification requirements under California Fish and Game Code Section 1600 *et seq*. These construction activities would result in the conversion and degradation of rivers, streams, and lakes, including aquatic and associated communities that support fish, wildlife, and plant species.

Rivers, streams, and lakes would be permanently affected primarily by the construction of the intakes (all alternatives), the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c), and new transmission line construction (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) (Table 13-104). The full list of potential sources of impacts are included in Appendix 13C. The permanent impacts on rivers would include the placement of the intake fish screens and supporting infrastructure (e.g., riprap, cement, steel) within the bed and banks of the Sacramento River and the placement of rock and cement in the bed and bank of the Italian Slough to support the Southern Forebay emergency spillway and access road crossings (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c). Long-term temporary impacts (those greater than 1 year) would primarily be associated with intake construction (all alternatives) and the construction of the Bethany Complex (Alternative 5).

Table 13-104. Estimated Impacts on Rivers, Streams, and Lakes and Associated Communities Potentially Regulated under California Fish and Game Code 1600 *et seq*. (permanent, long-term temporary, and temporary acres combined)

	Alt. 1	Alt. 2a	Alt. 2b	Alt. 2c	Alt. 3	Alt. 4a	Alt. 4b	Alt. 4c	Alt. 5
Rivers, Streams, And Lakes (Includes Wetlands Falling within the Bed, Bank, and Channel)									
Nontidal perennial aquatic	1.39	1.89	1.29	1.39	0.51	1.01	0.41	0.51	1.73

	Alt. 1	Alt. 2a	Alt. 2b	Alt. 2c	Alt. 3	Alt. 4a	Alt. 4b	Alt. 4c	Alt. 5
Tidal freshwater emergent wetland	2.94	2.76	2.76	2.76	1.64	1.64	1.64	1.64	1.98
Tidal perennial aquatic	52.75	53.93	48.94	51.51	35.87	37.55	32.55	35.13	22.39
Nontidal freshwater perennial emergent wetland	1.54	1.54	0.52	1.54	1.76	1.76	0.74	1.76	1.6
Rivers, Streams, and Lakes Subtotal	58.62	60.12	53.51	57.20	39.78	41.96	35.34	39.04	27.70
Associated Communities [a]									
Agricultural	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Developed	4.81	4.81	4.81	4.81	4.35	4.35	4.35	4.35	2.74
Grassland	25.82	25.79	25.79	25.75	1.98	1.98	1.98	1.93	2.48
Valley/foothill riparian	16.92	19.43	14.56	16.20	16.70	19.47	14.60	16.23	17.06
Vernal pool complex	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00
Associated Communities Subtotal	47.70	50.18	45.31	46.91	23.18	25.95	21.08	22.66	22.33
Total	106.32	110.30	98.82	104.11	62.96	67.91	56.42	61.70	50.03

Alt. = Alternative.

[a] Includes all land cover up to the top of bank and areas associated with or dependent upon adjacent rivers, streams, or lakes.

Construction impacts on fish species occurring in rivers and streams are discussed in detail in Chapter 12, *Fish and Aquatic Resources*, Impact AQUA-1: *Effects of Construction of Water Conveyance Facilities on Fish and Aquatic Species*. Special-status wildlife and plant species associated with rivers, streams, and lakes that would be affected are summarized in Table 13-105. The impacts on species would include loss of habitat, disturbance to habitat, injury, mortality, and disruption of normal behaviors. Associated communities, including habitat for fish, wildlife, and plant species, would be permanently affected by the construction of intakes (all alternatives), levee improvements (Alternatives 1, 2a, 2b, and 2c), and new transmission line construction (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) (Tables 13-104 and 13-105). The full list of potential sources of impacts are included in Appendix 13C.

Temporary impacts (those occurring for less than one year) on rivers, streams, and lakes, associated communities, and species would largely result from geotechnical work (all alternatives) and road construction (greatest for Alternatives 1, 2a, 2b, and 2c). The geotechnical work would involve some in-channel borings that would require use of bed materials and the deposit of grout to backfill these borings and would result in the temporary disturbance to associated communities (more detail on geotechnical work is provided below). Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans;* EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-4a: *Develop and Implement Erosion and Sediment Control Plans*; EC-4b*: Develop and Implement Stormwater Pollution Prevention Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would minimize potential impacts on rivers, streams, and lakes as well as associated communities and fish, wildlife, and plant species. These measures would ensure that (1) construction staff receive sufficient training regarding requirements concerning the protection of rivers, streams, lakes, and associated communities; (2) hazardous materials, spill prevention, erosion, sediment, and stormwater pollution plans are properly implemented to ensure that hazardous materials, sediment, and other materials are not transported from construction sites to rivers, streams, and lakes; (3) in-water work windows would limit temporal overlap of fish and aquatic habitats with construction activities, particularly for listed species such as migrating salmonids; and (4) a biological monitor is present to ensure that non-disturbance buffers and associated construction fencing remain intact and that all other protective measures are being properly implemented, where applicable.

Field investigations for each alternative would be conducted prior to and during construction and would involve a variety of ground-disturbing activities (Section 3.15), which could result in direct impacts on biological resources potentially subject to regulation under California Fish and Game Code Section 1600 *et seq*. Geotechnical investigations associated with the West Tracy Fault and the tunnels for all of the alternatives, which include test trenches, CPTs, and soil borings, would result in temporary impacts on rivers, streams, and lakes, associated communities, and species, which are included in the impact totals in Tables 13-104 and 13-105. Specific impacts related to West Tracy Fault and geotechnical investigations over the tunnels are described in Appendix 13C. Field investigations within proposed surface construction footprints (including portions of tunnel alignments), which include test trenches, CPTs, soil borings, ERT, groundwater testing and monitoring, monument installation, pilot studies for settlement, agronomic testing, and utility potholing, would temporarily affect habitats. These temporary impacts are not characterized as an additional loss of habitat because impacts for these locations have already been quantified within the construction footprints. Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-4a: *Develop and Implement Erosion and Sediment Control* Plan; EC-4b: *Develop and Implement Storm Water Pollution Prevention Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce potential impacts by (1) training construction staff on protecting rivers, streams, and lakes and special-status species habitat, and the ramifications for not following protective measures; (2) implementing hazardous material, spill prevention, erosion, sediment, and stormwater pollution plans to ensure that construction sites do not result in the transport of sediment and other materials into rivers, streams, and lakes or alter the hydrology of these features; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented would ensure that impacts caused by field investigations to rivers, streams, and lakes including associated fish and wildlife species, would be minimized.

1 **Table 13-105. Estimated Impacts on Species Habitat Potentially Regulated under California Fish and Game Code 1600 *et seq*. (permanent,**
2 **long-term temporary, and temporary acres combined)**

Species	Habitat	Alt. 1	Alt. 2a	Alt. 2b	Alt. 2c	Alt. 3	Alt. 4a	Alt. 4b	Alt. 4c	Alt. 5
Alkali milk-vetch, spiny-sepaled button-celery, saline clover	Modeled	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00
Brittlescale, recurved larkspur, Heckard's peppergrass	Modeled	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00
Watershield	Modeled	1.49	1.99	1.38	1.49	0.56	1.06	0.45	0.56	1.79
Bristly sedge	Modeled	3.53	3.43	2.24	3.18	3.16	3.16	1.97	2.91	3.24
Bolander's water-hemlock	Modeled	0.56	0.55	0.55	0.55	0.38	0.38	0.38	0.38	0.29
San Joaquin spearscale	Modeled	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	1.24
Woolly rose-mallow	Modeled	0.08	0.07	0.07	0.07	0.16	0.16	0.16	0.16	0.07
Delta tule pea	Modeled	29.63	30.68	27.65	29.29	6.64	7.75	4.73	6.36	5.93
Mason's lilaeopsis, Delta mudwort	Modeled	5.83	6.06	5.27	5.69	3.42	3.71	2.92	3.33	2.13
Shining navarretia, caper-fruited tropidocarpum	Modeled	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.24
Eel-grass pondweed	Modeled	2.92	3.42	1.81	2.92	2.27	2.77	1.15	2.27	3.34
California alkali grass, long-styled sand-spurry	Modeled	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.00
Sanford's arrowhead	Modeled	0.77	0.63	0.63	0.63	0.79	0.79	0.79	0.79	0.93
Marsh skullcap, side-flowering skullcap	Modeled	1.05	1.01	1.01	1.04	0.58	0.58	0.58	0.62	0.51
Suisun marsh aster	Modeled	30.85	31.86	28.86	30.33	6.45	7.53	4.53	6.01	5.80
Valley elderberry longhorn beetle	Total	42.74	45.22	40.35	41.95	18.73	21.50	16.63	18.21	19.59
Valley elderberry longhorn beetle	Riparian	16.92	19.43	14.56	16.20	16.70	19.47	14.60	16.23	17.06
Valley elderberry longhorn beetle	Non-riparian	25.82	25.79	25.79	25.75	2.03	2.03	2.03	1.98	2.53
Curved-foot hygrotus diving beetle	Modeled	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.33
Molestan blister beetle, blennosperma vernal pool andrenid bee	Modeled	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00
Crotch and western bumblebees	Modeled	25.92	25.89	25.89	25.85	2.08	2.08	2.08	2.03	2.48
California tiger salamander	Upland	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	1.24
California red-legged frog	Total	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	0.23
California red-legged frog	Aquatic	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	0.23

Species	Habitat	Alt. 1	Alt. 2a	Alt. 2b	Alt. 2c	Alt. 3	Alt. 4a	Alt. 4b	Alt. 4c	Alt. 5
California red-legged frog	Upland	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.00
Western pond turtle	Total	101.61	105.60	94.12	99.40	58.71	63.65	52.17	57.46	47.32
Western pond turtle	Aquatic	58.77	60.27	53.66	57.35	39.93	42.11	35.50	39.19	27.78
Western pond turtle	Upland	42.84	45.33	40.46	42.05	18.78	21.54	16.67	18.27	19.54
Coast horned lizard	Modeled	24.09	25.27	23.95	24.31	5.88	7.12	5.80	6.16	5.35
California legless lizard	Modeled	21.82	21.77	21.77	21.77	2.96	2.96	2.96	2.96	2.41
San Joaquin coachwhip	Modeled	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	1.24
Giant garter snake	Total	56.93	59.99	52.13	55.70	29.08	32.75	24.88	28.46	25.65
Giant garter snake	Aquatic	14.63	15.35	12.21	14.20	11.40	12.45	9.31	11.30	8.67
Giant garter snake	Upland	42.30	44.64	39.92	41.50	17.68	20.30	15.57	17.16	16.98
Western yellow-billed cuckoo, yellow warbler, least Bell's vireo	Modeled	8.24	9.95	6.44	7.68	8.45	10.21	6.70	7.95	8.56
California black rail	Total	4.04	4.04	3.02	4.04	3.06	3.06	2.04	3.06	3.02
California black rail	California black rail in-channel island primary	2.17	2.17	2.17	2.17	1.04	1.04	1.04	1.04	1.24
California black rail	California black rail in-channel island secondary	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
California black rail	Delta	1.87	1.87	0.85	1.87	2.02	2.02	1.00	2.02	1.78
Greater sandhill crane	Foraging	25.02	24.98	24.98	24.93	0.87	0.87	0.87	0.82	0.84
Lesser sandhill crane	Foraging	24.99	24.96	24.96	24.92	1.38	1.38	1.38	1.33	1.18
California least tern	Foraging	52.75	53.93	48.94	51.51	35.87	37.55	32.55	35.13	22.39
Double-crested cormorant, great blue heron, great egret	Modeled	16.84	19.37	14.50	16.14	16.29	19.05	14.18	15.82	16.64
Least bittern	Modeled	4.47	4.29	3.27	4.29	3.40	3.40	2.38	3.40	3.58
Snowy egret, black-crowned night heron	Nesting and foraging	21.28	23.63	17.74	20.40	19.65	22.41	16.52	19.18	20.22
Osprey	Total	65.85	70.06	59.96	63.91	48.96	53.90	43.80	47.75	37.03
Osprey	Nesting	11.62	14.15	9.64	10.92	12.56	15.32	10.81	12.09	12.88
Osprey	Foraging	54.23	55.91	50.32	52.99	36.40	38.58	32.99	35.66	24.15
White-tailed kite	Total	20.12	22.47	16.94	19.24	15.96	18.72	13.19	15.49	16.46
White-tailed kite	Nesting	11.62	14.15	9.64	10.92	12.56	15.32	10.81	12.09	12.88
White-tailed kite	Foraging	8.50	8.32	7.30	8.32	3.40	3.40	2.38	3.40	3.58
Northern harrier	Nesting and foraging	8.50	8.32	7.30	8.32	3.40	3.40	2.38	3.40	3.58

