4.6 Biological Resources

4.6.1 Affected Environment

This section describes the biological resources occurring in the Los Vaqueros Reservoir Expansion Project study area, and assesses the potential for the project alternatives to affect sensitive biological resources. Specific study areas were established for each of the proposed facilities or facility types, and wetlands and other biological resources were cataloged within these areas to provide information needed to assess both the direct (footprint) and indirect effects (such as construction noise, light, or erosion) of the project on biological resources. Study areas include:

- **Expanded Reservoir**: This study area includes the maximum inundation area plus an approximately 1,000-foot wide buffer around the expanded reservoir.

- **Facilities within the Los Vaqueros Watershed**: The study area for proposed facilities within the watershed (referred to in this section as other in-watershed facilities), which include the recreational facilities, the borrow areas and stockpile/staging area, the westside access road, and eastside trail. The Contra Costa Water District (CCWD) has detailed information about biological resources throughout the watershed, and this was used and updated for the analysis as needed to assess impacts.

- **New Delta Intake and Pump Station and Power Supply Infrastructure**: For these facilities, the study area included the footprint of the facility plus a 150-foot-wide buffer around the site or alignment.

- **Pipelines**: The study area for proposed pipelines was a 500-foot-wide study corridor centered on the alignment. For impact analysis purposes a 200-foot-wide construction easement was assumed for the Delta-Transfer Pipeline and the Transfer Los Vaqueros (-LV Pipeline), while a 300-foot wide construction easement was assumed for the Transfer-Bethany Pipeline.

Facility siting studies were conducted during development of the project alternatives to try to avoid or minimize potential environmental impacts in advance. As discussed in the Environmental Impact Statement/Environmental Impact Report (EIS/EIR), where impacts could not be avoided or minimized to a less-than-significant level through careful siting, mitigation measures have been identified.

This evaluation of biological resources is based on field surveys, aerial photograph interpretation, and database review of vegetation communities, wildlife habitat, and jurisdictional “waters of the United States” that occur or potentially occur in the project vicinity and specific project area, including ecosystems, habitats, plant communities, and special-status plants and wildlife. Extensive field surveys were conducted between 2004 and 2008 to augment existing information on biological resources in the project area and on project sites. Survey work that was completed for the project during this period includes:

- Large branchiopod surveys that were conducted within the Los Vaqueros Watershed, along pipeline alignments, and at project facilities in 2008 (ESA, 2008a);

- In-watershed surveys for valley elderberry longhorn beetle (ESA, 2005);
• Focused botanical surveys of the Delta-Transfer Pipeline, Transfer-LV Pipeline, Expanded Transfer Facility site, and Transfer-Bethany Pipeline from 2004 to 2008 (ESA, 2007; 2008b); and

• Reconnaissance-level wildlife surveys of the Delta Intake Facilities, Delta-Transfer Pipeline, Transfer-LV Pipeline, Transfer-Bethany Pipeline, Western Area Power Administration (Western) substation and powerline alignments, and PG&E substation and powerline alignment by ESA biologists conducted concurrently with botanical and branchiopod surveys in 2007 and 2008.

Regulatory Setting
Many biological resources in California are protected and/or regulated by a variety of laws and policies administered by federal, state, and/or local agencies. The following is an overview of the key agencies, regulations, and policies relevant to the Los Vaqueros Reservoir Expansion Project.

Federal – Special-Status Species

U.S. Fish and Wildlife Service


Federal Endangered Species Act

FESA Section 7 and Section 10. Under FESA, the Secretary of the Interior and the Secretary of Commerce have joint authority to list a species as threatened or endangered (16 USC 1533[c]). Two federal agencies oversee FESA: USFWS has jurisdiction over plants, wildlife, and resident fish, and the National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NMFS) has jurisdiction over anadromous fish and marine fish and mammals (addressed in Section 4.3, Delta Fisheries and Aquatic Resources). FESA Section 7 mandates that all federal agencies consult with USFWS and NMFS to ensure that federal agency actions do not jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat for listed species (see the discussion below under Critical Habitat). FESA prohibits the unauthorized “take”1 of any fish or wildlife species listed as threatened or endangered, including the destruction of habitat that could hinder species recovery.

FESA Section 10 requires the issuance of an incidental take permit before any public or private action may be taken that would harm, harass, injure, kill, capture, collect, or otherwise hurt any individual of an endangered or threatened species. The permit requires preparation and implementation of a habitat conservation plan that provides specific measures to avoid, offset, or minimize impacts on endangered or threatened species.

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1 “Take” is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct.
Pursuant to the requirements of FESA, a federal agency reviewing a proposed project within its jurisdiction must determine whether any federally listed threatened or endangered species could be present in the project area, and whether the project action would have a potentially significant effect on such species. In addition, the agency is required to determine whether the project action is likely to jeopardize the continued existence of any species proposed to be listed under FESA, or result in the destruction or adverse modification of critical habitat proposed to be designated for such species (16 USC 1536[3], [4]). Species proposed to be listed and critical habitat proposed for designation are those for which formal proposals have been submitted for agency review; species proposed for listing are distinct from candidate species. Candidate species are those for which USFWS has sufficient biological information to support a proposal to list as endangered or threatened, but a formal proposal has not been made. Candidate species receive “special attention” from federal agencies during environmental review, although they are not protected otherwise under FESA.

USFWS issued three separate Biological Opinions (BOs) to address the effects of the existing Los Vaqueros Reservoir on the San Joaquin kit fox and bald eagle (issued September 3, 1993), California red-legged frog and Alameda whipsnake (issued November 8, 1996), and the longhorn fairy shrimp and vernal pool fairy shrimp (Conference Opinion issued in 1995 and adopted as BO in 1995).

**Critical Habitat.** USFWS designates critical habitat for listed species under FESA. Critical habitat designations are specific areas within a geographic region that are occupied by a species and determined to be critical to its survival in accordance with FESA. Federal entities issuing permits or acting as a lead agency must show that their actions do not negatively affect the critical habitat to the extent that it impedes the recovery of the species. Portions of the Transfer-Bethany Pipeline are within designated critical habitat for vernal pool fairy shrimp (*Branchinecta lynchi*) and Contra Costa goldfields (*Lasthenia conjugens*). Within designated critical habitat, USFWS protects habitat that provides the primary constituent elements (PCEs) for survival of the listed species. PCEs are the physical and biological functions considered essential to species conservation that require special management considerations or protection. Critical habitat for listed fish is considered separately in Section 4.3, Delta Fisheries and Aquatic Resources.

PCEs for vernal pool fairy shrimp are those habitat components that are essential for the primary biological needs of foraging, sheltering, reproduction, and dispersal (USFWS, 2005a). These PCEs generally coincide with the presence of vernal pools and their associated upland habitat.

The PCEs for Contra Costa goldfields include seasonal wetland habitat (e.g., vernal pools, swales, and other ephemeral wetlands) that provide soil moisture and the specific aquatic environment for plant growth, reproduction, and dispersal, and the associated watershed(s) and hydrologic features that maintain suitable periods of pool inundation, water quality, and soil moisture for Contra Costa goldfields germination, growth, reproduction, and dispersal (USFWS, 2005a).

**Protection of Nesting Birds – Migratory Bird Treaty Act**

MBTA (16 USC 703, Supp. 1, 1989) prohibits the killing, possessing, or trading of migratory birds, bird parts, eggs, and nests, except in accordance with regulations prescribed by the
Secretary of the Interior. The MBTA prohibits direct and indirect acts, though harassment and habitat modification are not included unless they result in direct loss of birds, eggs, or nests. The list of birds covered by MBTA essentially includes all native birds.

**Bald Eagle Protection Act**
Under the Bald Eagle Protection Act, it is illegal to import, export, take (which includes molest or disturb), sell, purchase, or barter any bald eagle or golden eagle or part thereof.

**Fish and Wildlife Coordination Act**
The Fish and Wildlife Coordination Act (16 USC 661–667e, March 10, 1934, as amended 1946, 1958, 1978, and 1995) requires federal agencies to consult with USFWS, NMFS, and the California Department of Fish and Game (CDFG) before they undertake or approve projects that control or modify surface water. The consultation is intended to prevent the loss of or damage to fish and wildlife in connection with water projects and to develop and improve these resources. Compliance with this act is incorporated into a project’s National Environmental Policy Act (NEPA) process. For the current project, the U.S. Bureau of Reclamation (Reclamation) is consulting with USFWS and other agencies to fulfill the requirements of the Fish and Wildlife Coordination Act.

**State – Special-Status Species**

**California Department of Fish and Game**
The CDFG administers a number of laws and programs designed to protect fish and wildlife resources, as discussed below.

**California Endangered Species Act**
The California Endangered Species Act (CESA) (Fish and Game Code Section 2050 et seq.) generally parallels the main provisions of the FESA. CDFG administers the listing and authorizes the “take” of endangered and threatened species under CESA. CDFG may allow a take of such a species through its issuance of permits pursuant to Fish and Game Code Section 2081, except for designated “fully protected” species (see subsection below). Unlike its federal counterpart, CESA protections apply to candidate species that have been petitioned for listing.

**Fully Protected Species – Fish and Game Code Sections 3511, 4700, 5050, and 5515**
Fully protected species may not be taken or possessed at any time, and no licenses or permits may be issued for their take, except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock. Many fully protected species have also been listed as threatened or endangered species under the more recent endangered species laws and regulations; however, because the original statutes have not been repealed or amended, the legal protection of “no take” is still applicable.

**Protection of Nesting Birds – Fish and Game Code Sections 3503 and 3513**
Section 3503.5 states that it “unlawful to take, possess, or destroy the nests or eggs of any such bird of prey (i.e., species in the orders falconiformes and strigiformes) except as otherwise
provided by this code or any other regulation adopted hereto.” Section 3513 states that it is also unlawful to take or possess any migratory non-game bird (or part of such migratory non-game bird) as designated in the MBTA. Disturbance that causes nest abandonment and/or reproductive failure is considered a take by CDFG. This statute does not provide for the issuance of an incidental take permit.