Species	Habitat	Alt. 1	Alt. 2a	Alt. 2b	Alt. 2c	Alt. 3	Alt. 4a	Alt. 4b	Alt. 4c	Alt. 5
Coopers hawk	Nesting	16.80	19.34	14.47	16.10	16.25	19.01	14.14	15.78	16.64
Swainson's hawk	Total	36.34	38.84	34.33	35.61	13.70	16.46	11.95	13.23	13.30
Swainson's hawk	Nesting	11.62	14.15	9.64	10.92	12.56	15.32	10.81	12.09	12.66
Swainson's hawk	Foraging	24.72	24.69	24.69	24.69	1.14	1.14	1.14	1.14	0.64
Burrowing owl	Total	25.97	25.94	25.94	25.90	2.18	2.18	2.18	2.13	2.58
Burrowing owl	High value nesting and foraging	25.92	25.89	25.89	25.85	2.08	2.08	2.08	2.03	2.48
Burrowing owl	Low value nesting and foraging	0.05	0.05	0.05	0.05	0.10	0.10	0.10	0.10	0.10
Short-eared owl	Nesting and foraging	8.50	8.32	7.30	8.32	3.40	3.40	2.38	3.40	3.58
Loggerhead shrike	Nesting and foraging	28.24	28.24	28.20	28.38	5.04	5.08	5.04	5.22	5.66
California horned lark, grasshopper sparrow, ferruginous hawk,	Modeled	25.92	25.89	25.89	25.85	2.08	2.08	2.08	2.03	2.48
Modesto song sparrow	Nesting and foraging	21.39	23.72	17.84	20.49	20.10	22.86	16.98	19.63	20.64
Yellow-breasted chat	Modeled	16.41	17.95	14.41	15.69	16.23	18.02	14.48	15.76	16.62
Yellow-headed blackbird	Total	30.39	30.18	29.16	30.14	5.48	5.48	4.46	5.43	6.06
Yellow-headed blackbird	Nesting	4.47	4.29	3.27	4.29	3.40	3.40	2.38	3.40	3.58
Yellow-headed blackbird	Foraging	25.92	25.89	25.89	25.85	2.08	2.08	2.08	2.03	2.48
Tricolored blackbird	Total	35.22	35.01	33.99	34.97	8.86	8.86	7.84	8.81	9.52
Tricolored blackbird	Potentially suitable colony	9.30	9.12	8.10	9.12	6.73	6.73	5.71	6.73	6.99
Tricolored blackbird	Foraging	25.92	25.89	25.89	25.85	2.13	2.13	2.13	2.08	2.53
Bats	Total	102.30	106.28	94.79	100.08	59.63	64.59	53.09	58.38	47.79
Bats	Foraging	85.38	86.85	80.23	83.88	42.93	45.12	38.49	42.15	30.73
Bats	Tree roosting and foraging	16.92	19.43	14.56	16.20	16.70	19.47	14.60	16.23	17.06
San Joaquin kit fox	Low quality	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.24
American badger, San Joaquin pocket mouse	Modeled	8.36	8.33	8.33	8.29	1.53	1.53	1.53	1.49	1.94

Alt. = Alternative.

Operations

Project operations would result in the diversion of water from the Sacramento River at the intake locations. The effects of these diversions would result in impacts on fish, which are discussed in Chapter 12, but would not likely result in impacts on terrestrial biological resources addressed in this chapter. The operation of the project would not result in the substantial change or use of material from the bed, channel, or bank of rivers, streams, and lakes or the deposition of materials into these resources in the study area subject to notification under Fish and Game Code Section 1600 *et seq*. The effects of operations on surface waters are addressed in Chapter 5, and effects of operations on water quality are addressed in Chapter 9.

Maintenance

The maintenance of water conveyance facilities for all project alternatives could result in periodic impacts on rivers, streams, and lakes in the study area. Maintenance activities across all facilities that could affect these rivers, streams, and lakes include repaving of access roads every 15 years and semiannual general and ground maintenance (e.g., mowing, vegetation trimming, herbicide application) if these activities occur within or adjacent to these rivers, streams, and lakes. Maintenance at the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would include annual embankment repair, which could also result in the potential periodic impacts on this resource. However, none of these activities would result in diversion or obstruction of natural flows, or substantially change or use material from the bed, channel, or bank of rivers, streams, or lakes in the study area, and would also not result in depositing or disposing of debris, waste, or other material into these features.

CEQA Conclusion—All Project Alternatives

The construction and maintenance of each of the project alternatives would result in the conversion and degradation of rivers, streams, and lakes and associated communities, subject to the notification requirements of California Fish and Game Code 1600 *et seq*. Impacts on these resources would substantially adversely affect fish, wildlife, and plant resources that rely on rivers, streams, lakes, and associated communities.

Impacts on these resources would be avoided and minimized by Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-4a: *Develop and Implement Erosion and Sediment Control Plans*; EC-4b: *Develop and Implement Stormwater Pollution Prevention Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B). However, even with these commitments, the impacts on rivers, streams, and lakes, related to the diversion, obstruction, and substantial changes to rivers, lakes, and streams from construction, operation, and maintenance activities of the alternatives would have a substantial adverse effect on fish and wildlife resources and, consequently, would result in a significant impact.

The CMP, which would create and enhance aquatic resources and habitats for special-status species, would be required to avoid a significant loss in the overall abundance, diversity, or condition of rivers, streams, and lakes and substantial adverse effects on fish and wildlife resources, including rare plants, that depend on rivers, streams, and lakes and associated communities (Appendix 3F), which would reduce the impacts associated with the loss of habitats to a less-than-significant level.

Mitigation Measure BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities* would be required to avoid and minimize the potential for periodic, temporary impacts on rivers, streams, and lakes, including fish and wildlife resources, during maintenance activities. The impacts on these resources would be reduced to less-than-significant levels because the aforementioned measures would avoid a net loss in rivers, streams, and lakes and, consequently, habitat used by fish wildlife, and plant resources, by assessing maintenance work areas for aquatic and associated communities, establishing non-disturbance buffers around these resources, training maintenance staff on the need to avoid discharging of fill material into rivers, streams, and lakes, and having a biological monitor present, where applicable. Mitigation Measures AQUA-1a: *Develop and Implement an Underwater Sound Control and Abatement Plan,* AQUA-1b: *Develop and Implement a Barge Operations Plan,* AQUA-1c: *Develop and Implement a Fish Rescue and Salvage Plan,* BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants,* BIO-18a: *Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle,* BIO-22a: *Avoid and Minimize Impacts on California Tiger Salamander,* BIO-24a: *Avoid and Minimize Impacts on California Red-Legged Frog and Critical Habitat,* BIO-25: *Avoid and Minimize Impacts on Western Pond Turtle,* BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles,* BIO-30: *Avoid and Minimize Impacts on Giant Garter Snake,* BIO-31: *Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo,* BIO-32: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail,* BIO-33: *Minimize Disturbance of Sandhill Cranes,* BIO-36a: *Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors,* BIO-35: *Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries,* BIO-36b: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite,* BIO-39: *Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk,* BIO-40: *Conduct Surveys and Minimize Impacts on Burrowing Owl,* BIO-44a: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird,* BIO-45b: *Avoid and Minimize Impacts on Roosting Bats,* BIO-46: *Conduct Preconstruction Survey for San Joaquin Kit Fox and Implement Avoidance and Minimization Measures,* and BIO-47: *Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures* would be required to avoid and minimize the disturbance to rivers, streams, lakes, associated communities, and habitat for species, and the potential for injury, mortality, and disruption of normal behaviors. The impacts on rivers, streams, and lakes, and associated communities, subject to the notification requirements of California Fish and Game Code 1600 *et seq.* would be less than significant because the aforementioned measures would provide for compensatory mitigation to offset impacts on habitat that support fish and wildlife species, including rare plants, and would require steps to avoid and minimize effects on these species by establishing work windows to minimize the level of construction activities during sensitive time periods (e.g., migration, nesting), by establishing non-disturbance buffers to protect sensitive resources, by conducting preconstruction surveys to avoid occupied areas to the extent practicable, and by having biological monitors present to ensure measures are implemented and that direct effects on species are avoided and minimized.

Mitigation Measure CMP: Compensatory Mitigation Plan

DWR would implement the CMP (see Impact BIO-1 for a summary discussion of the CMP) to offset the loss of habitat for fish, wildlife, and plants associated with rivers, lakes, and streams (Appendix 3F, Sections 3F.3.2 and 3F 3.3, and Attachment 3F.1, Tables 3F.1-2 and 3F.1-3). The mitigation approach includes initial mitigation actions at specific sites, purchase of mitigation credits at existing or proposed mitigation banks, and a mitigation framework for future compensatory mitigation actions for tidal habitats. These actions would benefit the special-status species these activities are targeting as well as provide habitats for common species that occur in the study area.

Mitigation Measures AQUA-1a: Develop and Implement an Underwater Sound Control and Abatement Plan

See description of Mitigation Measure AQUA-1a under Impact AQUA-1.

Mitigation Measure AQUA-1b: Develop and Implement a Barge Operations Plan

See description of Mitigation Measure AQUA-1b under Impact AQUA-1.

Mitigation Measure AQUA-1c: Develop and Implement a Fish Rescue and Salvage Plan

See description of Mitigation Measure AQUA-1c under Impact AQUA-1.

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

See description of Mitigation Measure BIO-2a under Impact BIO-2.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

See description of Mitigation Measure BIO-2b under Impact BIO-2.

Mitigation Measure BIO-18: Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle

See description of Mitigation Measure BIO-18 under Impact BIO-18.

Mitigation Measure BIO-22a: Avoid and Minimize Impacts on California Tiger Salamander

See description of Mitigation Measure BIO-22a under Impact BIO-22.

Mitigation Measure BIO-24a: Avoid and Minimize Impacts on California Red-Legged Frog and Critical Habitat

See description of Mitigation Measure BIO-24a under Impact BIO-24.

Mitigation Measure BIO-25: Avoid and Minimize Impacts on Western Pond Turtle

See description of Mitigation Measure BIO-25 under Impact BIO-25.

Mitigation Measure BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles

See description of Mitigation Measure BIO-26 under Impact BIO-26.

Mitigation Measure BIO-30: Avoid and Minimize Impacts on Giant Garter Snake

See description of Mitigation Measure BIO-30 under Impact BIO-30.

Mitigation Measure BIO-31: Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo

See description of Mitigation Measure BIO-31 under Impact BIO-31.

Mitigation Measure BIO-32: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail

See description of Mitigation Measure BIO-32 under Impact BIO-32.

Mitigation Measure BIO-33: Minimize Disturbance of Sandhill Cranes

See description of Mitigation Measure BIO-33 under Impact BIO-33.

Mitigation Measure BIO-35: Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries

See description of Mitigation Measure BIO-35 under Impact BIO-35.

Mitigation Measure BIO-36a: Conduct Nesting Surveys for Special-Status and Non-Special-Status Birds and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors

See description of Mitigation Measure BIO-36a under Impact BIO-36.

Mitigation Measure BIO-36b: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite

See description of Mitigation Measure BIO-36b under Impact BIO-36.

Mitigation Measure BIO-39: Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk

See description of Mitigation Measure BIO-39 under Impact BIO-39.

Mitigation Measure BIO-40: Conduct Surveys and Minimize Impacts on Burrowing Owl

See description of Mitigation Measure BIO-40 under Impact BIO-40.

Mitigation Measure BIO-44: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird

See description of Mitigation Measure BIO-44 under Impact BIO-44.

Mitigation Measure BIO-45b: Avoid and Minimize Impacts on Roosting Bats

See description of Mitigation Measure BIO-45b under Impact BIO-45.

Mitigation Measure BIO-46: Conduct Preconstruction Survey for San Joaquin Kit Fox and Implement Avoidance and Minimization Measures

See description of Mitigation Measure BIO-46 under Impact BIO-46.

Mitigation Measure BIO-47: Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures

See description of Mitigation Measure BIO-47 under Impact BIO-47.

Mitigation Impacts

As discussed in Chapter 4, Section 4.1.1.5, *Mitigation Approaches*, CEQA requires an evaluation of mitigation measure impacts. The analyses below consider the potential impacts associated with implementing the CMP and other mitigation measures. Methods for these analyses are presented in Sections 13.3.1.5, *Evaluation of Compensatory Mitigation,* and 13.3.1.6, *Evaluation of Other Mitigation Measures.*

Compensatory Mitigation

The creation and enhancement of aquatic resources, as well as habitat for special-status species under the CMP (Appendix 3F), on Bouldin Island and at the I-5 ponds would result in the permanent and temporary discharges of fill material into existing aquatic habitat, specifically lakes (nontidal perennial aquatic) and associated communities that include habitats for plant and wildlife species (Appendix 13C), from grading to create the appropriate topography and soil conditions to establish and enhance habitats. The CMP also includes a framework for channel margin enhancement and tidal wetland habitat creation. The activities to enhance channel margins would generally include removal of existing riprap, modification of the existing channel margin with heavy equipment, and placement of large woody debris on the channel margin, which would result in the permanent and temporary alteration of the banks and beds of Delta channels. Channel margin enhancement sites would be targeted within the same general geography of the project, including the north Delta along the Sacramento River mainstem, north Delta along Sacramento River tributaries (e.g., Steamboat, Sutter, and Elk Sloughs), lower Yolo Bypass, and Cache Slough Complex. Tidal restoration activities would include grading, creating setback levees, planting, and breaching of existing levees. These tidal restoration and channel margin enhancement activities could result in impacts on fish and wildlife, including rare plants, which would include the conversion of habitat and the potential for injury, mortality, and the disruption of normal behaviors. Potential areas for tidal restoration would be within the lower Yolo Bypass and Cache Slough Complex.

In the event that non-bank sites are used for vernal pool or alkaline wetland creation or enhancement (Appendix 3F, Section 3F.3.2.4), these activities would not substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or deposit or dispose of debris, waste, or other material into any river, stream, or lake. Site-specific analyses are not provided because locations of potential non-bank sites are not currently known.

Site protection instruments (e.g., conservation easements, deed restrictions) for greater sandhill crane, Swainson's hawk, and tricolored blackbird would primarily consist of the protection and management of agricultural areas but may also include natural communities in the study area (Appendix 3F, Section 3F.4.2.2, Attachment 3F.1, Table 3F.1-3, CMP-18a: *Sandhill Crane Roosting Habitat*, CMP-18b: *Sandhill Crane Foraging Habitat*, CMP-19a: *Swainson's Hawk Nesting Habitat*, CMP-19b: *Swainson's Hawk Foraging Habitat*, CMP-22a: *Tricolored Blackbird Nesting Habitat*, and CMP-22b: *Tricolored Blackbird Foraging Habitat*). These areas may contain streams, rivers, or lakes but management activities on these properties would continue existing or similar cropping activities and natural communities would be protected as they are under baseline conditions with no physical changes to habitats. Site-specific analyses are not provided because locations of potential protection instruments are not currently known.

As stated in CMP Section 3F.4, *Mitigation Work Plan,* the compensatory mitigation actions at Bouldin Island would be designed to provide compensatory mitigation for aquatic resources under both federal and state mitigation standards and ensures a net gain in aquatic resources, accounting for any conversions of existing aquatic resources (e.g., agricultural ditches converted to freshwater emergent wetland). Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; EC-4a*: Develop and Implement Erosion and Sediment Control Plan*; EC-4b*: Develop and Implement Storm Water Pollution Prevention Plans*; and EC-14: *Construction Best Management Practices for Biological Resources* (Appendix 3B) would reduce the potential temporary impact on rivers, streams, and lakes by (1) training construction staff on protecting rivers, streams, and lakes and the ramifications for not following protective measures; (2) implementing spill prevention, erosion, sediment, and stormwater pollution plans to ensure that grading for sites do not result in the transport of sediment and other materials into adjacent rivers, streams, and lakes; and (3) having a biological monitor present to ensure that non-disturbance buffers and associated construction fencing are intact and all other protective measures are being implemented where applicable.

The impact on rivers, streams, lakes, associated communities, and species potentially subject to regulation under California Fish and Game Code 1600 *et seq*. from the project alternatives with the CMP would be less than significant with mitigation.

Other Mitigation Measures

Some other mitigation measures may cause impacts on resources regulated under California Fish and Game Code Section 1600 *et seq*. Impacts may be caused by activities such as grading, excavations, dredging, fill, construction of structures, placement and salvage of topsoil, plantings, irrigation system installation, and construction of swales. Impacts of these measures may include habitat degradation, habitat loss, ground disturbances, and noise that may cause disruption of normal wildlife behaviors, hydrological changes, altered drainage patterns, and sedimentation, which may affect rivers, streams, lakes, associated communities, and habitat for special-status species. Impacts would be similar to construction effects of the project alternatives on resources regulated under California Fish and Game Code Section 1600 *et seq*.

These impacts would be reduced through the CMP; Environmental Commitments EC-1: *Conduct Worker Awareness Training*; EC-2: *Develop and Implement Hazardous Materials Management Plans;* EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans;* EC-4a: *Develop and Implement Erosion and Sediment Control Plan;* EC-4b: *Develop and Implement Storm Water Pollution Prevention Plans;* and EC-14: *Construction Best Management Practices for Biological Resources;* and Mitigation Measures AQUA-1a: *Develop and Implement an Underwater Sound Control and Abatement Plan*; AQUA-1b: *Develop and Implement a Barge Operations Plan*; AQUA-1c: *Develop and Implement a Fish Rescue and Salvage Plan;* BIO-2a: *Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants*; BIO-2b: *Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities;* BIO-18a: *Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle*; BIO-22a: *Avoid and Minimize Impacts on California Tiger Salamander*; BIO-24a: *Avoid and Minimize Impacts on California Red-Legged Frog and Critical Habitat*; BIO-25: *Avoid and Minimize Impacts on Western Pond Turtle*; BIO-26: *Avoid and Minimize Impacts on Special-Status Reptiles*; BIO-30: *Avoid and Minimize Impacts on Giant Garter Snake*; BIO-31: *Avoid and*

Minimize Impacts on Western Yellow-Billed Cuckoo; BIO-32: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail*; BIO-33: *Minimize Disturbance of Sandhill Cranes*; *Conduct Nesting Surveys for Special-Status and Non-Special-Status Birds and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors*; BIO-35: *Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries*; BIO-36b: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite*; BIO-39: *Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk*; BIO-40: *Conduct Surveys and Minimize Impacts on Burrowing Owl*; BIO-44a: *Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird*; BIO-45b: *Avoid and Minimize Impacts on Roosting Bats*; BIO-46: *Conduct Preconstruction Survey for San Joaquin Kit Fox and Implement Avoidance and Minimization Measures*; BIO-47: *Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures*. Therefore, impacts on fish and wildlife resources regulated under California Fish and Game Code Section 1600 *et seq*. from implementation of other mitigation measures would be reduced to less than significant.

Overall, the impacts on rivers, streams, lakes, and fish and wildlife resources regulated under California Fish and Game Code Section 1600 *et seq*. from construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact conclusion of less than significant with mitigation.

13.3.4 Cumulative Analysis

13.3.4.1 Methodology

The cumulative effects analysis for terrestrial biological resources addresses the potential for the project alternatives to act in combination with other past, present, and reasonably foreseeable future projects, programs, or conditions to create a cumulatively significant adverse impact. The analysis also considers whether any incremental effect of an alternative is cumulatively considerable. Chapter 4, *Framework for the Environmental Analysis*, Section 4.1.1.6, *Cumulative Impacts*, provides the regulatory and statutory basis for the cumulative analyses found in this Draft EIR.

The geographic scope of the analysis for natural communities, including regulated wetlands and waters, is the terrestrial biology study area and lands immediately adjacent to this study area where past, present, or reasonably foreseeable activities might indirectly affect the natural communities in the study area. While the natural communities extend beyond these boundaries, the focus of the actions that might affect these resources is the Delta. The geographic scope of the cumulative analysis for each of the species varies, depending on the potential for other projects or programs to influence individuals that rely on the study area for some stage of their life history. For some wildlife species, such as migratory birds, this area includes their entire range within California. For other species whose individuals do not range beyond the study area and its immediate surroundings, the geographic range of the cumulative analysis has been limited to this smaller area. The geographic scope for cumulative effects from spread of invasive species is the study area. The geographic scope for cumulative effects from impacts on wildlife connectivity includes the study area and all areas in the following counties: Sacramento, San Joaquin, Santa Clara, Alameda, Contra Costa, Solano, and Napa.

The projects and programs that have been considered as part of the cumulative analysis have been drawn primarily from a list developed for this Draft EIR and contained in Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions*. The list of past, present, and reasonably foreseeable future projects and programs has been evaluated to determine which of these activities may have impacts on terrestrial habitats and terrestrial species that are known to occur within the study area. The list of projects and programs relevant to terrestrial biological resources is contained in Table 13-106.

Table 13-106. Cumulative Impacts on Terrestrial Biological Resources from Plans, Policies, and Programs