Species of Special Concern
CDFG maintains lists for candidate-endangered species and candidate-threatened species. California candidate species are afforded the same level of protection as listed species. California also designates species of special concern, which are species of limited distribution, declining populations, diminishing habitat, or unusual scientific, recreational, or educational value. These species do not have the same legal protection as listed species or fully protected species, but may be added to official lists in the future. CDFG intends the species of special concern list to be a management tool for consideration in future land use decisions.

Native Plant Protection Act
California Fish and Game Code Section 1900–1913, also known as the Native Plant Protection Act, is intended to preserve, protect, and enhance endangered or rare native plants in California. The act directs CDFG to establish criteria for determining what native plants are rare or endangered. Under Section 1901, a species is endangered when its prospects for survival and reproduction are in immediate jeopardy from one or more causes. A species is rare when, although not threatened with immediate extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens. The act also directs the California Fish and Game Commission to adopt regulations governing the taking, possessing, propagation, or sale of any endangered or rare native plant.

Vascular plants identified as rare or endangered by the California Native Plant Society (CNPS) (Skinner and Pavlik, 1994), but which may have no designated status or protection under federal or state endangered species legislation, are defined as follows:

- **List 1A**: Plants presumed extinct
- **List 1B**: Plants rare, threatened, or endangered in California and elsewhere
- **List 2**: Plants rare, threatened, or endangered in California, but more numerous elsewhere
- **List 3**: Plants about which more information is needed (a review list)
- **List 4**: Plants of limited distribution (a watch list)

In general, plants appearing on CNPS Lists 1A, 1B, or 2 are considered to meet the criteria of endangered, rare, or threatened under the California Environmental Quality Act (CEQA) Guidelines Section 15380. Additionally, plants identified on CNPS Lists 1A, 1B, or 2 meet the definition of Section 1901, Chapter 10 (Native Plant Protection Act) and Sections 2062 and 2067 (CESA) of the California Fish and Game Code as rare or endangered species.
Federal – Wetlands

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) administers Section 404 of the Clean Water Act (CWA). Section 404 regulates activities in wetlands and “other waters of the United States.” Wetlands are a subset of “waters of the United States” that are defined in the Code of Federal Regulations (CFR) (33 CFR 328.3[a]; 40 CFR 230.3[s]) as:

1. All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide.

2. All interstate waters including interstate wetlands. (Wetlands are defined by the federal government [33 CFR 328.3(b), 1991] as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances support, a prevalence of vegetation typically adapted for life in saturated soil conditions.)

3. All other waters—such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds—the use, degradation, or destruction of which could affect interstate or foreign commerce. This includes any waters with the following current or potential uses:
   - That are or could be used by interstate or foreign travelers for recreational or other purposes,
   - From which fish or shellfish are or could be taken and sold in interstate or foreign commerce, or
   - That are used or could be used for industrial purposes by industries in interstate commerce.

4. All impoundments of waters otherwise defined as waters of the United States under the definition.

5. Tributaries of waters identified in paragraphs (1) through (4).

6. Territorial seas.

7. Wetlands next to waters identified in paragraphs (1) through (6).

8. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area’s status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding the Clean Water Act jurisdiction remains with the U. S. Environmental Protection Agency (328.3[a][8] added 58 CFR 45035, August 25, 1993).

State – Wetlands

Policies and Regulations

CDFG regulates activities that would interfere with the natural flow of, or substantially alter, the channel, bed, or bank of a lake, river, or stream. The regulatory definition of a stream is a body of
water that flows at least periodically or intermittently through a bed or channel having banks, and supports wildlife, fish, or other aquatic life. These activities are regulated under California Fish and Game Code Section 1602. Requirements to protect the integrity of biological resources and water quality are often conditions of Streambed Alteration Agreements. Requirements may include avoidance or minimization of the use of heavy equipment, limitations on work periods to avoid impacts on wildlife and fishery resources, and measures to restore degraded sites or compensate for permanent habitat losses.

**CALFED Species and Habitat Planning Guidance**

**CALFED Multi-Species Conservation Strategy**

The CALFED Multi-Species Conservation Strategy (MSCS) is a programmatic document developed in 2000 for the CALFED Bay-Delta Program (CALFED) to comply with FESA, CESA, and California’s Natural Community Conservation Planning Act. The MSCS provides a comprehensive planning strategy for the conservation of plants, fish, and wildlife that may be affected by elements of the CALFED Bay-Delta Program, such as the Ecosystem Restoration Program, the Environmental Water Account, Conveyance and Storage.

**CALFED Natural Community Conservation Plan**

The CALFED Natural Community Conservation Plan (NCCP) was approved in June 2000, and an NCCP permit was issued in September 2004 for the Environmental Water Account. The program is a cooperative effort administered by CDFG as one of 25 contributing state and federal agencies to improve the quality and reliability of California’s water supplies while restoring the Bay-Delta ecosystem to protect habitats and species.

**Local**

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

The East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (East County HCP/NCCP), approved in July 2007, provides a comprehensive framework for species and ecosystem conservation, short- and long-term local land use decision-making in a rapidly urbanizing region, and environmental permitting processes. The East County HCP/NCCP was developed by the East Contra Costa County Habitat Conservation Plan Association (East County HCPA), which was formed in 2000. The East County HCPA was a Joint Powers Authority consisting of seven entities: Contra Costa County, CCWD, East Bay Regional Park District, and the Cities of Brentwood, Clayton, Oakley, and Pittsburg. Upon approval of the HCP/NCCP and issuance of the permits, the HCPA ceased to exist, and implementation of the plan is now managed by the East Contra Costa County Habitat Conservancy, which is composed of Contra Costa County and the cities of Brentwood, Clayton, Oakley, and Pittsburg. The Los Vaqueros Reservoir Expansion Project is not a covered action under the East County HCP/NCCP, but the Los Vaqueros Watershed is within the biological inventory area of the HCP/NCCP.
The East County HCP/NCCP’s primary goals are to prevent or minimize incidental take of covered species under FESA and CESA from reasonable and expected urban growth and to provide adequate safeguards for the protection of covered species in the plan area. As part of the East County HCP/NCCP approval, the East Contra Costa County Habitat Conservancy received permits from USFWS and CDFG authorizing incidental take. Participating local jurisdictions will be able to authorize development and other activities without proposing additional mitigation or conservation measures for covered species. The take permits are for 30 years, which coincides with the timeline applicable to all assessments made in the plan.

The East County HCP/NCCP’s geographic scope or “inventory area,” the area covered in the impact evaluation and by the conservation plan, is in eastern Contra Costa County (see Figure 4.6-1). The inventory area covers about one-third (173,680 acres) of the 435,000-acre Contra Costa County and consists primarily of unincorporated agricultural and public lands. A combination of political, ecological, and hydrologic (watershed and shoreline) boundaries defines the inventory area.

A list of 154 special-status species with known or potential occurrence in the inventory area was evaluated for coverage under the East County HCP/NCCP. A subset of 26 species (both listed and not listed) meeting certain regulatory and ecological criteria is covered by the East County HCP/NCCP. Two of the covered species, the San Joaquin kit fox (*Vulpes macrotis mutica*) and Alameda whipsnake (*Masticophis flagellum ruddocki*), have greatly influenced landscape-level planning because of their life histories and/or specialized habitat requirements. Some of the other species covered include the California red-legged frog (*Rana draytonii*), giant garter snake (*Thamnophis gigas*), western burrowing owl (*Athene cunicularia*), four species of fairy shrimp, and 10 plant species. The plan includes conservation measures for all 26 species, whether or not they are currently listed. Five major terrestrial vegetation communities meeting the East County HCP/NCCP requirement to identify communities that provide ecological functions and values that could be affected by plan implementation are covered.

Covered communities include grassland, chaparral/scrub, oak woodland, riparian woodland/scrub, and irrigated agriculture. The grassland community is most abundant and serves as a core vegetation community in the inventory area. The plan area includes critical habitat for several covered species and provides ecological linkages between other covered species and their habitats.

The East County HCP/NCCP’s conservation strategy is based on principles of conservation biology, including an ecosystem approach that highlights creation of a new preserve system to provide ecological landscape connectivity. Conservation actions to be conducted under the East County HCP/NCCP include land acquisition, habitat enhancement and restoration, species population enhancement, and impact avoidance and minimization. Preserves would be managed to achieve the biological goals and objectives contained in the East County HCP/NCCP for each covered species and vegetation community.

Conservation measures are proposed at three spatial scales: landscape, vegetation community, and species. The strategy is also designed to meet the regulatory requirements of both state and federal regulations governing sensitive biological resources.
Figure 4.6-1
Regional Conservation Planning and Public Lands

SOURCE: USGS, 1993 (base map); Contra Costa County, 2005; East County HCPA, 2006; and ESA, 2007

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Contra Costa County General Plan

The Contra Costa County General Plan designates 41 areas as Significant Ecological Resource Areas. These areas are defined by the presence of rare, threatened, or endangered species; unique natural areas; or wetlands and marshes. Of the designated areas, six are within the regional project vicinity. Near the watershed are areas of native bunchgrass (Area 26); historical eagle nests, outstanding natural features, and habitat for several sensitive plant and animal species (Area 30); and alkali meadows and northern claypan vernal pools (Area 29, within Area 30). Additionally, north of the watershed (Area 28) is habitat for a wide variety of sensitive plant and animal species in the Marsh Creek riparian corridor and reservoir. Byron Hot Springs (Area 38), which contains alkali mudflats, salt marshes, and hot mineral springs, is just east of the Transfer-Bethany Pipeline, north of Armstrong Road.

The Contra Costa County General Plan contains numerous goals, policies, and programs related to protection of wildlife and vegetation. Goals and policies include: protection of rare, threatened, and endangered species (8-D); preservation and restoration of the San Francisco Bay–Delta estuary and adjacent lands supporting fisheries and waterfowl (8-F); identification and protection of seasonal wetlands in grassland areas (8-27); preservation of natural woodlands (8-12); and retention of existing vegetation and wildlife habitat areas in large open areas sufficient to support wildlife populations (8-15). A list of goals and policies related to biological resources is included in Appendix E.

Alameda County General Plan (East County Area Plan)

The Alameda County General Plan (East County Area Plan) contains goals and policies relevant to preserving or protecting trees and wildlife habitat. Provisions include preservation of areas known to support special-status species (Policy 125), protection of riparian and seasonal wetlands (Policy 126), and preservation of East County oak woodland plant communities and riparian woodland habitat (Alameda County, 2002). Specific goals and policies in the East County Area Plan are provided in Appendix E.

Environmental Setting

Regional Setting

The project alternatives are in southeastern Contra Costa County and northeastern Alameda County in the California Floristic Province. This area is characterized by a Mediterranean climate with steep to rolling hills of the eastern Diablo Range and a portion of the southern Delta. Vegetation is a mosaic of annual grasslands, croplands, oak woodlands, upland scrubs, wetland communities, and riparian scrubs and forests.

Within the Los Vaqueros Watershed, valley/foothill woodland and forest, annual grasslands, upland scrub, aquatic, and riparian vegetation dominate the landscape. The Central Valley portions of the pipeline corridors are characterized by annual grasslands, upland croplands, intermittent streams, and seasonal wetlands. Current principal land uses vary within the watershed and along pipeline corridors, and include agriculture, pasture lands, cattle grazing, and open space. Project activities are principally in undeveloped areas that support minimal or low-density residential, commercial, and industrial development.
**Existing Environment**

**Vegetation Communities and Wildlife Habitats**

Vegetation communities are assemblages of plant species that occur together in the same area, which are defined by species composition and relative abundance. To characterize plant communities in the Los Vaqueros Watershed, vegetation series were mapped using the Sawyer and Keeler-Wolf (1995) classification system (see **Figure 4.6-2**). Outside the watershed, the evaluation was based on the broader habitat classification system developed by the East County HCP/NCCP.

To establish a consistent approach to vegetation and habitat classification throughout the study area, and to be compatible with CALFED Bay-Delta Program guidelines for habitat mitigation, plant community and habitat descriptions are presented for in-watershed and out-of-watershed areas using CALFED NCCP habitat types. The CALFED Ecosystem Restoration Program Plan uses this classification system for evaluating ecosystems, broad habitats, and ecological functions within the CALFED planning area.

The CALFED NCCP habitat types generally correlate with vegetation communities in the Sawyer and Keeler-Wolf system (see **Table 4.6-1**). These communities also share a relationship with wildlife habitat types, which were classified and evaluated using CDFG’s *Guide to Wildlife Habitats of California* (Mayer and Laudenslayer, 1988). The CALFED NCCP habitat types are used as the overarching classification system for this analysis as described in Table 4.6-1.

**Grassland.** Grassland habitat includes perennial and alkali grassland habitat and the much more extensive annual grassland vegetation. Grasslands are the most common habitat type in the study area, both within and outside the watershed, and often occur in association with Valley/foothill woodland habitat. Annual grasslands are often found in areas that have been grazed or were once croplands. This is the most common habitat type in the Los Vaqueros Watershed and on pipeline corridors, with habitat quality varying from disturbed ruderal vegetation to relatively intact communities.

The most common species in this community include wild oats (*Avena fatua*), ripgut brome (*Bromus diandrus*), yellow star-thistle (*Centaurea solstitialis*), fescue (*Vulpia myuros*), filaree (*Erodium* sp.), and mustards (*Brassica* and *Hirschfeldia* spp.). Native wildflowers may also occur within the annual grassland community and may include fiddleneck (*Amsinckia* spp.), lupine (*Lupinus* spp.), popcorn flower (*Plagiobothrys* spp.), and California poppy (*Eschscholzia californica*), among many others. Grasslands in the project study area support a substantial number of non-native invasive plant species including yellow star-thistle and medusahead (*Taeniatherum caput-medusae*).

Many wildlife species use both native and non-native grasslands for refugia, nesting, and as foraging habitat. Reptiles commonly found in grasslands include the western fence lizard (*Sceloporus occidentalis*), common garter snake (*Thamnophis sirtalis*), and western rattlesnake (*Crotalus viridis*). Most project area grasslands also provide habitat for the California tiger salamander (*Ambystoma californiense*). Bird species that nest in project area grasslands include northern harrier (*Circus cyaneus*), burrowing owl, western meadowlark (*Sturnella neglecta*), and California horned lark (*Eremophila alpestris*).
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Figure 4.6-2
Distribution of Plant Communities and Habitats in the Los Vaqueros Watershed

SOURCE: USGS, 1993 (base map); ESRI, 2006; CCWD, 2007; CCC, 2007; MWH, 2007; and ESA, 2008
TABLE 4.6-1
PLANT COMMUNITIES AND HABITATS IN THE LOS VAQUEROS WATERSHED

<table>
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<tr>
<th>NCCP Habitat Types</th>
<th>Acres</th>
<th>Sawyer and Keeler-Wolf Vegetation Series</th>
<th>Acres</th>
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<td></td>
<td></td>
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<tr>
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\(^a\) Classified as “Sensitive” by CDFG and/or CALFED.

\(^b\) Includes alkali wetlands and meadow habitats.


Birds that commonly forage in grasslands include the turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and white-tailed kite (*Elanus leucurus*). Mammal species known to inhabit study area grasslands include the western harvest mouse (*Reithrodontomys megalotis*), California ground squirrel (*Spermophilus beecheyi*), black-tailed jackrabbit (*Lepus californicus*), and black-tailed deer (*Odocoileus hemionus columbianus*). San Joaquin kit fox are sparsely distributed throughout the region in annual grasslands habitat, and also use adjacent oak woodlands, riparian woodlands, and other habitats.

**Valley/Foothill Riparian.** Valley/foothill riparian habitat consists of all successional stages of woody vegetation, commonly dominated by willow (*Salix spp.*), Fremont cottonwood (*Populus fremontii*), valley oak (*Quercus lobata*), or sycamore (*Plantanus racemosa*), within the active and
historical floodplains of low-gradient reaches of streams and rivers generally below a 300-foot elevation. Valley/foothill riparian habitat includes riparian and riverine aquatic habitat.

Arroyo willow habitat occurs in Kellogg Creek, both within the watershed and in downstream reaches. This habitat type is characterized by riparian scrub dominated by arroyo willow (Salix lasiolepis) and red willow (Salix laevigata). Associated species found within this habitat include California black walnut (Juglans californica), California buckeye (Aesculus californica), Mexican elderberry (Sambucus mexicana), and Himalayan blackberry (Rubus discolor). This vegetation community often occurs in association with valley oak habitat along Kellogg Creek’s banks.

Riparian areas provide important nesting and foraging habitat for many amphibians, reptiles, birds, and mammals including special-status species such as the California red-legged frog. These areas are also movement and dispersal corridors, allowing animals to move from upland and other aquatic habitats within the watershed.

A riparian forest/riparian scrub vegetation community occurs along Kellogg Creek’s banks. This vegetation community is characterized by riparian vegetation dominated by sycamore, valley oak, mulefat (Baccharis salicifolia), and willow. This vegetation type often transitions into the arroyo willow habitat when gravel bars develop and willows are able to establish.

**Upland Scrub.** Upland scrub habitat includes habitat areas dominated by shrubs characteristic of chaparral and coastal scrub communities. East- and north-facing steep, rocky slopes and ridge tops in the western portion of the Los Vaqueros Watershed are characterized by chaparral and, to a lesser degree, coastal scrub. Chaparral is dominated by evergreen shrubs, generally with little or no herbaceous ground cover or overstory trees. Chamise (Adenostoma fasciculatum) is usually the dominant or codominant species throughout chaparral, although in some areas it is absent. Gaps in the dense shrub community support grassland species, both from the annual grassland series and the purple needlegrass series. Coastal scrub occurs on arid south-facing slopes in the watershed. This community is typically composed of California sagebrush (Artemesia californica) and chamise as codominants, with lesser amounts of black sage (Salvia mellifera), poison oak, bush monkey flower (Mimulus aurantiacus), and California buckwheat (Eriogonum fasciculatum var. foliolosum). Canopy openings support annual grassland species. Upland scrub habitat is limited to the upper Los Vaqueros Watershed, west of Los Vaqueros Dam.

Characteristic wildlife species in chaparral and scrub habitat include the western fence lizard, common garter snake, common kingsnake (Lampropeltis getulus), western rattlesnake, California quail (Callipepla californica), western scrub-jay (Aphelocoma californica), bushtit (Psaltriparus minutus), California thrasher (Toxostoma redivivum), spotted towhee (Pipilo maculatus), sage sparrow (Amphispiza belli), California mouse (Peromyscus californicus), deer mouse (Peromyscus maniculatus), and the introduced wild pig (Sus scrofa). Alameda whipsnakes are typically found in chaparral and coastal scrub habitat, though their home ranges also include adjacent grassland, oak woodlands, and other habitats (USFWS, 2002; CDFG, 2005).

**Valley/Foothill Woodland and Forest.** Valley/foothill woodland and forest habitat consists of non-riparian forest, woodland, and savannas. These vegetation communities commonly occur in
the study area in the Los Vaqueros Watershed and are dominated by blue oak (*Quercus douglasii*), valley oak, interior live oak (*Q. wislizeni*), and coast live oak (*Q. agrifolia*).