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
East Alameda County Conservation Strategy	Alameda County	Ongoing	The East Alameda County Conservation Strategy (EACCS) is intended to preserve endangered species with a plan for long-term habitat protection. The EACCS will assess the conservation value of East Alameda County to establish biological principles for conservation in that area. The EACCS will provide a framework for regional conservation of biological species, streamline the environmental permitting process, provide guidance to project proponents, and facilitate ongoing conservation programs. The EACCS will identify land suitable for voluntary mitigation or conservation, mitigation ratios, standards for habitat restorations, best management and maintenance practices for conservation sites, monitoring standards, and guidelines for adaptive management.	Beneficial effects on terrestrial biological resources.
CALFED Levee System Integrity Program	DWR, California Department of Fish and Wildlife, USACE	Ongoing	The CALFED Record of Decision requires that the Levee System Integrity Program be managed to provide for long-term protection for Delta resources through maintenance and improvement of the Delta levee system. Goals are to protect life, infrastructure, and properties and reduce the risk to land use and associated economic activities, water supply, infrastructure, and ecosystem from catastrophic breaching of Delta levees. The primary focus is on the legal Delta as defined in Section 12220 of the California Water Code. Protection and maintenance of 1,300 miles of project and nonproject levees have taken place since the inception of the CALFED Levee System Integrity Program in 2000.	Beneficial effects on a variety of wildlife with potential for impacts on species during activities.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			Other major undertakings include restoration of native vegetation and reuse of dredge material to bolster levee stability. Major activities include levee maintenance, levee improvement, environmental mitigation, emergency response functions, and other components carried out using local funds, with additional funds provided by the state and federal governments. However, uncertainty in program funding has required that some goals be revised and schedules be extended. Proposition 50 provided $70 million for Delta levees.	
Lower Cache Creek/Woodland Flood Risk Management Project	City of Woodland, USACE, DWR, CVFPB	Planning phase	The Final EIR and Final EIS evaluate impacts associated with a proposed flood risk reduction project on lower Cache Creek. As part of the overall effort, USACE is also preparing a project feasibility study. Similarly, the City of Woodland is partnering with DWR through its Urban Flood Risk Reduction Program to identify and implement the flood risk reduction project to meet the State's urban level of protection requirements in a cost-effective manner that would be compatible with and supportive of elements of the Integrated Watershed Monitoring Program. Project components include secondary earthen levees and a diversion channel to redirect overland flood flows into the Yolo Bypass, modification of the Cache Creek Settling Basin to allow conveyance of flood flows into the Yolo Bypass, and various bridge and/or culvert improvements to facilitate conveyance of flood flows in the diversion channel.	Could result in impacts on giant garter snake and other species that occur in the Cache Creek Settling Basin and Yolo Bypass.
Submersed Aquatic Vegetation (SAV) Control Program	California State Parks Division of Boating and Waterways (DBW)	Ongoing	Previously known as the *Egeria densa* Control Program, the SAV Control Program is part of the California State Parks DBW Aquatic Invasive Plant Control Program (AIPCP). From 2001 through 2015, DBW operated the original *Egeria densa* Control Program (EDCP) in the Sacramento–San Joaquin Delta and its tributaries. With the addition of curlyleaf pondweed (*Potamogeton crispus* L.) in 2016, the	Beneficial effects on freshwater marsh and aquatic habitats.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			program was renamed as the SAV Control Program. The program includes treatment with herbicides and annual environmental monitoring, in pursuant to BiOps issued by USFWS and NMFS and State Water Resources Control Board Statewide General NPDES permit.	
Floating Aquatic Vegetation (FAV) Control Program	California State Parks DBW	Ongoing	The FAV Control Program is part of the California State Parks DBW AIPCP. It was created in 2015 when DBW combined the Water Hyacinth (and Spongeplant) Control Program with the Water Primrose (*Ludwigia hexapetala*) Control Program. The program includes treatment with herbicides, mechanical harvesting, biological control (in partnership with USDA), hand picking, and annual environmental monitoring, pursuant to the Aquatic Invasive Plant Control Program BiOps issued by USFWS and NMFS and the State Water Resources Control Board Statewide General NPDES permit.	Beneficial effects on freshwater marsh and aquatic habitats.
Private Lands Incentive Programs	CDFW	Ongoing	CDFW manages the California Waterfowl Habitat Program (Presley Program), a multi-faceted wetland incentive program designed to improve habitat for waterfowl on private lands. Consistent with its primary waterfowl habitat objectives, the program also endeavors to enhance habitat for shorebirds, wading birds, and other wetland- dependent species. The program pays private landowners $30/acre ($60/acre in the Tulare Basin) annually for a 10-year duration to implement habitat practices in accordance with a detailed management plan. In cooperation with Wildlife Conservation Board's Inland Wetland Conservation Program, CDFW also administers the Permanent Wetland Easement Program that pays willing landowners approximately 50-70% of their property's fair market value to purchase the farming and development rights in perpetuity. Landowner retains many rights including: trespass rights, the right to hunt and/or operate a hunting club, and the ability to pursue other types of	Beneficial effects on waterfowl.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			undeveloped recreation (fishing, hiking, etc.). Easement landowners are required to follow a cooperatively developed wetland management plan. CDFW also administers the California Winter Rice Habitat Incentive Program to annual incentive payments of $15/acre to landowners for winter flooding of harvested rice fields for a minimum of 70 continuous days.	
California Aquatic Invasive Species Management Plan	CDFW	Ongoing	The California Aquatic Invasive Species Management Plan (CAISMP) was released in January 2008. The plan's overall goal is to identify the steps that need to be taken to minimize the harmful ecological, economic, and human health impacts of aquatic invasive species in California. This plan provides the state's first comprehensive, coordinated effort to prevent new invasions, minimize impacts from established aquatic invasive species and establish priorities for action statewide. In addition, it proposes a process for annual plan evaluation and improvement so that aquatic invasive species can continue to be managed in the most efficient manner in the future. Eight major objectives and 163 actions were identified in the CAISMP.	Beneficial effects on terrestrial biologicals resources.
Aquatic Invasive Species Draft California Rapid Response Plan	CDFW	Ongoing	The California Aquatic Invasive Species Management (described above) proposes an Aquatic Invasive Species Rapid Response Plan for the State of California. The Rapid Response Plan establishes a draft general procedure for rapid response following detection of new aquatic invasive species infestation. It provides a framework for developing and implementing a rapid response plan. It is preliminary in that it describes types of information, resources and decisions necessary to finalize the plan. In order to finalize, fund, and implement the draft Rapid Response Plan, CDFW expects that cooperating agencies will assign staff to participate. CDFW Invasive Species Program staff will provide coordination for the interagency activities called for in the agreement(s).	Beneficial effects on freshwater marsh and aquatic habitats.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
Bethany Dams Improvement Project	DWR	In progress	To ensure the long-term safety and operations of the State Water Project (SWP), DWR is conducting additional vegetation removal in the drainage ditches at Dams 1 and 2, removing accumulated sediment blocking the culvert in the drainage ditch at Dam 3, repairing existing rodent burrow damage on the dam faces, establishing a long-term, sustainable program of effective rodent control to reduce or eliminate further burrowing within the dam embankments, and performing annual maintenance to repair new rodent burrow damage at the four Bethany Reservoir Dams. Work for this project began in April of 2021 for completion in 2022.	Potential impacts on California tiger salamander and other terrestrial biological resources.
Lower Sherman Island Wildlife Area (LSIWA) Land Management Plan (LMP)	CDFW	Ongoing	The LSIWA occupies roughly 3,900 acres, primarily marsh and open water, at the confluence of the Sacramento and San Joaquin Rivers in the western Delta. This extensive tract of natural vegetation and Delta waters provides diverse and valuable wildlife habitats and related recreational opportunities and is integral to the functioning and human use of the Delta. The mission of the CDFW is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. The LMP is consistent with that mission. The purpose of the LMP is to: (1) guide management of habitats, species, and programs described in the LMP to achieve the CDFW's mission to protect and enhance wildlife values; (2) serve as a guide for appropriate public uses of the LSIWA; (3) serve as descriptive inventory of fish, wildlife, and native plant habitats that occur on or use the LSIWA; (4) provide an overview of the property's operation and maintenance and of the personnel requirements associated with implementing management goals (this LMP also serves as a budget planning aid for annual regional budget preparation); and (5) present the environmental documentation necessary for compliance with state and federal	Beneficial effects on terrestrial biologicals resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			statutes and regulations, provide a description of potential and actual environmental impacts that may occur during plan management, and identify mitigation measures to avoid or lessen these impacts.	
Yolo Bypass Wildlife Area Land Management Plan	CDFW	Ongoing	The Yolo Bypass Wildlife Area comprises approximately 16,770 acres of managed wildlife habitat and agricultural land within the Yolo Bypass. The bypass conveys seasonal high flows from the Sacramento River to help control river stage and protect the cities of Sacramento, West Sacramento, and Davis and other local communities, farms, and lands from flooding. Substantial environmental, social, and economic benefits are provided by the Yolo Bypass, benefiting the people of the State of California. The stated purposes of the Yolo Bypass Wildlife Area Land Management Plan are to: (1) guide the management of habitats, species, appropriate public use, and programs to achieve CDFW's mission; (2) direct an ecosystem approach to managing the Yolo Bypass Wildlife Area in coordination with the objectives of the CALFED ERP; (3) identify and guide appropriate, compatible public-use opportunities within the Yolo Bypass Wildlife Area; (4) direct the management of the Yolo Bypass Wildlife Area in a manner that promotes cooperative relationships with adjoining private-property owners; (5) establish a descriptive inventory of the sites and the wildlife and plant resources that occur in the Yolo Bypass Wildlife Area; (6) provide an overview of the Yolo Bypass Wildlife Area's operation, maintenance, and personnel requirements to implement management goals, and serve as a planning aid for preparation of the annual budget for the Bay-Delta Region (Region 3); and (7) present the environmental documentation necessary for compliance with state and federal statutes and regulations, provide a description of potential and actual environmental impacts that may occur during plan management, and	Beneficial effects on terrestrial biologicals resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			identify mitigation measures to avoid or lessen these impacts.	
Staten Island Wildlife-Friendly Farming Demonstration	CDFW	Ongoing	Acquisition and restoration of Staten Island (9,269 acres) by The Nature Conservancy to protect critical agricultural wetlands used by waterfowl and sandhill cranes. Phase II of this project improved wildlife-friendly agriculture to foster recovery of at-risk species and to investigate effects of agriculture on water quality. This demonstration project for wildlife-friendly agriculture practices increased habitat availability by flooding 2,500-5,000 acres of corn for a longer duration than previously possible. The demonstration project also determined the effect of winter flooding strategies on target bird species, namely greater sandhill crane and northern pintail in the Delta Ecological Management Zone.	Beneficial for cranes.
Restoring Ecosystem Integrity in the Northwest Delta	CDFW	Ongoing	Completed in 2015, this project acquired conservation easements within the Cache Slough Complex, along the Barker, Lindsey and Calhoun Sloughs, north Delta tidal channels located west of the Yolo Bypass. Acquisition of conservation easements are on 978 acres of existing riparian, wetland and/or agricultural lands.	Beneficial effects on terrestrial biologicals resources.
Suisun Marsh Habitat Management, Preservation, and Restoration Plan	CDFW, USFWS, Reclamation, and Suisun Marsh Charter Group	Ongoing	The Suisun Marsh Charter Group, a collaboration of federal, state, and local agencies with primary responsibility in Suisun Marsh, prepared the Suisun Marsh Habitat Management, Preservation, and Restoration Plan. The plan balances implementation of the CALFED Program, the Suisun Marsh Preservation Agreement, and other management and restoration programs within the Suisun Marsh in a manner that is based upon voluntary participation by private landowners and that responds to the concerns of interested parties. Charter agencies include Reclamation, DWR, USFWS, Delta Stewardship Council, Suisun Resource Conservation District, and NMFS. The Charter Group is charged with developing a regional plan that would outline the actions needed in Suisun	Beneficial for marsh species.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			Marsh to preserve and enhance managed seasonal wetlands, restore tidal marsh habitat, implement a comprehensive levee protection/improvement program, and protect ecosystem and drinking water quality. The plan would be consistent with the goals and objectives of the Bay-Delta Program and would balance those goals and objectives with the Suisun Marsh Preservation Agreement and federal and state endangered species programs within the Suisun Marsh. The Suisun Marsh Habitat Management, Preservation, and Restoration Plan also provides for simultaneous protections and enhancement of: (1) existing wildlife values in managed wetlands, (2) endangered species, (3) tidal marshes and other ecosystems, and (4) water quality, including, but not limited to, the maintenance and improvement of levees. Restoration projects that are expected to partially fulfill requirements of the Suisun Marsh Habitat Management, Preservation, and Restoration Plan include the Chipps Tidal Habitat Restoration Project, Arnold Slough Restoration Project, Bradmoor Island Restoration Project, Tule Red Tidal Restoration Project, and Wings Landing Tidal Habitat Restoration Project.	
Central Valley Vision	California State Parks	Ongoing	In 2003, California State Parks began work on a long-term Central Valley Vision to develop a strategic plan for State Parks expansion in the Central Valley. The plan will provide a 20-year road map for State Park actions to focus on increasing service to Valley residents and visitors. Within the Great Central Valley (San Joaquin Valley, Sacramento Valley, and the Delta region), California State Parks operates and maintains 32 state park units representing 7% of the total state park system acreage. Plans include: Delta Meadows River Park, Brannan Island SRA, Franks Tract SRA, Locke Boarding House, and San Joaquin and Sacramento Rivers.	Beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			In 2008, California State Parks published a Draft Central Valley Vision Implementation Plan that focuses on meeting the public's recreation needs in the Central Valley 20 years into the future. It outlines planning options to develop new and improved recreation opportunities, acquire new park lands, and build economic and volunteer partnerships.	
Central Valley Flood Protection Plan	DWR	Ongoing	Central Valley Flood Protection Plan (CVFPP) is a sustainable, integrated flood management plan that reflects a system-wide approach for protecting areas of the Central Valley currently receiving protection from flooding by existing facilities of the State Plan of Flood Control (SPFC). The plan incorporates the SPFC and Flood Control System Status Update. The first plan was adopted in 2012 and is updated every 5 years. The CVFPP recommends actions to reduce the probability and consequences of flooding. Produced in partnership with federal, Tribal, local, and regional partners and other interested parties, the CVFPP also identifies the mutual goals, objectives, and constraints important in the planning process; distinguish plan elements that address mutual flood risks; and, finally, recommend improvements to the state-federal flood protection system.	Could result in impacts on giant garter snake and other species that occur in the Yolo Bypass if plans include expanding the Bypass.
Delta Flood Emergency Preparedness, Response, and Recovery Program	DWR	Ongoing	Pursuant to the Disaster Preparedness and Flood Prevention Bond Act of 2006, DWR developed the Delta Flood Emergency Preparedness, Response, and Recovery Program to prepare for, respond to, and recover from large-scale catastrophic flooding emergencies in the Delta region. The objectives of this program include: (1) protect the lives, property, and infrastructure critical to the functioning of both the Delta and California; (2) protect water quality and restore water supply for both Delta and export water users; (3) reduce the recovery time of California's water supply to less than 6 months; and (4) minimize impacts on environmental resources. Under this program, DWR	Beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			finalized the Delta Flood Emergency Management Plan in 2018 to help manage risk of levee failures in the Delta and guide DWR Delta flood emergency management.	
Levee Repairs Program	DWR	Ongoing	On February 24, 2006, Governor Arnold Schwarzenegger declared a State of Emergency for California's levee system, commissioning up to $500 million of state funds to repair and evaluate state/federal project levees. Following the emergency declaration, the Governor directed DWR to secure the necessary means to fast-track repairs of critical erosion sites. Hundreds of levee sites were identified for immediate repair throughout the Central Valley. These repairs were necessary to maintain the functionality of flood control systems that have deteriorated over time and/or do not meet current design standards. While many of the most urgent repairs have been completed or are near completion, other sites of lower priority are still in progress, and still more are in the process of being identified, planned, and prioritized. In general, repairs to state/federal project levees are being conducted under three main programs: the Flood System Repair Project, the Sacramento River Bank Protection Project, and the Public Law 84-99 (PL 84-99) Rehabilitation Program. DWR has completed geotechnical exploration, testing, and analysis of state and federal levees that protect several highly populated urban areas of greater Sacramento, Stockton/Lathrop, and Marysville/Yuba City. This program is being implemented simultaneously with the various urgent levee repairs.	Impacts on plants and wildlife that occur along Delta shorelines and on Delta islands.
Old Banks Landfill Cap Project	DWR	Completed	DWR is constructing the Old Banks Landfill Cap Project to cap the Old Banks Landfill (also known as the Harvey O. Banks Pumping Plant Landfill) to address concerns related to landfill debris exposure raised by the Contra Costa County Health Department (CCCHD). This proposed	Potential impacts on terrestrial species during construction.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			project is located approximately 9 miles northwest of the City of Tracy and 12 miles northeast of the City of Livermore in Contra Costa County. Landfill debris concerns would be addressed by DWR by confining the landfill materials and preventing the landfill contents from being exposed by rodent activities, as well as improving surface drainage and minimizing future maintenance. Project activities include clearing existing vegetation, removing the upper 2 to 4 inches of topsoil of the landfill crown, grading the existing landfill crown by adding fill soil materials in localized areas to bring the site to grade, placing a commercially available rodent control barrier material, placing a 1-foot thick surface layer on top of the rodent control fill fabric to protect it, and returning the project site to near pre-project conditions by hydroseeding. A Notice of Completion for an IS/MND was filed on October 25, 2019. This project was completed December 10, 2021.	
Lower Yolo Ranch Restoration Project	State and Federal Contractors Water Agency, DWR, and MOA Partners	Ongoing	The project is located in the lower Yolo Bypass and is a tidal and seasonal salmon habitat project restoring tidal flux to about 1,670 acres of existing pastureland. The project site includes the Yolo Ranch, also known as McCormack Ranch, which was purchased in 2007 by the Westlands Water District. The goal of this project is to provide important new sources of food and shelter for a variety of native fish species at the appropriate scale in strategic locations in addition to ensuring continued or enhanced flood protection. The lower Yolo wetlands restoration project is part of an adaptive management approach in the Delta to learn the relative benefits of different fish habitats, quantify the production and transport of food and understand how fish species take advantage of new habitat.	Beneficial effects on terrestrial biological that use marshes and impacts on grassland species.
Meins Landing Restoration	DWR, Suisun Marsh Preservation Agreement agencies, and	In progress	Meins Landing is a 668-acre property in the eastern Suisun Marsh along Montezuma Slough that was purchased in 2005 as part of a multi-agency tidal restoration project. Previously a duck	Benefits to tidal species.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
	State Coastal Conservancy		club, the property was purchased to restore it to tidal influence by breaching the levee. Due to the presence of three underground gas and oil pipelines with restrictive easements, the original restoration concept for the site was not able to be implemented. While DWR explored other restoration options, the property was leased to the previous owners for 10 years and was operated as a duck club until the lease ended in 2016. The property is currently being operated as a managed marsh and maintained by DWR and Suisun Resource Conservation District, with no hunting leases on the property and restricted public access. As a managed marsh, the current operation goals are: (1) Operate Meins as a managed marsh to provide productive habitat for a diverse population of waterfowl, salt marsh harvest mouse, and other wildlife. (2) Formulate and test management practices to maximize nutrient production and export into adjacent sloughs to meet objectives of the Delta Smelt Resiliency Strategy. (3) Provide research opportunities for study of primary and secondary production, waterfowl feed utilization, nutrient export, and other topics to meet objectives of the Delta Smelt Recovery Plan. (4) Explore providing public access and hunting opportunities to meet demands by the SF Bay Conservation and Development Commission (BCDC) for habitat restoration projects in Suisun Marsh to include public access. Managed wetlands, like Meins Landing, are potentially more effective (and cheaper) at augmenting local food production than creating intertidal wetlands while providing more diverse habitats for multiple species. Research on managed wetlands is critical to understand the management techniques best suited to boost food/nutrient production while minimizing impacts to other species (e.g., waterfowl, western pond turtle, salt marsh harvest mouse). Once best	