Woodland habitat is typically found on higher slopes and ridgetops where soils are well-drained. The dominant tree species in the watershed is blue oak. Other tree species typically found in this habitat type include California bay laurel (*Umbellularia californica*) and California buckeye. This habitat occurs in patches throughout the watershed and is most prevalent in areas west and north of the Los Vaqueros Reservoir.

Woodland and forest habitat provide food, cover, and nesting sites for many wildlife species. Bird species typically found in oak woodlands include the acorn woodpecker (*Melanerpes formicivorus*), bushtit, oak titmouse (*Baeolophus inornatus*), and hermit thrush (*Catharus guttatus*). Cavity nesting birds and many raptor species rely on oaks and oak woodlands for nesting sites.

**Upland Cropland.** Upland cropland habitat consists of agricultural lands farmed for feed and grain, produce, orchard crops, and other crops that are not seasonally flooded. This habitat type occurs in and near major portions of the Delta-Transfer Pipeline alignment and Power Options 1 and 2. Croplands on the pipeline alignment are closely situated to grassland habitats and freshwater permanent emergent habitat. Thus, many of the wildlife species associated with these habitats also forage in croplands. Common species occurring in cropland include small mammals such as voles and mice, and birds such as mourning doves, pheasants, and several blackbird species. Croplands are important foraging habitats for numerous raptors including the red-tailed hawk, northern harrier, and white-tailed kite.

Upland cropland habitat includes farmed land along the Delta-Transfer Pipeline and in the vicinity of the Old River Intake and Pump Station and the new Delta Intake and Pump Station. Crops in the study area include tomatoes, alfalfa, corn, and hay, and orchards of English walnut and persimmon.

**Lacustrine.** Lacustrine habitats are permanent water bodies that do not support emergent vegetation and are not subject to tidal exchange; they, include lakes, ponds, oxbows, gravel pits, and flooded islands. Los Vaqueros Reservoir is an engineered feature characterized by lacustrine habitat. Aquatic habitat quality for fish is low to moderate due to poorly developed cover vegetation along the shoreline. The reservoir has been stocked with more than 300,000 game fish, principally rainbow trout (*Oncorhynchus mykiss*) and Kokanee (sockeye) salmon (*Oncorhynchus nerka*). Other fish introduced to the reservoir include striped bass (*Morone saxatilis*), largemouth bass (*Micropterus salmoides*), sunfish (*Lepomis sp.*), brown bullhead catfish (*Ameiurus nebulosus*), and channel catfish (*Ictalurus punctatus*), among others.

Waterfowl species that forage, overwinter, rear their brood, or otherwise rely on lacustrine habitat in the reservoir at some time during the year include the Canada goose (*Branta canadensis*), wood duck (*Aix sponsa*), gadwall (*Anas strepera*), American wigeon (*A. americana*), mallard (*A. platyrhinchos*), northern shoveler (*A. clypeata*), northern pintail (*A. acuta*), green-winged teal (*A. carolinensis*), canvasback (*Aythya valisineria*), redhead, ring-necked duck (*A. collaris*), greater scaup (*A. marila*), lesser scaup (*A. affinis*), bufflehead (*Bucephala albeola*), common
goldeneye (*B. clangula*), hooded merganser (*Lophodytes cucullatus*), common merganser (*Mergus merganser americanus*), and ruddy duck (*Oxyura jamaicensis*) (CCWD file data). Other birds at or near the reservoir include grebes, sandpipers, pelicans, cormorants, egrets, herons, and gulls. Birds use the reservoir throughout the year, although unlike water bodies in Southern California, the site is not used as a long-term stopover.

**Riverine (Tidal Perennial Aquatic).** Old River is the principal deepwater aquatic feature that supplies water to the Los Vaqueros Reservoir. Though tidally influenced, this wide delta channel principally supports freshwater habitat. Its banks support a mélange of natural earthen berm, armored riprap, and sporadic growth of emergent vegetation. Dense riparian vegetation is nonexistent in the project study area. However, portions of the project study area on the fringes of Old River support extensive emergent vegetation such as cattails. Common wildlife species typically found in this habitat include the pacific chorus frog (*Pseudacris regilla*), western toad (*Bufo boreas*), garter snake, and bird species adapted to riparian environments such as the snowy egret (*Egretta thula*), great blue heron (*Ardea herodias*), and black phoebe (*Sayornis nigricans*). A discussion of fisheries resources in Old River can be found in Section 4.3, Delta Fisheries and Aquatic Resources.

**Nontidal Freshwater Permanent Emergent.** Nontidal freshwater permanent emergent habitat consists of permanent (natural and managed) wetlands, including meadows dominated by wetland plant species that are not tolerant of saline or brackish conditions. Within this habitat type, bulrush (*Scirpus spp.*) and cattails (*Typha latifolia* and *T. angustifolia*) are found in areas that are wet year-round, such as ponds (natural or engineered); shallow edges of lakes, pools, and stock ponds; and in seasonal drainages and riparian areas such as Kellogg Creek. Such habitat occurs intermittently in drainage ditches in agricultural areas and several natural drainages along pipeline routes. This habitat type occurs in stream channels and created ponds in the Los Vaqueros Watershed, in agricultural channels near the Delta Intake Facilities, and in natural and created channels along pipeline corridors and transmission line corridors associated with Power Options 1 and 2.

Wildlife species that typically use this habitat type include the pacific chorus frog, California red-legged frog, and western pond turtle (*Actinemys marmorata*). Common bird species using this habitat include the marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), and red-winged blackbird (*Agelaius phoeniceus*). Mammals may use these aquatic features for water or forage.

**Natural Seasonal Wetland.** Natural seasonal wetland habitat consists of vernal pools, alkali marshes, alkali sink scrub habitats, and other unmanaged seasonal wetlands with natural hydrologic conditions. They are dominated by herbaceous vegetation and pond surface water or maintain saturated soils at the ground surface for enough of the year to support facultative or obligate wetland plant species.

Vernal pools are seasonal wetlands that occur in grasslands. These wetlands are typically found in slight depressions that form over bedrock or hardpan soils that allow water to pool during winter and spring rains. Vernal pools typically have an impervious layer of silicate-based hardpan underlying
them that prevents water from percolating into the soil. Although vernal pools occur naturally in grassland and woodland settings, they may also occupy disturbed locations where the underlying soil conditions remain intact. Vernal pools are considered unique habitat and often support species that are endemic to vernal pools or other shallow pools in that particular geographic region. Vernal pool communities have been greatly reduced due to conversion of grasslands to agriculture or urban development and are identified as a Significant Natural Community by CDFG. Many vernal pool-dependent plants and animal species receive special-status protection by the state or federal government. Plant species common to vernal pools include coyote thistle (*Eryngium* spp.), dwarf bleenosperma (*Blehnosperma nanum*), spike rush (*Eleocharis* spp.), and California hairgrass (*Deschampsia danthonioides*). Vernal pool conditions occur in a portion of the Transfer-Bethany Pipeline alignment on Armstrong Road near Byron Airport, and in areas farther south along this alignment.

Vernal pool communities provide habitat for wildlife species that are adapted to seasonal ponding and drying, including the California tiger salamander and vernal pool fairy shrimp.

Alkali marshes and alkali sink scrub habitat occur within some grasslands in limited locations and favor a unique set of characteristics. Alkali meadows form in shallow basins where soils are particularly alkaline relative to surrounding grasslands and where soil types are seasonally inundated and slow to drain. Commonly dominated by saltgrass (*Distichlis spicata*), saline emergent habitat also supports hare barely (*Hordeum marinum*), alkali heath (*Frankenia salina*), toad rush (*Juncus bufonius*) and, less frequently, iodine bush (*Allenrolfea occidentalis*). Plant species found in alkali meadows are typically adapted to soil conditions and seasonal ponding. Common or ruderal species that may occur within the alkali meadow community include curly dock (*Rumex crispus*) and Italian ryegrass (*Lolium multiflorum*), with heartscale (*Atriplex cordulata*) and San Joaquin saltbush (*Atriplex joaquiniana*) as less common special-status species.

Alkali meadows support wildlife species that are adapted to seasonal ponding and may include the California tiger salamander and vernal pool fairy shrimp.

Within the watershed, alkali marsh habitat occurs within and next to the 15-acre stockpile/staging area and north of the 160-thousand acre-feet (TAF) borrow area. Such habitat also occurs outside the watershed, in isolated pockets on the Delta-Transfer Pipeline south of State Route (SR) 4, and on the Transfer-Bethany Pipeline alignment near Byron Airport.

**NCCP Plant Communities and Habitats in the Los Vaqueros Watershed**

The Los Vaqueros Watershed encompasses 18,535 acres of land and 20 distinct Sawyer-Keeler-Wolf vegetation series (ESA, 2004; Sawyer and Keeler-Wolf, 1995) (see Table 4.6-1). Plant communities are further detailed in Appendix D. The watershed includes 1,489 acres of open-water habitat. The distribution and extent of plant communities in the watershed and corresponding CALFED NCCP habitat types are presented on **Figure 4.6-3** and in Table 4.6-1.

Grasslands, including annual and native grasslands, are the most abundant NCCP habitat types in the watershed and cover more than 12,819 acres (see Table 4.6-1). Valley/foothill woodland and forest is the next most abundant habitat type, which mostly includes oak woodlands; blue oak
Figure 4.6-3 Distribution of NCCP Habitats in the Los Vaqueros Watershed

SOURCE: USGS, 1993 (base map); ESRI, 2006; CCWD, 2007; CCC, 2007; MWH, 2007; and ESA, 2008

Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110
is the most common oak woodland type within the watershed. The 3,009 acres of valley/foothill woodland forest habitat are distributed primarily in the western and northern regions of the watershed. Upland scrub habitats are most abundant on the western side of the watershed and cover 775 acres. Natural seasonal wetland habitat covers roughly 300 acres of habitat and includes just over 295 acres of alkali wetlands. Alkali wetlands are dominated by a variety of salt-tolerant plants such as saltgrass, bulrush, cattails (*Typha* spp.), and seepweed (*Suaeda moquinii*). Natural seasonal wetland habitat is also represented by vernal pools in the eastern portion of the watershed.