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			management practices are identified, they could be evaluated on other sites throughout Suisun Marsh with cooperating landowners. Research by UC Davis and California Trout is currently underway on Meins Landing to evaluate primary and secondary production and determine optimal conditions to increase the production.	
Mayberry Farms Subsidence Reversal and Carbon Sequestration Project	DWR	Completed in 2010	The Mayberry Farms Subsidence Reversal and Carbon Sequestration Project created permanently flooded wetlands on a 307-acre parcel on Sherman Island that is owned by DWR. The project has restored approximately 192 acres of emergent wetlands and enhanced approximately 115 acres of seasonally flooded wetlands. Construction occurred in summer 2010. Ongoing operations and maintenance is routinely performed by DWR. The Mayberry Farms project was conceived as a demonstration project that would provide subsidence reversal benefits and develop knowledge that could be used by operators of private wetlands (including duck clubs) that manage lands for waterfowl-based recreation. By maintaining permanent water, the growth and subsequent decomposition of emergent vegetation is expected to control and reverse subsidence. The project is also anticipated to provide climate benefits by sequestering atmospheric CO_2. The project is expected to provide year-round wetland habitat for waterfowl and other wildlife.	Beneficial effects on marsh species.
Sherman Island Setback Levee-Mayberry Slough	DWR	Completed	Reclamation District 341, with funding from DWR, constructed four sections of setback levee to increase levee stability along Mayberry Slough on Sherman Island in 2004 and 2005. The Sherman Island setback levee represents an opportunity to reverse some of the ecological damage resulting from levee construction and maintenance by implementing a habitat development project that will augment the existing riparian vegetation and provide habitat for native species. Project implementation restored tidal wetland and riparian habitat.	Beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			Construction of the waterside portion of the setback levee was divided into two phases (Phase IIA, Phase IIB) that were completed in fall 2008 and fall 2009, respectively. Vegetation monitoring and maintenance was conducted until 2013.	
Sherman Island Whale's Mouth Wetlands	DWR	Completed	The Sherman Island Whale's Mouth Wetland Restoration Project restored approximately 600 acres of palustrine emergent wetlands within an 877-acre project boundary on a nearly 975-acre parcel on Sherman Island that is owned by the California Department of Water Resources (DWR). The property is currently managed for flood irrigated pasture land, which includes a regular and extensive disturbance regime associated with field prepping, disking, and grazing. The ultimate outcome of the restoration project was hundreds of additional acres of freshwater emergent wetlands. Other native plant restoration components included installation of native trees and shrubs compatible with their respective hydrologic regime as well as a substantial amount of upland transitional area, all of which provide a diversity of habitat structure and function. The project was completed in 2015.	Beneficial effects on terrestrial biological resources.
Sherman Island—Whale's Belly Wetlands	DWR	In progress	Whale's Belly is part of the California EcoRestore Initiative to restore and protect at least 30,000 acres of habitat across the Sacramento–San Joaquin Delta. The project objectives are to reduce the effects of climate change and Delta subsidence, as well as improve habitat for millions of migrating birds along the Pacific Flyway that rely on the Delta as a crucial rest stop and safe haven. Whale's Belly is one of four projects on Sherman Island that creates managed wetlands, tidal wetlands, and setback levees to contribute toward EcoRestore's restoration targets. The Whale's Belly Wetland Restoration Project includes adding soils and materials to support protective levees and riverbanks, enabling these structures to effectively hold back high floodwaters. Construction will also	Beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			involve relocation of drainage ditches, pipelines, and water pumps. Upon completion of construction activities, the island will be inundated to an approximate depth of 1–3 feet, allowing marshland growth to eliminate subsidence on this southeast section of Sherman Island. The project began in May 2020 and is scheduled for completion by Summer 2022.	
Twitchell Island—East End Wetland Restoration	DWR	Completed	The Twitchell Island East End Wetland Restoration Project restored approximately 740 acres of palustrine emergent wetlands and approximately 50 acres of upland and riparian forest habitat on Twitchell Island. This property is owned by the DWR and previously managed as flood irrigated corn and alfalfa. This project was completed in 2013.	Beneficial effects on terrestrial biological resources.
Twitchell Island—San Joaquin River Setback Levee	DWR	Planning phase	This project will stabilize a threatened section of levee along the San Joaquin River and allow for several different types of waterside habitat features to be constructed. Expected habitat types include riparian shaded riverine aquatic, intertidal habitats, and upland vegetation created by waterside beaches, benches, and undulations. An original 2,200-feet section was completed in 2000, and is currently serving as a model for an approximately 23,000-feet setback spanning the entire San Joaquin River levee plus a proposed 80-acre tidal marsh restoration site on Chevron Point. There are eight reaches to the setback project. Reach #6, a 2,680-feet setback levee reach is the top priority. Funding has not yet been secured but all permits have been obtained. Reach #10 is the Chevron Point Dryland Levee that separates the 80-acre tidal marsh restoration site from the rest of the island.	Beneficial effects on terrestrial biological resources.
North Delta Flood Control and Ecosystem Restoration Project	DWR	Ongoing	Consistent with objectives contained in the CALFED Record of Decision, the North Delta Flood Control and Ecosystem Restoration Project is intended to improve flood management and provide ecosystem benefits in the north Delta area	Beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			through actions such as construction of setback levees and configuration of flood bypass areas to create quality habitat for species of concern. These actions are focused on McCormack-Williamson Tract and Staten Island. The purpose of the Project is to implement flood control improvements in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. Flood control improvements are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem resulting from overflows caused by insufficient channel capacities and catastrophic levee failures near where the Mokelumne River, Cosumnes River, Dry Creek, and Morrison Creek converge.	
South Delta Temporary Barriers Project	DWR	In progress	The 2017–2022 South Delta Temporary Barriers Project, consists of annual construction, operation, and removal of the Middle River, Old River near Tracy, Grant Line Canal, and Heald of Old River spring and fall rock barriers. The project reduces adverse water level impacts (i.e., minimum tide elevations) caused by the SWP and CVP export pumping on local agricultural diverters within the South Delta Water Agency. The South Delta Temporary Barriers Project consists of four rock barriers across south Delta channels. The objectives of the project are to increase water levels, improve water circulation patterns and water quality in the southern Delta for local agricultural diversions, and improve operational flexibility of the SWP to help reduce fishery impacts and improve fishery conditions. Of the four rock barriers, the barrier at the head of Old River serves as a fish barrier (intended to primarily benefit migrating San Joaquin River Chinook salmon) and is installed and operated in April–May and again in September–November. The remaining three barriers (Old River at Tracy, Grant Line Canal, Middle River) serve as agricultural barriers (intended to primarily benefit agricultural water users in the south	Potential impacts on giant garter snake and Swainson's hawk, and other aquatic and terrestrial species.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			Delta) and are installed and operated between April 15 and November 30 of each season.	
Dutch Slough Tidal Marsh Restoration Project	DWR and California State Coastal Conservancy	In progress	The Dutch Slough Tidal Marsh Restoration Project, located near Oakley in Eastern Contra Costa County, would restore wetland and uplands, and provide public access to the 1,187-acre Dutch Slough property owned by the DWR. The property is composed of three parcels separated by narrow manmade sloughs. The project would provide ecosystem benefits, including habitat for sensitive aquatic species. It also would be designed and implemented to maximize opportunities to assess the development of those habitats and measure ecosystem responses so that future Delta restoration projects will be more successful. Two neighboring projects proposed by other agencies that are related to the Dutch Slough Restoration Project collectively contribute to meeting project objectives. These include the City of Oakley's proposed Community Park and Public Access Conceptual Master Plan for 55 acres adjacent to the wetland restoration project and 4 miles of levee trails on the perimeter of the DWR lands. The City Community Park will provide parking and trailheads for the public access components of the Dutch Slough Restoration Project. Construction on two of the parcels, Emerson and Gilbert, started in May 2018 and site grading completed in 2019, followed by revegetation planting. Breaching of these two parcels will be completed in 2021. Restoration planning of the third parcel, Burroughs, would begin in 2022.	Beneficial effects on terrestrial biological resources
Los Vaqueros Reservoir Expansion	Reclamation, DWR, and CCWD	Planning phase	The Los Vaqueros Reservoir Expansion Project consists of enlarging the existing Los Vaqueros Reservoir and constructing related reservoir system facilities to develop water supplies for environmental water management that supports fish protection, habitat management, and other environmental needs in the Delta and tributary river systems, and to improve water supply	Potential impacts on California red-legged frog, California tiger salamander, golden eagle, and other terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			reliability and water quality for urban users in the San Francisco Bay Area. Los Vaqueros Reservoir is a 100,000 acre-foot off-stream storage reservoir owned and operated by Contra Costa Water District (CCWD) that is used to store water pumped from the Delta. This storage capacity allows CCWD to improve the water quality delivered to its customers and to adjust the timing of its Delta water diversions to accommodate the life cycles of Delta aquatic species, thus reducing species impact and providing a net benefit to the Delta environment. The proposed expansion project would increase the reservoir capacity to 275,000 acre-feet and add a new 470 cfs connection that would allow the Los Vaqueros system to provide water to South Bay water agencies – Alameda County Flood Control and Water Conservation District, Zone 7, Alameda County Water District, and Santa Clara Valley Water District – that otherwise would receive all of their Delta supplies through the existing SWP and CVP export pumps. It also would include construction of a new diversion on Old River with a capacity of 170 cfs. The new and expanded facilities would be operated in coordination with Reclamation and DWR to shift Delta pumping for the three South Bay water agencies from the CVP and SWP Delta export pumps to the expanded Los Vaqueros Reservoir system. In August 2020, Reclamation released its Final Feasibility Report, which documents potential costs and benefits of the expansion of Los Vaqueros Reservoir. The Recommended Plan described in the Report provides for Federal Cost sharing of up to 25% of project construction costs. A similar 25% federal share for Phase 2 construction was requested by members of Congress in a letter dated April 2, 2021, to the Department of the Interior. On January 20, 2021, the California Water Commission increased its Water Storage Investment Program funding for the project based on inflation.	

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
Transfer-Bethany Pipeline with the Los Vaqueros Reservoir Expansion	U.S. Bureau of Reclamation, DWR, and Contra Costa Water District	Planning phase	The Los Vaqueros Reservoir Expansion Project includes expansion of the Los Vaqueros Reservoir from its current capacity of 160 TAF to 275 TAF, construction of a pipeline between CCWD's Transfer Pump Station and the SWP's California Aqueduct at Bethany Reservoir (the "Transfer-Bethany Pipeline"), upgrades to the existing Transfer Pump Station Facilities, and construction of the Neroly High Lift Station. Expansion of Los Vaqueros Reservoir improves Bay Area water supply reliability and water quality while protecting Delta fisheries and providing additional Delta ecosystem benefits. The proposed project will include a regional intertie (the Transfer-Bethany Pipeline) and improved pump stations and pipelines. The Transfer-Bethany Pipeline is composed of a new 300-cfs (84-inch-diameter) pipeline would deliver water from the Transfer Facility to the vicinity of Bethany Reservoir for South-of-Delta partners. The new Transfer-Bethany Pipeline would tie into the California Aqueduct just north of Bethany Reservoir in the Bethany Recreation Area.	Potential impacts on California red-legged frog, California tiger salamander, golden eagle, and other terrestrial biological resources.
The Riparian Bird Conservation Plan	California Partners in Flight and Riparian Habitat Joint Venture	Ongoing	The Riparian Habitat Joint Venture (RHJV) was initiated by California Partners in Flight in 1994. To date, 18 federal, state, and private organizations have signed the Cooperative Agreement to protect and enhance habitats for native landbirds throughout California. These organizations include the CDFW, DWR, California State Lands Commission, Ducks Unlimited, National Audubon Society, National Fish and Wildlife Foundation, The Nature Conservancy, The Trust for Public Land, The Resources Agency State of California, Reclamation, USFWS, U.S. Geological Survey, and Wildlife Conservation Board. The RHJV, modeled after the successful Joint Venture projects of the North American Waterfowl Management Plan, reinforces other collaborative efforts currently underway that protect biodiversity and	Beneficial effects on riparian species.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			enhance natural resources as well as the human element they support. The vision of the RHJV is to restore, enhance, and protect a network of functioning riparian habitat across California to support the long-term viability of landbirds and other species. A wide variety of other species of plants and animals will benefit through the protection of forests along rivers, streams, and lakes. The RHJV mission is to provide leadership and guidance to promote the effective conservation and restoration of riparian habitats in California through the following goals: (1) Identify and develop technical information based on sound science for a strategic approach to conserving and restoring riparian areas in California; (2) Promote and support riparian conservation on the ground by providing guidance, technical assistance and a forum for collaboration; and (3) Develop and influence riparian policies through outreach and education. In 2004, Partners in Flight and the RHJV prepared The Riparian Bird Conservation Plan, a guidance document that outline a strategy for conserving riparian birds, including birds using the Delta.	
Central Valley Joint Venture Program	Central Valley Joint Venture	Ongoing	The Central Valley Joint Venture (CVJV) is a self-directed coalition consisting of 22 state and federal agencies and private conservation organizations. The partnership directs their efforts toward the common goal of providing for the habitat needs of migrating and resident birds in the Central Valley of California. The CVJV was established in 1988 as a regional partnership focused on the conservation of waterfowl and wetlands under the North American Waterfowl Management Plan. It has since broadened its focus to the conservation of habitats for other birds, consistent with major national and international bird conservation plans and the North American Bird Conservation Initiative. The CVJV provides guidance and facilitates grant funding to accomplish its habitat goals and objectives.	Beneficial effects on waterfowl and wetland species.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			Integrated bird conservation objectives for wetland habitats in the Central Valley identified in the 2006 Implementation Plan include restoration of 19,170 acres of seasonal wetland, enhancement of 2,118 acres of seasonal wetland annually, restoration of 1,208 acres of semi-permanent wetland, and restoration of 1,500 acres of riparian habitat.	
Cache Creek, Bear Creek, Sulfur Creek, Harley Gulch Mercury TMDL	Central Valley Regional Water Quality Control Board	Ongoing	Historic mining activities in the Cache Creek watershed have discharged and continue to discharge large volumes of inorganic mercury to creeks in the watershed. Much of the mercury discharged from the mines is now distributed in the creek channels and floodplain downstream from the mines. Natural erosion processes are expected to slowly move the mercury downstream out of the watershed over the next several hundred years. However, current and proposed activities in and around the creek channel can enhance mobilization of this mercury. To reduce mercury loads in these streams, which ultimately connect to the northern Delta, the Central Valley Regional Water Quality Control Board is implementing mercury TMDLs for Cache Creek and its tributaries, as well as Sulfur Creek. The implementation plans require a reduction in mercury loads through a combination of actions to clean up mines, sediments, and wetlands; identify engineering options; control erosion reduction actions and perform studies and monitoring.	Potential beneficial effects on Delta species that are part of the aquatic food chain.
Sacramento–San Joaquin Delta Estuary TMDL for Methylmercury	Central Valley Regional Water Quality Control Board	Ongoing	The Central Valley Regional Water Quality Control Board identified the Delta as impaired because of elevated levels of methylmercury in Delta fish that pose a risk for human and wildlife consumers. As a result, it initiated the development of a water quality attainment strategy to resolve the mercury impairment. The strategy has two components: the methylmercury total maximum daily load (TMDL) for the Delta and the amendment of the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (the Basin Plan) to	Potential beneficial effects on Delta species that are part of the aquatic food chain.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			implement the TMDL program. The Basin Plan amendment requires methylmercury load and waste load allocations for dischargers in the Delta and Yolo Bypass to be met as soon as possible, but no later than 2030. The regulatory mechanism to implement the Delta Mercury Control Program for point sources would be through NPDES permits. Nonpoint sources would be regulated in conformance with the State Water Resources Control Board's Nonpoint Source Implementation and Enforcement Policy. Both point and nonpoint source dischargers would be required to conduct mercury and methylmercury control studies to develop and evaluate management practices to control mercury and methylmercury discharges. The Regional Water Board will use the study results and other information to amend relevant portions of the Delta Mercury Control Program during the Delta Mercury Control Program Review. The Basin Plan amendment also requires proponents of new wetland and wetland restoration projects scheduled for construction after 2011 to either participate in a comprehensive study plan or implement a site-specific study plan, evaluate practices to minimize methylmercury discharges, and implement newly developed management practices as feasible. Projects would be required to include monitoring to demonstrate effectiveness of management practices. Activities, including changes to water management and storage in and upstream of the Delta, changes to salinity objectives, dredging and dredge materials disposal and reuse, and changes to flood conveyance flows, would be subject to the open water methylmercury allocations. Agencies would be required to include requirements for projects under their authority to conduct control studies and implement methylmercury reductions as necessary to comply with the allocations by 2030.	

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan	Contra Costa County and East Contra Costa County Habitat Conservancy	Ongoing	The East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (Plan) was adopted in 2006 and provides regional conservation and development guidelines to protect natural resources while improving and streamlining the permit process for endangered species and wetland regulations. The Plan was developed by a team of scientists and planners with input from independent panels of science reviewers and interested parties. Within the 174,018-acre inventory area, the Plan provides permits for between 8,670 and 11,853 acres of development and will permit impacts on an additional 1,126 acres from rural infrastructure projects. The Plan will result in the acquisition of a preserve system that will encompass 23,800 to 30,300 acres of land that will be managed for the benefit of 28 species as well as the natural communities that they depend upon. The East Contra Costa County Habitat Conservancy is a joint exercise of powers authority formed by Contra Costa County and the cities of Brentwood, Clayton, Oakley, and Pittsburg to implement the Plan. It allows Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, the East Bay Regional Park District and the cities of Brentwood, Clayton, Oakley, and Pittsburg (collectively, the Permittees) to control permitting for activities and projects they perform or approve in the region that have the potential to adversely affect state- and federally listed species. The Plan also provides for comprehensive species, wetlands, and ecosystem conservation and contributes to the recovery of endangered species in northern California. The Plan avoids project-by-project permitting that often results in uncoordinated and biologically ineffective mitigation.	Beneficial effects on terrestrial biological resources through coordinated planning efforts, despite impacts on species from approved development.
Delta Protection Commission Land Use and Resource	Delta Protection Commission	Ongoing	The Delta Protection Commission (DPC), created with passage of the Delta Protection Act, was formed to adaptively protect, maintain, and where possible, enhance and restore	Beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
Management Plan Update			the overall quality of the Delta environment consistent with the Delta Protection Act and the Land Use and Resource Management Plan (LURMP) for the Primary Zone. The DPC is currently updating its LURMP, which was last adopted in 2010. The LURMP outlines the long-term land use requirements for the Delta and sets out findings, policies, and recommendations in the areas of environment, utilities and infrastructure, land use, agriculture, water, recreation and access, levees, and marine patrol/boater education/safety programs. The updated LURMP will place increased emphasis on the requirement for local government general plans to provide for consistency with the provisions of the LURMP. The DPC develops priorities and timelines for tasks to be implemented each year and provides annual progress reports to the Legislature. One of the tasks identified by the DPC is to monitor the Delta Vision, Bay Delta Conservation Plan, and Delta Risk Management Strategy processes and provide input as deemed appropriate.	
Delta Plan	Delta Stewardship Council	Ongoing	The Delta Reform Act, created by Senate Bill X7-1, established the co-equal goals for the Delta of “providing a more reliable water supply for California and protecting, restoring, and enhancing the delta ecosystem.” (Public Resources Code § 29702; Water Code § 85054). These coequal goals are to be achieved “in a manner that protects and enhances the unique cultural, recreational, natural resources, and agricultural values of the Delta as an evolving place.” (Wat. Code § 85054). The Delta Reform Act also established the DSC. The DSC is tasked with furthering the State’s coequal goals for the Delta through development of the Delta Plan, a comprehensive, long-term, resource management plan for the Delta, containing both regulatory policies and recommendations aimed at furthering the coequal goals and	Beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			promoting a healthy Delta ecosystem. The Delta Plan provides for a distinct regulatory process for activities that qualify as Covered Actions under Water Code Section 85057.5. State and local agencies proposing Covered Actions, prior to initiating implementation of that action, must prepare a written certification of consistency with detailed findings regarding consistency with applicable Delta Plan policies and submit that certification to the DSC.	
Delta Adapts	Delta Stewardship Council (DSC)	Ongoing	The DSC decided to take action in the Delta and Suisun Marsh in response to climate change at its May 2018 meeting, directing staff to begin a two-phase effort preparing: (1) a *vulnerability assessment* to improve understanding of regional vulnerabilities in order to protect the vital resources the Delta provides to California and beyond with state interests and investments top of mind; and (2) an *adaptation plan* detailing strategies and tools that state, regional, and local governments can use to help communities, infrastructure, and ecosystems thrive in the face of climate change. Together, these two phases form the *Delta Adapts: Creating a Climate Resilient Future* initiative, a comprehensive, regional approach to climate resiliency that cuts across regional boundaries and commits to collaboration across state, local, and regional levels. Delta Adapts supports the Delta Reform Act, Executive Order B-30-15, and the Delta Plan. The goals of Delta Adapts are to: (1) inform future work at the Council; Provide local governments with a toolkit of information to incorporate into their regulatory and planning documents; (2) integrate climate change into the state's prioritization of future Delta actions and investments; and (3) serve as a framework to be built upon by the Council and others in years to come**.** DSC staff are pursuing these goals across the two phases, while following the statutory	Beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			requirements outlined in the Delta Reform Act of 2009. Delta Adapts will consider climate change impacts that are expected to occur and amend the Delta Plan, where applicable.	
Liberty Island Conservation Bank	Reclamation District 2093	Ongoing	This project received permits and approvals in 2009 to create a conservation bank on the northern tip of Liberty Island that would preserve, create, restore, and enhance habitat for native Delta fish species, including Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, California Central Valley steelhead, delta smelt, and Central Valley fall- and late fall–run Chinook salmon. The project consists of creating tidal channels, perennial marsh, riparian habitat, and occasionally flooded uplands on the site. The project also includes the breaching of the northernmost east-west levee, and preservation and restoration of shaded riverine aquatic habitat along the levee shorelines of the tidal sloughs. The island's private levees failed in the 1997 flood and were not recovered, leaving all but the upper 1,000 acres and the adjacent levees permanently flooded. These upper acres encompass the proposed bank. The lower nearly 4,000 acres will remain, at least for the near future, predominantly open water and subtidal because tidal elevations are too great for marsh or riparian habitat.	Beneficial effects on terrestrial biological species using riparian and wetland habitat, some impacts on species using croplands for foraging.
Flood Management Program	Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, and USACE	Ongoing	The Sacramento Area Flood Control Agency (SAFCA) Flood Management Program includes studies, designs, and construction of flood control improvements. In the South Sacramento area, SAFCA projects include the South Sacramento Streams Project and the Sacramento River Bank Protection Project. The South Sacramento Streams Project consists of levee, floodwall, and channel improvements starting south of the town of Freeport along the Sacramento River to protect the City of Sacramento from flooding associated with Morrison, Florin, Elder, and Union House creeks. The Sacramento River	Potential impacts on species using agricultural areas for foraging, on riparian species, and giant garter snake.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			Bank Protection Project, which is implemented and funded primarily through USACE, addresses long-term erosion protection along the Sacramento River and its tributaries. Bank protection measures typically consist of large angular rock placed to protect the bank, with a layer of soil/rock material to allow bank revegetation. SAFCA contributes to funding the local share for bank protection activities within its jurisdiction.	
South Sacramento Habitat Conservation Plan	South Sacramento Conservation Agency Joint Powers Authority	Ongoing	The South Sacramento Habitat Conservation Plan (HCP) is a regional plan to address issues related to species conservation, agricultural protection, and urban development in south Sacramento County. Adopted in 2018, the HCP covers 40 different species of plants and wildlife including 10 that are state- or federally listed as threatened or endangered, and allow land owners to engage in the "incidental take" of listed species (i.e., to destroy or degrade habitat) in return for conservation commitments from local jurisdictions. The conservation measures outlined in the HCP would minimize and mitigate the impact of incidental take and provide for the conservation of covered species that may occur in the plan area. The geographic location of the HCP includes a combined 317,656 acres within south Sacramento County (unincorporated area) and the cities of Rancho Cordova, Elk Grove, and Galt.	Beneficial effects on terrestrial biological resources through coordinated planning effort for conservation and development.
Harvest Water (formerly called the South County Ag Program)	Sacramento Regional County Sanitation District	Planning phase	Harvest Water is being developed by Sacramento Regional County Sanitation District (Regional San) and could deliver up to 50,000 acre-feet per year (AFY) of safe and reliable supply of tertiary-treated water for agricultural uses to more than 16,000 acres of permanent agriculture through irrigation, as well as habitat conservation lands near the Cosumnes River and Stone Lakes Wildlife Refuge. This project has received up to $287.5 million through the Proposition 1 grant funding of the California Water Commission, Water Storage Investment Program. Regional San is currently	Beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			working with local farmers and the initial planning stages of preliminary designs for transmission and distribution systems near Elk Grove in southern Sacramento County.	
San Francisco Bay Mercury TMDL	San Francisco Bay Region Water Quality Control Board	Ongoing	San Francisco Bay is impaired because mercury contamination is adversely affecting existing beneficial uses, including sport fishing, preservation of rare and endangered species, and wildlife habitat. On February 12, 2008, EPA approved a Basin Plan amendment incorporating a TMDL for mercury in San Francisco Bay and an implementation plan to achieve the TMDL. The amendment was formerly adopted by the San Francisco Bay Water Board, the State Water Resources Control Board, and the state Office of Administrative Law. It is now officially incorporated into the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan). The San Francisco Bay mercury TMDL, which includes the waters of the Delta within the San Francisco Bay region, is intended to: (1) reduce mercury loads to achieve load and waste load allocations, (2) reduce methylmercury production and consequent risk to humans and wildlife exposed to methylmercury, (3) conduct monitoring and focused studies to track progress and improve the scientific understanding of the system, and (4) encourage actions that address multiple pollutants. The implementation plan establishes requirements for dischargers to reduce or control mercury loads and identifies actions necessary to better understand and control methylmercury production. In addition, it addresses potential mercury sources and describes actions necessary to manage risks to Bay fish consumers. Load reductions are expected via implementation of the Delta Methylmercury TMDL (river source), plus urban runoff management, Guadalupe River mine remediation, municipal and industrial wastewater source controls and pretreatment, and sediment remediation.	Potential beneficial effects on Delta species that are part of the aquatic food chain.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
San Joaquin County Multi-Species Habitat Conservation and Open Space Plan	San Joaquin Council of Governments	Ongoing	Permitted in 2000, the key purpose of the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (Plan) is to provide a strategy for balancing the need to conserve open space and the need to convert open space to non-open space uses. These goals are intended to be met while protecting the region's agricultural economy; preserving landowner property rights; providing for the long-term management of plant, fish and wildlife species, especially those that are currently listed, or may be listed in the future, under the federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA); providing and maintaining multiple-use open spaces that contribute to the quality of life of the residents of San Joaquin County; and accommodating a growing population while minimizing costs to project proponents and society at large. The conservation strategy relies on minimizing, avoiding, and mitigating impacts on the species covered by the Plan. Minimization of impacts on covered species takes a species-based approach emphasizing the implementation of measures to minimize incidental take by averting the actual killing or injury of individual covered species and minimizing impacts on habitat for such species on open space lands converted to non-open space uses. Unavoidable impacts on covered species are addressed through a habitat-based approach that emphasizes compensation for habitat losses through the establishment, enhancement and management-in-perpetuity of preserves composed of a specific vegetation types or association of vegetation types (habitats) upon which discrete groups of covered species rely. The purchase of easements from landowners willing to sell urban development rights is the primary method for acquiring preserves. The Plan identifies zones distinguished by a discrete association of soil types, water regimes (e.g., Delta lands subject to tidal influence, irrigated lands, lands receiving only	Beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			natural rainfall), elevation, topography, and vegetation types. In general, impacts within a particular zone are mitigated within the same zone	
San Joaquin County General Plan Update	San Joaquin County	Ongoing	The General Plan 2035 was adopted by the in December 2016. The general plan contains designations for residential, commercial, and industrial development through 2035. Most of the urban growth is directed to existing urban communities.	Potential impacts on terrestrial biological resources due to continued growth in the county.
Solano Multispecies Habitat Conservation Plan	Solano County Water Agency	In development	The Solano HCP is intended to support the issuance of an incidental take permit under the federal ESA for a period of 30 years. This permit is required by the March 19, 1999, Solano Project Contract Renewal BiOp between the USFWS and Reclamation. The scope of the Solano HCP was expanded beyond the requirements of the BiOp to include additional voluntary applicants and additional species for incidental take coverage. Thirty-seven species are proposed to be covered under the Solano HCP. The minimum geographical area to be covered is the Solano County Water Agency's contract service area that is the cities of Fairfield, Vacaville, Vallejo, Suisun City, the Solano Irrigation District, and the Maine Prairie Water District. The area covered by the HCP is all of Solano County and a small portion of Yolo County. The Final Administrative Draft was submitted to the lead agencies in June 2009. The HCP includes a Coastal Marsh Natural Community Conservation Strategy designed to maintain the water and sediment quality standards, hydrology of this natural community; contribute to the restoration of tidally influenced coastal marsh habitat; and promote habitat connectivity. Primary conservation actions include preservation (primarily through avoidance), restoration, invasive species control, and improvement of water quality. The plan area Covers 580,000 acres, which includes 12,000 acres of proposed development and 30,000 acres that will be preserved.	Potential future beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
Delta Dredged Sediment Long-Term Management Strategy (LTMS)/Pinole Shoal Management Study	USACE	Ongoing	The Delta Dredged Sediment Long-Term Management Strategy is a cooperative planning effort to coordinate, plan, and implement beneficial reuse of sediments in the Delta. Five agencies (USACE, EPA, DWR, California Bay Delta Authority, and the Central Valley Regional Water Quality Control Board) have begun to examine Delta dredging, reuse, and disposal needs. The strategy development process will examine and coordinate dredging needs and sediment management in the Delta to assist in maintaining and improving channel function (navigation, water conveyance, flood control, and recreation), levee rehabilitation, and ecosystem restoration. Agencies and interested parties will work cooperatively to develop a sediment management plan that is based on sound science and protective of the ecosystem, water supply, and water quality functions of the Delta. As part of this effort, the sediment management plan will consider regulatory process improvements for dredging and dredged material management so that project evaluation is coordinated, efficient, timely, and protective of Delta resources.	Potential impacts on terrestrial species due to dredge stockpiling and on giant garter snake and western pond turtle from dredging activities and potential benefits from the plan's coordinated reuse of dredge material.
Lower San Joaquin Feasibility Study	USACE	Planning phase	The Lower San Joaquin Feasibility Study is intended to determine if there is a federal interest in providing flood risk management and ecosystem restoration improvements along the lower (northern) San Joaquin River. The lower San Joaquin River study area includes the San Joaquin River from the Mariposa Bypass downstream to, and including, the city of Stockton. The study area also includes the channels of the San Joaquin River in the southernmost reaches of the Delta: Paradise Cut and Old River as far north as Tracy Boulevard and Middle River as far north as Victoria Canal. The floodplains of the lower San Joaquin River and its tributaries are also included in the study area. Additionally, studies have been funded by grants from the California Delta Conservancy and funds from	Potential impacts and benefits on terrestrial biological resources, would vary by location and species.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			Reclamation District Number 2062. Currently the effort is being led by the San Joaquin County Resource Conservation District, American Rivers, and the South Delta Water Agency with the purpose of developing a mitigation strategy to consider and minimize the downstream effects of the future Paradise Cut Flood Bypass Expansion Project.	
Sacramento River Bank Protection Project	USACE	Planning phase	Originally authorized by Section 203 of the Flood Control Act of 1960, the Sacramento River Bank Protection Project is a long-term flood risk management project designed to enhance public safety and help protect property along the Sacramento River and its tributaries. While the original authorization approved the rehabilitation of 430,000 linear feet of levee, the 1974 Water Resources Development Act added 405,000 linear feet to the authorization and a 2007 bill authorized another 80,000 linear feet for a total of 915,000 linear feet of project. The Corps is set to release a Post Authorization Change Report, including an Environmental Impact Statement, to address the effects of the latest authorization. USACE, Sacramento District is responsible for implementation of the project in conjunction with its non-federal partner, the California Central Valley Flood Protection Board. A Final Post Authorization Change Report and EIS/EIR were released in April and March 2020, respectively	Impacts on Swainson's hawk, valley elderberry longhorn beetle, and other riparian species. Impacts on species foraging in affected agricultural lands.
San Francisco Bay to Stockton Deep Water Ship Channel Project	USACE, Port of Stockton, and Contra Costa County Water Agency	Planning phase	The San Francisco Bay to Stockton Deep Water Ship Channel Project is a congressionally authorized project being implemented by USACE, the Port of Stockton, and Contra Costa County Water Agency. A joint EIS/EIR will evaluate the action of navigational improvements to the Stockton Deep Water Ship Channel. A General Reevaluation Report and EIS, both released in January 2020, determined the feasibility of modifying the current dimensions of the West Richmond, Pinole Shoal, Suisun Bay, and Stockton Ship Channels, which are currently maintained to 35 feet and provide	Impacts on giant garter snake, western pond turtle, Swainson's hawk, largely temporary in nature.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			access to oil terminals, industry in Pittsburg, and the Port of Stockton. The proposed action consists of altering the depth of the deep draft navigation route.	
Sacramento Deep Water Ship Channel Project	U.S. Army of Corps of Engineers and Port of Sacramento	Planning phase (on hold)	The Sacramento River Deep Water Ship Channel Project is a Congressionally authorized project being implemented by USACE and the Port of Sacramento. The proposed project would complete the deepening and widening of the navigation channel to its authorized depth of 35 feet. Deepening of the existing ship channel is anticipated to allow for movement of cargo via larger, deeper draft vessels. Widening portions of the channel would increase navigational safety by increasing maneuverability. The 46.5-mile-long ship channel lies within Contra Costa, Solano, Sacramento, and Yolo counties and serves the marine terminal facilities at the Port of Sacramento. The Sacramento Deep Water Ship Channel joins the existing 35-feet-deep channel at New York Slough, thereby affording the Port of Sacramento access to San Francisco Bay Area harbors and the Pacific Ocean. The project has been on hold since 2014.	Impacts on giant garter snake, western pond turtle, Swainson's hawk, largely temporary in nature.
Agricultural Drainage Selenium Management Program Plan	Reclamation and San Luis & Delta-Mendota Water Authority	Ongoing	Impairment of water quality in the San Joaquin River, the Delta, and San Francisco Bay has resulted in the completion of a TMDL for selenium in the lower San Joaquin River, listing of the western Delta as having impaired water quality for selenium, and initiation of a TMDL study for selenium in North San Francisco Bay. The overall goal of the Agricultural Drainage Selenium Management Program is to minimize discharges of selenium in subsurface agricultural drainage from the western San Joaquin Valley to the river and downstream areas. Actions being taken include reduction in the generation of agricultural drainage containing elevated levels of selenium (through land and irrigation management practices) and limiting where and when the drainage water can be discharged	Potential beneficial effects on bird species that are part of the aquatic food chain.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
North American Waterfowl Management Plan	USFWS	Ongoing	The North American Waterfowl Management Plan, a collaboration of Canada, the United States, and Mexico to enhance waterfowl populations, was originally written in 1986 and envisioned as a 15-year effort to achieve landscape conditions that could sustain waterfowl populations. The plan has been modified twice since the 1986 Plan to account for biological, sociological, and economic changes that influence the status of waterfowl and the conduct of cooperative habitat conservation. This 2018 Plan Update presents examples of progress toward achieving the goals of the 2012 Revision. It also establishes important groundwork for incorporating an understanding of people's relationship with nature into the North American waterfowl conservation enterprise.	Beneficial effects on waterfowl and species using similar habitats.
Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan	USFWS	Ongoing	USFWS published a final Comprehensive Conservation Plan (CCP) for Stone Lakes National Wildlife Refuge in January 2007 to describe the selected alternative for managing Stone Lakes National Wildlife Refuge for the next 15 years. The refuge is located about 10 miles south of Sacramento, straddling I-5 and extending south from Freeport to Lost Slough. Under the plan, the Refuge will continue its focus of providing wintering habitat for migratory birds and management to benefit endangered species. Management programs for migratory birds and other Central Valley wildlife will be expanded and improved and public-use opportunities will also be expanded. The number of refuge units open to the public will increase from one to five. In addition, environmental education, interpretation, wildlife observation, wildlife photography, hunting, and fishing programs will be expanded. The plan achieves the refuge's purposes, vision, and goals; contributes to the Refuge System mission; addresses the significant issues and relevant mandates; and is consistent with principles of sound fish and wildlife management.	Beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
West Sacramento Levee Improvements Program	West SAFCA and USACE	Ongoing	The West Sacramento Levee Improvements Program would construct improvements to the levees protecting West Sacramento to meet local and federal flood protection criteria. The program area includes the entire WSAFCA boundaries which encompasses portions of the Sacramento River, the Yolo Bypass, the Sacramento Bypass, and the Sacramento Deep Water Ship Channel. The levee system associated with these waterways includes over 50 miles of levees in Reclamation District (RD) 900, RD 537, RD 811, DWR's Maintenance Area 4, and the Deep Water Ship Channel. These levees surround the West Sacramento. For the purposes of this program, the levees have been generally divided into the nine reaches: Sacramento River Levee North, Sacramento River Levee South, Port North Levee, Port South Levee, South Cross Levee, Deep Water Ship Channel Levee East, Deep Water Ship Channel Levee West, Yolo Bypass Levee, and Sacramento Bypass Levee.	Potential impacts on species using agricultural areas for foraging, on riparian species, and aquatic species.
Yolo County Habitat/Natural Community Conservation Plan	Yolo Habitat Conservancy		The Yolo Habitat Conservancy, a Joint Powers Authority, launched the Yolo Natural Heritage Program in March 2007. This effort includes the continuing preparation of a joint Habitat Conservation Plan/ Natural Community Conservation Plan (HCP/NCCP). Member agencies include Yolo County, City of Davis, City of Woodland, City of West Sacramento, and City of Winters. The HCP/NCCP describes the measures that local agencies will implement in order to conserve biological resources, obtain permits for urban growth and public infrastructure projects, and continue to maintain the agricultural heritage and productivity of the county. The nearly 653,549-acre planning area provides habitat for covered species occurring within five dominant habitats/natural communities. The plan proposes to address 12 covered species, including seven state-listed species: palmate-bracted birds beak, giant garter snake, Swainson's hawk, western yellow-billed cuckoo, and	Beneficial effects on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			bank swallow. The Yolo Habitat Conservancy also consults regularly with CDFW and USFWS, as well as the Conservancy's Advisory Committee and other partners.	
Delta Science Plan	Delta Plan Interagency Implementation Committee (DPIIC)	Ongoing	The 2019 Delta Science Plan is the first comprehensive update to the 2013 Delta Science Plan. As with the 2013 document, the update process took on an open, transparent, and inclusive approach involving input from a diverse range of federal and state agencies, interested parties, academia, and the public. The actions identified in this updated Plan are intended to promote more forward looking and nimble science and management efforts. They address how to use open and transparent processes to prioritize science activities, determine how these can be carried out effectively and efficiently, and identify how the resulting information is best communicated to those who need it.	Generally beneficial to terrestrial biological resources.
Twitchell Island- San Joaquin Setback Levee Project	DWR	In progress	This project would stabilize a threatened section of levee along the San Joaquin River while also creating different habitat types waterside features to be constructed. In 2000, 2,200 linear feet of the waterside levee was re-contoured and replanted with native vegetation to create shaded riverine aquatic habitat. Additional riparian habitat, intertidal habitat, upland vegetation, and waterside beaches, benches, and undulations are planned in conjunction with an additional 23,000-feet setback along the San Joaquin River.	Beneficial effects on a variety of wildlife with potential for impacts on species during activities.
Twitchell Island Mitigation Enhancement Site	DWR	In progress	The Twitchell Island Mitigation Enhancement Site (TIMES) is currently in pre-project maintenance, with work on the planting plan and freshwater marsh to begin in 2022. After establishment, the TIMES project will contribute 110 advanced mitigation acres to Delta Levee Program participants, and the 70 enhancement acres will continue its current lease.	Beneficial effects on terrestrial biological resources.
Grizzly Slough Floodplain Project at the	DWR		The Grizzly Slough Floodplain Restoration Project, is one of two main elements of the North Delta Flood Control and Ecosystem Restoration	Potential impacts during construction but ultimately beneficial to species