Nontidal freshwater and saline emergent habitat covers nearly 55 acres of land in the watershed, and occurs mostly in created wetlands and stock ponds. Valley/foothill riparian habitat is predominantly represented by valley oak woodlands, though some areas are dominated by Fremont cottonwood. This habitat type covers nearly 69 acres and primarily occurs along Kellogg Creek both north and south of the reservoir as well as along Adobe Creek in the northwestern part of the watershed.

**NCCP Plant Communities For Facilities Outside of the CCWD Watershed**

**Delta Intake Facilities.** The CALFED NCCP habitat types that occur in the new Delta Intake and Pump Station study area along Old River are upland cropland and tidal freshwater emergent (see Figure 4.6-4 and Table 4.6-2).

<table>
<thead>
<tr>
<th>TABLE 4.6-2</th>
<th>NCCP PLANT COMMUNITIES/HABITATS TYPES FOR FACILITIES OUTSIDE OF THE WATERSHED (ACRES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCCP Plant Community/Habitat Type</td>
<td>Pipelines</td>
</tr>
<tr>
<td></td>
<td>Delta-Transfer</td>
</tr>
<tr>
<td>Tidal Freshwater Emergent</td>
<td>0</td>
</tr>
<tr>
<td>Natural Seasonal Wetland</td>
<td>0</td>
</tr>
<tr>
<td>Valley/Foothill Riparian</td>
<td>0</td>
</tr>
<tr>
<td>Grassland</td>
<td>39.38</td>
</tr>
<tr>
<td>Valley/Foothill Woodland and Forest</td>
<td>0.13</td>
</tr>
<tr>
<td>Upland Cropland</td>
<td>113.53</td>
</tr>
</tbody>
</table>

LV = Los Vaqueros

Distribution of NCCP Habitats in the Vicinity of the Delta Intake Facilities, Delta-Transfer Pipeline, and the Expanded Transfer Facility

Los Vaqueros Reservoir Expansion Project EIS/EIR . 2011110

SOURCE: USGS, 1993 (base map); and ESA, 2008
4.6 Biological Resources

Pipelines. The Delta-Transfer Pipeline, Transfer-LV Pipeline, and Transfer-Bethany Pipeline study areas support the following CALFED NCCP habitat types (see Figures 4.6-4 and 4.6-5, and Table 4.6-2): natural seasonal wetland, valley/foothill riparian, grassland, valley/foothill woodland and forest, and upland cropland.

Transfer Facility. Grasslands are the only vegetation type in the Expanded Transfer Facility study area.

Power Supply Infrastructure. Under Power Option 1, a new substation would be placed within annual grasslands that are surrounded by irrigated pasturelands and upland cropland. From the new substation, the powerline alignment to the Delta Intakes principally traverses upland cropland and annual grassland habitat types and contains natural seasonal wetland habitat in and around irrigation ditches that would be spanned by the powerlines. Under Power Option 2, the Western powerline alignment would traverse within the 230-kilovolt transmission line corridor from the Tracy substation to supply power to the Delta Intakes. These facilities would traverse irrigated pasturelands, upland cropland, and annual grasslands. Pacific Gas and Electric (PG&E) facilities, including distribution lines and a substation, are entirely within annual grasslands.

Special-Status Species
A comprehensive list of special-status plant and wildlife species in the project region was compiled to assess the likelihood of species occurrence and potential project impacts to these species. Sources used in preparing this list include the California Natural Diversity Data Base (CNNDDB) (CDFG, 2008), ongoing consultation with CDFG and USFWS, CNPS’ literature and an electronic database, scoping letters, biological literature of the region, ongoing CCWD wetland and wildlife monitoring programs, and focused field surveys (see Table 4.6-3 for survey dates and findings).

The regional species list includes 54 special-status plants and 38 special-status wildlife species with the potential to occur in the regional project vicinity (see Appendix D, Table D-1). For each project component, each species’ habitat requirements were compared to available habitats in the study area. This review of habitat requirements, focused botanical and wildlife survey findings, and database records identified 7 special-status plant species and 36 special-status wildlife species that could potentially occur or are known to occur in study areas that could be affected by the project. These species are presented in Table 4.6-4.

Several species were eliminated from further consideration because typical habitat required by the species does not occur in the project area, and/or focused surveys provided further evidence that it would be unlikely for the species to occur in the area of potential project impact (e.g., big tarplant [Blepharizonia plumosa], caper-fruited tropidocarpum [Tropidocarpum capparideum], diamond-petaled California poppy [Eschscholzia rhombipetala], rayless ragwort [Senecio aphanactis] and recurved larkspur [Delphinium recurvatum]). See Appendix D for the complete list of special-status species considered and information about species eliminated from further consideration.

The study area is defined as a 500-foot-wide corridor for pipelines and a 150-foot-wide area around the perimeter of facilities.
Figure 4.6-5
Distribution of NCCP Habitats along the Transfer-LV and Transfer-Bethany Pipelines

SOURCE: USGS, 1993; and ESA, 2008
### TABLE 4.6-3
SURVEY DATES FOR SPECIAL-STATUS PLANTS

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Survey Dates</th>
<th>Findings</th>
<th>Pending Surveys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir Inundation Footprint and Dam and other In-Watershed Facilities&lt;sup&gt;1&lt;/sup&gt;</td>
<td>June 3, 4, 10, 11, 14, and 15, 2004; March 21, April 11-14, April 27-28, May 11 and 31, June 2, June 8-9, 21-23, August 17-18, October 25, 2005; May 22, 2007; April 18, 2008</td>
<td>San Joaquin spear-scale: present in watershed outside project area Brewer's dwarf-flax: Portions of one population occur in the reservoir inundation footprint; absent from other project facilities</td>
<td>None</td>
</tr>
<tr>
<td>Delta Intakes and Transfer Station</td>
<td>May 22, 2007; April 23, 2008</td>
<td>Rose-mallow: populations occur outside the Expanded Old River Intake project area 1.400 feet to the north, 1,100 feet to the south, and 600 feet away across Old River. A colony consisting of fewer than 15 plants occurs at the site for the new Delta Intake and Pump Station Mason's lilaeopsis: Populations occur 5,000 feet north and 1,200 feet south of Expanded Old River Intake and Pump Station; greater than 700 feet from the new Delta Intake and Pump Station site.</td>
<td>None</td>
</tr>
<tr>
<td>Delta-Transfer Pipeline</td>
<td>May 22, 2007</td>
<td>Negative for rare plants</td>
<td>None</td>
</tr>
<tr>
<td>Transfer-LV Pipeline</td>
<td>March 21, April 11-14, April 27-29, May 11 and 31, June 2, June 8-9, 21-23, August 17-18, October 25, 2005; May 22, 2007; April 18, 2008</td>
<td>Negative for rare plants</td>
<td>None</td>
</tr>
<tr>
<td>Transfer-Bethany Pipeline</td>
<td>April 15, 17, and 18, 2008</td>
<td>San Joaquin spear-scale: present in portions of alignment Limited follow-up surveys for heartscale and brittlescale at a few distinct locations</td>
<td>None</td>
</tr>
<tr>
<td>Power Option 1</td>
<td>April 22 and 23, 2008</td>
<td>San Joaquin spear-scale present in Power Option 1 Western substation siting zone—facilities will be sited to avoid plants Limited follow-up surveys for heartscale and brittlescale at a few distinct locations</td>
<td>None</td>
</tr>
<tr>
<td>Power Option 2</td>
<td>April 22 and 23, 2008</td>
<td>San Joaquin spear-scale present in Western powerline alignment and would be spanned by powerlines Limited follow-up surveys for heartscale and brittlescale at a few distinct locations</td>
<td>None</td>
</tr>
<tr>
<td>160-TAF Borrow Area (Alternative 4)&lt;sup&gt;2&lt;/sup&gt;</td>
<td>April 23, 2008; August 5, 2008</td>
<td>Negative for rare plants</td>
<td>None</td>
</tr>
</tbody>
</table>

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<sup>1</sup> Other in-watershed facilities under Alternatives 1, 2, and 3 include the Marina Complex, marina access road, borrow area, picnic areas, trailhead parking, westside access road, eastside trail, stockpile area, and parking areas. Facilities under Alternative 4 include similar facilities and the 160-TAF borrow area.