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
Cosumnes River Preserve			Project that consists of flood management and habitat improvements where the Mokelumne River, Cosumnes River, Dry Creek and Morrison Creeks converge. Flood flows and high-water conditions in this area threaten levees, bridges, and roadways. The north Delta project will reduce flooding and provide contiguous aquatic and floodplain habitat along the downstream portion of the Cosumnes Preserve by modifying levees on Grizzly Slough. Benefits to ecosystem processes, fish and wildlife, will be achieved by recreating floodplain seasonal wetlands and riparian habitat on the Grizzly Slough proper. As of July 28, 2021, the grantee was securing final permits and subcontractors prior to construction.	using riparian and wetlands.
Lower Putah Creek Realignment	CDFW	In progress	One of six separate projects identified and implemented to carry out the RPA Actions in the 2009 NMFS BiOp specific to the Yolo Bypass. The project will restore 300–700 acres of tidal freshwater wetlands, creating 5 miles of a new fish channel, improving anadromous fish access to 25 miles of stream, and restoring at least 5,000 square feet of salmon spawning habitat. Connectivity between these habitats will enhance salmonid in migration and spawning as well as rearing and outmigration conditions for smolts. The project will achieve this objective by enhancing habitat within Lower Putah Creek to support the recovery of local fall-run Chinook salmon, steelhead, and Sacramento splittail populations. This project has been identified as one of the projects that will be implemented under California EcoRestore.	Beneficial for aquatic species but potential impacts on upland species during grading.
Prospect Island Tidal Habitat Restoration Project	DWR and Department of Fish and Wildlife	In progress	The northern portion of Prospect Island (about 1,253 acres) is currently owned by DWR, who acquired the property with the intent of restoring freshwater tidal marshes and associated aquatic habitat. Consistent with the objectives for the refuge, the USACE and DWR completed the environmental documentation Mitigated Negative Declaration/Findings of No Significant	Beneficial effects on aquatic species.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			Impact for a restoration project on Prospect Island in 2001. This project would partially fulfill the 80,000-acre tidal habitat restoration obligation outlined in Reasonable and Prudent Alternative (RPA) 4 of the 2019 USFWS BiOp for the effects of long-term coordinated operations of the SWP and the federal Central Valley Project (CVP) on delta smelt and has been fully funded by the SWP contractors with several restoration activities in the planning process. The final EIR was certified in 2019.	
McCormack-Williamson Tract Flood Control and Ecosystem Restoration Project	DWR	Completed	This project is a part of the North Delta Flood Control and Ecosystem Restoration Project and will implement flood control improvements principally on and around McCormack-Williamson Tract in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. Flood control improvements are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem caused by catastrophic levee failures in the Project study area. This project has been identified as one of the projects that will be implemented under California EcoRestore.	Beneficial effects on aquatic and terrestrial species, some impacts during construction.
Lookout Slough Tidal Habitat Restoration and Flood Improvement Project	DWR	In progress	The Project is designed to be a multi-benefit project to restore approximately 3,100 acres of tidal marsh, increase flood storage and conveyance in the Yolo Bypass, increase levee resilience, and decrease flood risk. Habitat restoration and flood improvement goals would be attained by excavating a network of tidal channels, constructing a new setback levee along Duck Slough, breaching and degrading the Shag Slough (Yolo Bypass West) Levee, breaching the Vogel Levee, and improving the Cache/Hass Slough Levee. On November 3, 2020, DWR certified the EIR for the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project and filed a Notice of Determination with the Governor's Office of Planning and Research. On July 16, 2021, the Delta Stewardship Council, as part of an Appeals of the Certification of Consistency case,	Beneficial effects on aquatic species; potential impacts on terrestrial species during construction.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			remanded DWR on portions of the project which had not provide enough information to be shown as consistent with the Delta Plan. DWR is responsible for providing additional information. However, on July 27, 2021, approval of Permit No. 19477 was granted by the Central Valley Flood Protection Board under California Code of Regulations, Title 23, Article 3, Section 6 to construct approximately 2.9 miles of a new setback levee along Duck Slough and Liberty Island Road and breach the existing Yolo Bypass levee at Shag Slough. This permitted work would restore and enhance approximately 3,164 acres of upland, tidal, and floodplain habitat.	
Decker Island Tidal Habitat Restoration Project	DWR, CDFW	In progress	Decker Island is located in the Sacramento–San Joaquin River Delta along the Sacramento River. DWR is undertaking the restoration of the Decker Island Tidal Habitat Restoration Project in conjunction with CDFW to enhance roughly 140 acres of established emergent wetland with muted tidal connectivity to Horseshoe Bend, and uplands to fully tidal habitat. Construction began in August 2018 and was completed by mid-November of the same year. CDFW will implement biological monitoring to ensure desired site functions are established and to inform future restoration projects.	Beneficial effects on aquatic species.
SR-239 Project (East Bay – Contra Costa, Alameda, northern San Joaquin Counties)	Contra Costa Transportation Authority, Contra Costa County, Caltrans	Planning phase	The SR 239 project will provide a new, four-lane highway from SR 4 at Marsh Creek Road in Contra Costa County to I-580 in Alameda County. This new state route will ultimately improve the transportation network for an area that had few viable north-south roadway connections between East Contra Costa and the Central Valley.	Potential impacts on California red-legged frog, California tiger salamander, vernal pool fairy shrimp, and wildlife connectivity.
City of Antioch Brackish Water Desalination Project	City of Antioch	In development	The Antioch Brackish Water Desalination Project, which utilizes existing infrastructure to the extent possible, includes the construction of new desalination facilities and associated infrastructure, in order to improve the City's water supply reliability and operational flexibility. Once constructed the desalination facility, located at the existing water	No impacts on terrestrial biological resources.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			treatment plant, will provide for 6 million gallons per day of capacity (producing up to 5,500 AFY), helping the City reduce its purchases of more expensive CCWD water.	
Three Creeks Parkway Restoration Project	Contra Costa County Flood Control and Water Conservation District	In development	In July 2015, the District partnered with American Rivers, a non-profit partner, on the $2 million Three Creeks Parkway Restoration Project in Brentwood, a multiagency public-private partnership to transform 1/4 mile of the Marsh Creek flood control channel into high-quality salmon and riparian habitat, with enhanced public access. Since then, the project has expanded to restore ¾ mile of Marsh Creek and costs approximately $9.0 million. Approximately $5.9 million of outside funding from private, federal, and state agencies has been obtained to date. The project has multiple local and regional partners including the City of Brentwood, Friends of Marsh Creek Watershed, East Contra Costa County Habitat Conservancy, and East Bay Regional Park District. In 2018, planning and environmental studies were completed, and construction began in June 2020. Phase 1 has been completed.	Beneficial effects on riparian species.
Winter Island Tidal Habitat Restoration Project	DWR, CDFW	Completed	The Winter Island Tidal Habitat Restoration Project was created to partially fulfill the Fish Restoration Program (FRP)'s 8,000-acre tidal habitat restoration obligations of DWR in RPA 4 of the 2019 U.S. Fish and Wildlife Service (USFWS) Biological Opinion (BiOp) for the effects of the long-term coordinated operations of the SWP and the federal CVP on delta smelt. Because restoration of tidal habitat would provide access for salmonids rearing at Winter Island, the project is also consistent with RPA I.6.1 of the National Marine Fisheries Service (NMFS) Salmonid BiOp for SWP/CVP operations. These obligations were upheld in the 2019 Re-evaluation of Consultation published by USFWS and NMFS, with the addition that FRP now has until 2030 to reach these restoration goals. The project was also established to fulfill FRP's 800-acre mesohaline	Beneficial effects on riparian and wetland species.

Program/ Project	Agency	Status	Description of Program/Project	Impacts on Terrestrial Biological Resources
			habitat requirement of the California Department of Fish and Wildlife (CDFW) Longfin Smelt Incidental Take Permit for the SWP Delta operations. The primary goal of the project is to restore unrestricted tidal connectivity between the interior of Winter Island and the surrounding channels, which would convert muted tidal emergent wetland and open water habitats into tidal wetland habitat and improve access for the benefit of native fish species. Construction was completed on September 25, 2019.	

Caltrans = California Department of Transportation; cfs = cubic feet per second; CVP = Centra Valley Project; BiOp = Biological Opinion; CDFW = California Department of Fish and Wildlife; DWR = California Department of Water Resources; EBMUD = East Bay Municipal Utility District; EIR = Environmental Impact Report; EIS = Environmental Impact Statement; EPA = U.S. Environmental Protection Agency; I = Interstate; NMFS = National Marine Fisheries Service; Reclamation = Bureau of Reclamation; SR = State Route; SWP = State Water Project; USACE = U.S. Army Corps of Engineers; USFWS = U.S. Fish and Wildlife Service.

The current conditions of study area biological resources are the byproduct of past and ongoing human activity and natural processes. The present geographic range and condition of natural communities, special-status and common plants and wildlife, and invasive species are described in Section 13.1, *Environmental Setting*. A brief synopsis of general environmental conditions and their evolution in the study area is presented in Section 13.1.1, *Study Area.* This discussion provides a context of gradually declining acreages of natural habitat because of agricultural, urban development, flood control and water management activities.

13.3.4.2 Cumulative Impacts of the No Project Alternative

The cumulative impacts with No Project Alternative scenario would include projects listed in Table 13-106 and would include other water supply projects that could be implemented if the Delta Conveyance Project is not approved. Generally, many of these projects and programs are beneficial to terrestrial biological resources while others could create temporary and permanent impacts on biological resources. Other water supply projects that could be implemented under the No Project Alternative scenario would not occur in the study area and would not be expected to contribute to cumulative study area impacts on study area natural communities or species. Other water supply projects outside the study area that could be implemented under the No Project Alternative have the potential to affect special-status species, natural communities, wetlands, and waters of the United States, and may combine to create cumulative biological resources in California. As other water supply and management projects are implemented, biological resource impacts would be required to be reduced by CEQA and permit requirements to compensate for, avoid, and minimize impacts, which would reduce the potential for widespread cumulative impacts on biological resources. Therefore, the potential for cumulative biological resources under the No Project Alternative is considered to be less than significant and the No Project Alternative contribution would not be cumulatively considerable.

13.3.4.3 Cumulative Impacts of the Project Alternatives

The various projects and programs listed in Table 13-106 will have cumulative effects on the existing terrestrial biological resources of the study area through project construction and beyond. The most relevant elements of these projects and programs are their ability to modify land use patterns, modify land management practices, and change the patterns of hydrology and vegetation in the study area. Most of the local, state, and federal land use and land management programs that are affecting or will affect the Delta are designed to preserve open space and agricultural lands, and to manage the resources of the area for multiple uses, including agriculture, recreation, fish and wildlife habitat, flood protection, and water management. The restoration programs will increase primarily wetland and riparian natural communities by converting agricultural land. The special-status and common plants and wildlife that rely on wetland and riparian habitats for some stage of their life will benefit from these changes over time. Other species that rely on agricultural land, but do not benefit from wetland and riparian expansion, may decline in the study area. On the upland fringes of the Delta, plans exist for small expansions of urban development that would remove primarily agricultural land uses. The management of state- and federally owned wildlife areas, including Sherman Island and Yolo Bypass State Wildlife Areas and Stone Lakes NWR, will continue to focus on multiple uses, including wildlife habitat improvement, public access for wildlife viewing, wildlife-friendly agricultural production, and hunting opportunities. Natural habitat will be improved and expanded. The principal changes that are likely to result from the various habitat conservation plans that overlap with the study area would be expected to include the restoration and protection of the habitats that support the same special-status species being addressed in this Draft EIR (see Impact BIO-54: *Conflict with the Provisions of an Adopted Habitat Conservation Plan, Natural Community Conservation Plan, or Other Approved Local, Regional, or State Habitat Conservation Plan*). These changes would be expected to result in increases of wetland, grassland, and riparian habitats, and a decrease in agricultural lands.

Implementation of the water management strategies associated with the programs listed in Table 13-106 would not significantly modify the principal natural communities in the study area. These management strategies are designed, in part, to improve aquatic habitat conditions in the Delta for the benefit of special-status fish species. Periodic levee and channel maintenance activities associated with the flood management programs in Table 13-106 would result in localized disturbances to valley/foothill riparian, grassland, and tidal perennial aquatic natural communities, and to a lesser extent to tidal brackish and tidal freshwater emergent wetlands. To the extent that ongoing levee repair and replacement involves use of reinforcing rock and discouragement of replanting streamside vegetation, there could be a gradual decline in the extent and value of valley/foothill riparian habitat and grassland along minor and major waterways. Several of the water management and transportation projects listed in Table 13-106 require localized removal of natural communities and agricultural land for expanding infrastructure. Most of these activities are on the periphery or just outside of the study area.

The overall direction of these existing and ongoing programs and policies that influence land conversion and land management in the study area would continue to be toward maintaining the mix of agricultural, recreational, water management, and wildlife uses in the study area. Some actions that will occur will expand natural and manmade terrestrial and wetland habitats that will benefit the special-status and common plants and wildlife with expanded and enhanced habitat in the study area. The potential will remain, however, for long-term trends in levee deterioration, global climate change, and seismic activity that could damage levees and result in significant changes in natural communities and cultivated lands.

For all alternatives, the environmental commitments (Appendix 3B, *Environmental Commitments and Best Management Practices*), mitigation measures in this chapter, and CMP (Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources*) would reduce potential significant cumulative effects from the combined habitat losses and conversions due to project construction and restoration activities. The aforementioned measures would avoid and minimize construction, restoration, operations, and maintenance effects on terrestrial biological resources and would provide offsetting compensation (i.e., minimum ratio of 1:1) in the form of habitat conservation (restoration, enhancement, and protection) for permanent, and in some cases temporary, losses of habitat. Therefore, cumulative projects combined with the project alternatives would create less than significant cumulative impacts on biological resources and the project alternatives' contribution to cumulative impacts with compensatory mitigation, mitigation measures and environmental commitments incorporated would not be cumulatively considerable.