<sup>2</sup> TAF = thousand acre-foot

SOURCE: ESA, 2004; 2007b; 2008
### TABLE 4.6-4

**SPECIAL-STATUS SPECIES KNOWN TO OCCUR OR WITH POTENTIAL TO BE AFFECTED BY THE PROJECT**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Listing Status USFWS/CDFG/ CNPS/ CALFED</th>
<th>General Habitat</th>
<th>Potential for Species Occurrence in the Project Area</th>
<th>Period of Identification or Blooming Period</th>
<th>NCCP Habitat Associations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Invertebrates</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Branchinecta longiantenna</td>
<td>Longhorn fairy shrimp</td>
<td>FE/-/--/m</td>
<td>Rock outcrop pools or other areas capable of ponding water seasonally</td>
<td>Absent. No longhorn fairy shrimp habitat or local occurrences occur within 500 feet of project facilities. This species would not be affected by project activities.</td>
<td>Year-round (eggs in dry season, adult shrimp in winter)</td>
<td>NSW (Rock outcrop pools)</td>
</tr>
<tr>
<td>Branchinecta lynchi</td>
<td>Vernal pool fairy shrimp</td>
<td>FT/-/--/m</td>
<td>Vernal pools or other areas capable of ponding water seasonally</td>
<td>Present. Occupied and potential habitat identified in the Transfer-Bethany Pipeline alignment; possibly in a single pool on the Delta-Transfer Pipeline (ESA, 2008a). In-watershed occurrences are outside the project area.</td>
<td>Year-round (eggs in dry season, adult shrimp in winter)</td>
<td>NSW</td>
</tr>
<tr>
<td>Desmocerus californicus dimorphus</td>
<td>Valley elderberry longhorn beetle</td>
<td>FT/-/--/R</td>
<td>Riparian habitat, levee and riprap lined stream banks containing its host plant, elderberry shrubs (Sambucus spp.)</td>
<td>Present (in-watershed). Elderberry shrubs in the watershed show larval exit holes. Elderberry shrubs are not otherwise present in the project area.</td>
<td>Year round, emergence March-June</td>
<td>VFR, Gr, US, VFW, UC</td>
</tr>
<tr>
<td><strong>FEDERAL OR STATE SPECIES OF SPECIAL CONCERN</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Branchinecta mesovallensis</td>
<td>Midvalley fairy shrimp</td>
<td>--/-/--/m</td>
<td>Vernal pools or other areas capable of ponding water seasonally</td>
<td>Low-Moderate. Low likelihood of occurrence in created pools on the Transfer-Bethany Pipeline.</td>
<td>Year-round (eggs in dry season, adult shrimp in winter)</td>
<td>NSW</td>
</tr>
<tr>
<td>Hygrotus curvipes</td>
<td>Curved-foot hygrotus diving beetle</td>
<td>FSC/-/--/--</td>
<td>Drainages, seeps, and wet areas; standing water in ponds or ephemeral pools</td>
<td>Present. Present in stock ponds and drainages in the watershed and likely in intermittent drainages and swales on pipeline routes.</td>
<td>Spring months</td>
<td>NSW</td>
</tr>
<tr>
<td><strong>Amphibians</strong></td>
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<td></td>
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<tr>
<td><strong>FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambystoma californiense</td>
<td>California tiger salamander</td>
<td>FT/CSC/-/--</td>
<td>Wintering sites occur in grasslands occupied by burrowing mammals; breed in ponds and vernal pools</td>
<td>Present. Four breeding sites in the watershed study area; uplands throughout watershed provide aestivation habitat; upland habitat present on the Delta-Transfer Pipeline, Transfer-LV Pipeline, and Transfer-Bethany Pipeline.</td>
<td>Winter rains and March-April</td>
<td>NFE, NSW, VFR, Gr, VFW</td>
</tr>
</tbody>
</table>

3 Status codes defined at end of chart.
### TABLE 4.6-4 (Continued)
**SPECIAL-STATUS SPECIES KNOWN TO OCCUR OR WITH POTENTIAL TO BE AFFECTED BY THE PROJECT**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
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<th>Potential for Species Occurrence in the Project Area</th>
<th>Period of Identification or Blooming Period</th>
<th>NCCP Habitat Associations</th>
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<tbody>
<tr>
<td><strong>Amphibians (cont.)</strong></td>
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<tr>
<td></td>
<td><strong>FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES (cont.)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rana draytonii</td>
<td>California red-legged frog</td>
<td>FT/CSC/---/m</td>
<td>Breed in stock ponds, pools, and slow-moving streams</td>
<td>Present. Eleven breeding sites in the watershed study area, with more potential breeding habitat. Frogs may be encountered in upland habitat on the Delta-Transfer Pipeline, Transfer-LV Pipeline, and Transfer-Bethany Pipeline.</td>
<td>Year-round</td>
<td>NFE, VFR, Gr, VFW</td>
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<tr>
<td><strong>Reptiles</strong></td>
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<td></td>
<td><strong>FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES</strong></td>
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<tr>
<td>Masticophis laterals euryxanthus</td>
<td>Alameda whipsnake (= Alameda striped racer)</td>
<td>FT/ST/---/m</td>
<td>Coastal ranges, in chaparral and riparian habitat and adjacent grasslands.</td>
<td>Present. Occupied scrub habitat present in the watershed study area. Snakes are expected to use grasslands, woodlands, and other nonscrub habitat in the watershed.</td>
<td>March-November</td>
<td>VFR, Gr, US, VFW</td>
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<td></td>
<td><strong>FEDERAL OR STATE SPECIES OF SPECIAL CONCERN</strong></td>
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<tr>
<td>Actinemys marmorata</td>
<td>Western pond turtle</td>
<td>--/CSC/---/m</td>
<td>Lakes, ponds, reservoirs, and slow-moving streams and rivers, primarily in foothills and lowlands</td>
<td>Present. Present in stock ponds and drainages in the watershed and likely in intermittent drainages and swales on pipeline routes.</td>
<td>Year-round</td>
<td>La, NFE, VFR, Gr, US, VFW</td>
</tr>
<tr>
<td>Masticophis flagellum ruddocki</td>
<td>San Joaquin whipsnake (= coachwhip)</td>
<td>--/CSC/---/m</td>
<td>Open grassland, pasture, and alkali scrub</td>
<td>Present. Presumed present in grasslands in the watershed, on pipeline routes, and at the Expanded Transfer Facility.</td>
<td>March-October</td>
<td>Gr, US, VFW</td>
</tr>
<tr>
<td>Phrynosoma coronatum</td>
<td>Coast horned lizard</td>
<td>--/CSC/---/--</td>
<td>Valley woodland, coniferous forest, riparian, and grassland habitats; most commonly in sandy washes with scattered shrubs</td>
<td>High. Suitable habitat may be present on the Transfer-Bethany Pipeline, south of Armstrong Road, and parts of the Power Option 2 Western powerline alignment.</td>
<td>Year-round</td>
<td>VFR, US, VFW</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
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<tr>
<td>Buteo swainsoni</td>
<td>Swainson’s hawk</td>
<td>--/ST/--</td>
<td>Nests in large trees, often near water, open grasslands, or agricultural lands</td>
<td>Moderate. Historic nesting site noted at one location, 300 feet from the Delta-Transfer Pipeline; low likelihood of nesting on other pipeline alignments or in the watershed</td>
<td>March-July</td>
<td>VFR, Gr, UC, VFW, NSW, US</td>
</tr>
<tr>
<td>Haliaeetus leucocephalus</td>
<td>Bald eagle</td>
<td>BEPA-FD/SE-CFP/---/m</td>
<td>Winter foraging at lakes and along major rivers</td>
<td>Low (nesting). The watershed supports active wintering and foraging habitat, but no active nesting</td>
<td>Year-round</td>
<td>La, NFE, VFR, VFW</td>
</tr>
</tbody>
</table>
### TABLE 4.6-4 (Continued)
SPECIAL-STATUS SPECIES KNOWN TO OCCUR OR WITH POTENTIAL TO BE AFFECTED BY THE PROJECT

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<tr>
<th>Scientific Name</th>
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<th>NCCP Habitat Associations</th>
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</tr>
<tr>
<td>Accipiter cooperi</td>
<td>Cooper's hawk</td>
<td>--/CSC/--/m</td>
<td>Nests in dense oak and riparian woodland</td>
<td>High. Expected to nest in wooded portions of the watershed and on the Transfer-LV Pipeline and Transfer-Bethany Pipeline.</td>
<td>Year-round</td>
<td>VFR, VFW</td>
</tr>
<tr>
<td>Accipiter striatus</td>
<td>Sharp-shinned hawk</td>
<td>--/CSC/--/--</td>
<td>Nests in dense stands of conifers and riparian habitats</td>
<td>High. Expected to nest in wooded portions of the watershed and on the Transfer-LV Pipeline and Transfer-Bethany Pipeline.</td>
<td>Year-round</td>
<td>VFR, VFW</td>
</tr>
<tr>
<td>Agelaius tricolor</td>
<td>Tricolored blackbird</td>
<td>--/CSC/--/m</td>
<td>Nests in freshwater marshes with dense stands of cattails or bulrushes, occasionally in willows, thistles, mustard, blackberry brambles, and dense shrubs and grains</td>
<td>Moderate. Nesting sites available at disjunctive locations in the watershed and on pipeline routes.</td>
<td>Year-round; spring (nesting)</td>
<td>NFE, VFR, Gr, UC</td>
</tr>
<tr>
<td>Aquila chrysaetos</td>
<td>Golden eagle</td>
<td>BEPA/CSC--/CFP/--/m</td>
<td>Nests in canyons and large trees in open habitats</td>
<td>Present. Six nesting occurrences reported from the watershed; one in the study area. Potential to occur on Transfer-LV Pipeline</td>
<td>Year-round</td>
<td>Gr, US, VFW</td>
</tr>
<tr>
<td>Athene cunicularia hypugea</td>
<td>Western burrowing owl</td>
<td>--/CSC/--/m</td>
<td>Nests and forages in low-growing grasslands with burrowing mammals</td>
<td>High. Nesting habitat present in grasslands in the watershed, on the fringes of agricultural lands and in grasslands on the Delta-Transfer Pipeline, Transfer-LV Pipeline, Transfer-Bethany Pipeline, and at the Expanded Transfer Facility.</td>
<td>Year-round</td>
<td>Gr, UC</td>
</tr>
<tr>
<td>Asio flammeus</td>
<td>Short-eared owl</td>
<td>--/CSC/--/--</td>
<td>Inhabits open fields, meadows, and marshes</td>
<td>High. Nesting habitat present in grasslands in the watershed and on the Delta-Transfer Pipeline, Transfer-LV Pipeline, and Transfer-Bethany Pipeline.</td>
<td>Year-round</td>
<td>Gr, UC</td>
</tr>
<tr>
<td>Circus cyaneus</td>
<td>Northern harrier</td>
<td>--/CSC/--/m</td>
<td>Ground nester found in grasslands and in adjacent wetlands or upland/wetland areas</td>
<td>Moderate. Though nests have not been identified, low likelihood of nesting near marshland habitat in the watershed; may nest in open grasslands on pipeline routes and at Expanded Transfer Facility.</td>
<td>Year-round</td>
<td>NFE, NSW, Gr, UC</td>
</tr>
<tr>
<td>Elanus leucurus</td>
<td>White-tailed (= black shouldered) kite</td>
<td>--/CFP/--/m</td>
<td>Nests in shrubs and trees next to grasslands, forages over grasslands and agricultural lands</td>
<td>High. Nesting habitat available in watershed. May nest in the few wooded areas in and near the Delta-Transfer Pipeline, Transfer-LV Pipeline, and Transfer-Bethany Pipeline.</td>
<td>Year-round</td>
<td>VFR, Gr, UC</td>
</tr>
<tr>
<td>Eremophila alpestris actica</td>
<td>California horned lark</td>
<td>--/CSC/--/--</td>
<td>Nests and forages in short-grass prairie, mountain meadow, coastal plain, fallow fields, and alkali flats</td>
<td>High. May nest in short annual grasslands in the watershed and on all pipeline segments.</td>
<td>Year-round</td>
<td>Gr, UC</td>
</tr>
</tbody>
</table>
### TABLE 4.6-4 (Continued)
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<td><strong>Birds (cont.)</strong></td>
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<tr>
<td>Falco mexicanus</td>
<td>Prairie falcon</td>
<td>--/CSC/--/--</td>
<td>Inhabits hills, canyons, and mountainous areas with grasslands; nests on cliffs or abandoned raptor nests</td>
<td>Low. Nesting not expected in study area</td>
<td>March-August</td>
<td>Gr, US</td>
</tr>
<tr>
<td>Lanius ludovicianus</td>
<td>Loggerhead shrike</td>
<td>--/CSC/--/--</td>
<td>Scrub, open woodlands, and grasslands</td>
<td>Moderate. May nest in brush and scrub in the watershed and on all pipeline segments.</td>
<td>Year-round</td>
<td>VFR, Gr, US, VFW</td>
</tr>
<tr>
<td>Pandion haliaetus</td>
<td>Osprey</td>
<td>--/CSC/--/--</td>
<td>Large bodies of water that produce fish and are surrounded by forested habitats</td>
<td>High. Nesting may occur in watershed. Less likely elsewhere in project area.</td>
<td>Year-round</td>
<td>VFR, Gr, UC</td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
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<tr>
<td>Vulpes macrotis mutica</td>
<td>San Joaquin kit fox</td>
<td>FE/ST/--/--/m</td>
<td>Annual grasslands or grassy open areas with shrubs, loose-textured soils for burrows and prey base</td>
<td>Presumed present. High quality habitat is present in the watershed and portions of each pipeline alignment. Low to moderate quality habitat is present at the Delta Intake Facilities and Expanded Transfer Facility.</td>
<td>Year-round</td>
<td>Gr, US, VFW</td>
</tr>
<tr>
<td><strong>FEDERAL OR STATE SPECIES OF SPECIAL CONCERN</strong></td>
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<tr>
<td>Antrozous pallidus</td>
<td>Pallid Bat</td>
<td>--/CSC/--/--</td>
<td>Roosts in buildings, caves, or cracks in rocks</td>
<td>Low-Moderate. Habitat may be available in large trees in the watershed study area, but large rock crevices are generally lacking.</td>
<td>February-August</td>
<td>La, VFR, Gr, US, VFW</td>
</tr>
<tr>
<td>Corynorhinus townsendii</td>
<td>Townsend’s big-eared bat</td>
<td>--/CSC/--/--</td>
<td>Oak and coniferous woodland and arid grasslands. Roosts in caves, buildings, etc.</td>
<td>Low. Habitat may be available in large trees in the watershed study area, but large rock crevices are generally lacking.</td>
<td>April-October</td>
<td>La, VFR, Gr, US, VFW</td>
</tr>
<tr>
<td>Eumops perotis californicus</td>
<td>Greater western mastiff bat</td>
<td>FSC/CSC/--/--</td>
<td>Breeds in rugged, rocky canyons and forages in a variety of habitats</td>
<td>Low. Habitat may be available in large trees in the watershed study area, but large rock crevices are generally lacking.</td>
<td>February-August</td>
<td>La, VFR, Gr, US, VFW</td>
</tr>
<tr>
<td>Myotis ciliolabrum</td>
<td>Small-footed myotis bat</td>
<td>FSC/--/--/--</td>
<td>Forages over grasslands and roosts in caves and rock crevices</td>
<td>Low. Habitat may be available in large trees in the watershed study area, but large rock crevices are generally lacking.</td>
<td>February-August</td>
<td>La, VFR, Gr, US, VFW</td>
</tr>
<tr>
<td>Myotis evotis</td>
<td>Long-eared myotis bat</td>
<td>FSC/--/--/--</td>
<td>Inhabits woodlands and forests up to an approximately 8,200-foot elevation; generally not in Central Valley.</td>
<td>Low. Habitat may be available in large trees and rocks in the watershed study area, but large rock crevices are generally lacking.</td>
<td>February-August</td>
<td>La, VFR, Gr, US, VFW</td>
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<tr>
<td><em>Myotis thysanodes</em></td>
<td>Fringed myotis bat</td>
<td>FSC/-/-/--</td>
<td>Inhabits a variety of habitats including pinyon-juniper woodland, valley-foothill hardwood, hardwood-conifer forests, and desert scrub; generally not in Central Valley</td>
<td>Low. Rock crevice habitat is generally lacking in the watershed study area.</td>
<td>February-August</td>
<td>La, VFR, Gr, US, VFW</td>
</tr>
<tr>
<td><em>Myotis volans</em></td>
<td>Long-legged myotis bat</td>
<td>FSC/-/-/--</td>
<td>Inhabits forests and woodland habitats, primarily oak and juniper woodlands</td>
<td>Low. Habitat may be available in large trees in the watershed study area, but large rock crevices are generally lacking.</td>
<td>February-August</td>
<td>La, VFR, Gr, US, VFW</td>
</tr>
<tr>
<td><em>Myotis yumanensis</em></td>
<td>Yuma myotis bat</td>
<td>FSC/CSC/-/-</td>
<td>Open forests and woodlands below 8,000-foot elevation in close association with water bodies</td>
<td>Low. Rock crevice habitat is generally lacking in the watershed study area.</td>
<td>February-August</td>
<td>La, VFR, Gr, US, VFW</td>
</tr>
<tr>
<td><em>Perognathus inornatus inornatus</em></td>
<td>San Joaquin pocket mouse</td>
<td>-/-CSC/-/-</td>
<td>Annual grasslands, saltbush scrub, and oak savannah habitats; usually found in areas with friable soils</td>
<td>Moderate. Bush seepweed (iodine bush) habitat on the Western alignment and grasslands with friable soils on the Transfer-Bethany Pipeline and at the Western substation site provide the best available habitat. Non-native annual grasslands throughout the project area provide potential, though lesser quality habitat.</td>
<td>Year-round</td>
<td>Gr</td>
</tr>
<tr>
<td><em>Taxidea taxus</em></td>
<td>American badger</td>
<td>-/-CSC/-/-</td>
<td>Dry, open grasslands</td>
<td>Present. High quality habitat is present in the watershed and portions of each pipeline alignment; low to moderate quality habitat is present at the Delta Intake Facilities and Expanded Transfer Facility.</td>
<td>Year-round</td>
<td>Gr</td>
</tr>
</tbody>
</table>

### Plants

| **FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES** | | | | | | |
| *Lasthenia conjugens* | Contra Costa goldfields | FEI/-/1B/m | Vernal pools and seasonal wetlands in grassland and woodland | Absent based on focused botanical survey findings. Transfer-Bethany Pipeline traverses critical habitat for this species. | March-June | NSW |

| **FEDERAL OR STATE SPECIES OF SPECIAL CONCERN** | | | | | | |
| *Atriplex cordulata* | Heartscale | --/--/1B/-- | Chenopod scrub and sandy, alkaline grasslands | Low-Moderate potential at a few distinct sites on the Transfer-Bethany Pipeline alignment; final survey delayed by site access. | April-October | NSW, Gr |
### TABLE 4.6-4 (Continued)
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<tr>
<td>Atriplex depressa</td>
<td>Brittlestem</td>
<td>--/-1B/m</td>
<td>Alkaline or clay grasslands, chenopod scrub, and playas; occasionally in riparian areas, marshes, or vernal pools</td>
<td>Present in LV watershed. Moderate potential at a few distinct sites on the Transfer-Bethany Pipeline alignment; final survey delayed by site access.</td>
<td>May-October</td>
<td>NSW, Gr</td>
</tr>
<tr>
<td>Atriplex joaquiniana</td>
<td>San Joaquin spearscale</td>
<td>--/-1B/m</td>
<td>Alkaline seasonal wetlands and sinks in grasslands, chenopod scrub, and alkali meadows</td>
<td>Present outside staging area in the watershed, on portions of the Transfer-Bethany Pipeline alignment, Power Option 1 (i.e., new substation siting zone); and spanned by powerlines under Power Option 2.</td>
<td>April-October</td>
<td>NSW, Gr</td>
</tr>
<tr>
<td><strong>Hesperolinon breweri</strong></td>
<td>Brewer’s dwarf-flax (=western flax)</td>
<td>--/-1B/m</td>
<td>Transition between annual grassland and mixed chaparral; also near woodlands</td>
<td>Present. Portions of one population occur in the watershed study area; absent from other project facilities.</td>
<td>May-July</td>
<td>Gr, US, VFW</td>
</tr>
<tr>
<td><strong>Hibiscus lasiocarpos</strong></td>
<td>Rose-mallow</td>
<td>--/-2/m</td>
<td>Tidally influenced coastal and freshwater marsh</td>
<td>Present (New Intake). A population occurs at the site for the new Delta Intake and Pump Station</td>
<td>June-September</td>
<td>NFE</td>
</tr>
<tr>
<td><strong>Lilaeopsis masonii</strong></td>
<td>Mason’s lilaeopsis</td>
<td>--/SR/1B</td>
<td>Tidally influenced coastal and freshwater marsh</td>
<td>Present (off site). Near Delta Intake Facilities, 5,000 feet north and 1,200 feet south of Expanded Old River Intake and Pump Station, greater than 700 feet from the new Delta Intake and Pump Station site</td>
<td>April-November</td>
<td>TFE</td>
</tr>
</tbody>
</table>

**STATUS CODES:**

Federal (U.S. Fish and Wildlife Service):
- **BEPA** = Bald Eagle Protection Act
- **FE** = Listed as Endangered by the Federal Government
- **FT** = Listed as Threatened by the Federal Government
- **FPE** = Proposed for Listing as Endangered
- **FPT** = Proposed for Listing as Threatened
- **FSC** = Former Federal Species of Special Concern (list is no longer maintained)
- **FD** = Federal Delisted Species
- **FC** = Candidate for Federal listing

State (California Department of Fish and Game):
- **SE** = Listed as Endangered by the State of California
- **ST** = Listed as Threatened by the State of California
- **SR** = Listed as Rare by the State of California (plants only)
- **CSC** = California species of special concern
- **CFP** = California fully protected species

California Native Plant Society: List 1A = Plants believed extinct; List 1B = Plants rare, threatened, or endangered in California and elsewhere; List 2 = Plants rare, threatened, or endangered in California but more common elsewhere; List 3 = Plants about which more information is needed; List 4 = Plants of limited distribution

SOURCES: CNPS, 2008; CDFG, 2008; ESA, 2008a; ESA, 2008b
The following data sources advised the analysis:

- The CNDDB for plants, wildlife, and plant communities, including species occurrence data and Geographic Information System (GIS) map coverage (CDFG, 2008), and review of available data in the CNDDB files associated with discussion with CNDDB staff
- CALFED documents including the Ecosystem Restoration Plan Program, NCCP prepared by California resources agencies, including CDFG, and the MSCS (CALFED, 2000) prepared by federal resource agencies, including USFWS and NMFS
- Environmental regulatory documents (Stage II EIS/EIR, BOs), technical reports, state and federal regulatory permits, and mitigation plans prepared for the existing Los Vaqueros Reservoir project
- East County HCP/NCCP documents and in-house GIS data
- Mt. Diablo State Park HCP draft documents
- San Joaquin County Multi-Species Habitat Conservation and Open Space Plan, including maps
- Coordination with CCWD watershed biologists
- USFWS Endangered Species Program staff, Fish and Wildlife Coordination Act staff, and Endangered Species Recovery Program staff
- Focused botanical and wildlife surveys of the 160-TAF borrow area, Transfer-Bethany Pipeline, Delta intake facility, Power Option 1 and 2 (i.e., new substation siting zone, PG&E substation and powerline alignments) by ESA biologists in 2008 (ESA, 2008b)
- Large branchiopod surveys within the watershed and along project pipeline alignments (ESA, 2008a)
- Focused botanical and wildlife surveys of the Delta-Transfer Pipeline, Transfer-LV Pipeline, Expanded Transfer Facility site, and Transfer-Bethany Pipeline in 2007 (ESA, 2007)
- Focused botanical surveys in the Los Vaqueros Watershed conducted in 2005 and 2006 that characterized the 500-TAF inundation level, which is no longer being considered as an option under the project, plus a 1,000 foot buffer. This survey area was large enough to adequately characterize the potential for all proposed recreational facilities in the Los Vaqueros Watershed to support special status plants.
- CDFG regional staff, CALFED staff, and state species experts

Comprehensive protocol-level special-status plant surveys have been completed for nearly all project facilities. After comprehensive botanical surveys in spring 2008 that analyzed all out-of-watershed facilities, a limited number of discrete sites in the Transfer-Bethany Pipeline alignment and Power Option 1 (i.e., within new Western substation siting zone) were identified that provide habitat for non-listed late-blooming *Atriplex* species, specifically brittlescale and heartscale, and require follow-up surveys, as identified in Tables 4.6-3 and 4.6-4.
The special-status plant and wildlife species identified in Table 4.6-4 are more fully described in the species accounts provided below. The following special status plant species occur in the local project area, but are absent from the project study area based on focused botanical survey findings. The regional distribution of these species is presented in maps used in this section, but because they are absent from the study area, or surveys identified that impacts would not occur, they are not further described in this section. See Appendix D for descriptions of these species.

- Mt. Diablo manzanita 
  \textit{(Arctostaphylos auriculata)}
- Contra Costa manzanita 
  \textit{(Arctostaphylos manzanita ssp. laevigata)}
- Alkali milk-vetch 
  \textit{(Astragalus tener var. tener)}
- Big tarplant \textit{(Blepharizonia plumosa)}
- Congdon’s tarplant 
  \textit{(Centromadia parryi ssp. congdonii)}
- Recurved larkspur 
  \textit{(Delphinium recurvatum)}
- Round-leaved filaree 
  \textit{(Erodium macrophyllum)}
- Diamond-petaled California poppy 
  \textit{(Eschscholzia rhombipetala)}
- Diablo helianthella 
  \textit{(Helianthella castanea)}
- Rayless ragwort \textit{(Senecio aphanactis)}
- Caper-fruit tropidocarpum 
  \textit{(Tropidocarpum capparideum)}
- Mt. Diablo fairy lantern 
  \textit{(Calochortus pulchellus)}

A brief description of those special-status plant and wildlife species that have been identified, or are expected to occur in the project area based on local sightings and/or available habitat (but that may not necessarily be impacted by the project), is provided below.

\textbf{Invertebrates}

\textbf{Federal or State Threatened and Endangered Species}

\textbf{Longhorn fairy shrimp \textit{(Branchinecta longiantenna)}.} Longhorn fairy shrimp are described from several vernal pool habitat types in California, ranging from small, clear, sandstone outcrop pools to large, turbid, alkaline, grassland pools; however, in Alameda and Contra Costa Counties this species is only described from a small series of sandstone outcrop pools.

Two local longhorn fairy shrimp records were identified in the East County HCP/NCCP: Souza Ranch and Vasco Caves Regional Preserve. Both of these locations are shallow sandstone-rock-outcrop vernal pools within non-native grasslands (East County HCPA, 2006).

Potential low-quality habitat for this species may be present in 16 vernal pools on the Transfer-Bethany Pipeline alignment in the project study area, which includes the Los Vaqueros Reservoir Expansion, Delta Intake Facilities, Conveyance Facilities, Recreation Facilities, and Power Supply Infrastructure (ESA, 2008a). Of these, pools with the highest quality were observed to support vernal pool fairy shrimp \textit{(Branchinecta lynchii)}, which rarely co-occur with longhorn fairy shrimp (USFWS, 2005a). Because longhorn fairy shrimp are locally restricted to rock outcrop pools, and because this habitat is absent from the study area, this species is not expected in the project area.
**Vernal Pool Fairy Shrimp (Branchinecta lynchi).** Vernal pool fairy shrimp occur in a variety of vernal pool habitats, ranging from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools. Although the species has been collected from large vernal pools, it tends to occur in smaller ones. Most commonly they occur in grass- or mud-bottomed swales, or basalt flow depression pools in unplowed grasslands (USFWS, 2005a).

Two vernal pool fairy shrimp occurrences are documented in the Los Vaqueros Watershed (CDFG, 2008; ESA, 2008a), both outside the Reservoir Expansion and Recreation Facilities study areas. Before construction of Los Vaqueros Reservoir, Jones and Stokes (1990) found vernal pool fairy shrimp in a rock outcrop vernal pool roughly 0.20 mile east and upslope from the inundation boundary (**Figure 4.6-6**). Habitat for vernal pool fairy shrimp at the Vasco Caves vernal pool complex is 0.90 mile east of the inundation boundary (Figure 4.6-6).

Potential habitat for vernal pool fairy shrimp is present in a single swale on the Delta-Transfer Pipeline. During dip netting surveys in 2008, this species was identified in 4 vernal pools in the Transfer-Bethany Pipeline alignment, with another 12 pools deemed to provide suitable habitat (ESA, 2008a). To the degree possible, habitat for branchiopods was characterized beyond the 500-foot pipeline study area boundaries. An extant population occurs in the local vicinity of Byron Airport within vernal pool fairy shrimp Critical Habitat Unit 19B (CDFG, 2008; USFWS, 2006).

During biological surveys in spring 2008, high-quality vernal pool habitat was noted in multiple pools in the Western powerline alignment, just north of Reclamation’s Skinner Delta Fish Protective Facility. This area would be spanned under Power Option 2 (with no activities in this area under Power Option 1). Habitat is absent from the new Western substation siting zone associated with Power Option 1 and the PG&E facilities associated with Power Option 2.

**Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus).** Valley elderberry longhorn beetles are unique insects that spend most of their lives within the stems of elderberry (Sambucus spp.) trees and shrubs. Often, the only indicators of their presence are the distinctive small oval openings that are left after larvae pupate and emerge (UC Berkeley, 2005; USFWS, 1999c). Valley elderberry longhorn beetles use elderberry shrubs with a stem diameter of at least 1-inch (at ground level) as a host plant (USFWS, 1999c). Elderberry shrubs typically grow in association with other riparian species, but they also occur as isolated shrubs in upland areas (UC Berkeley, 2005).

The nearest documented valley elderberry longhorn beetle to the inundation boundary is about 17 miles east of the existing dam (CDFG, 2008). The Los Vaqueros Watershed is on the westernmost fringe of this species’ range, as valley elderberry longhorn beetles are not described from the inner or outer Coast Ranges. The geographic dividing line between the valley elderberry longhorn beetle and coastal longhorn beetle subspecies is not well defined.

Valley elderberry longhorn beetle activity was found in several portions of the proposed inundation area and in the Inlet/Outlet Pipelines study area. The 275-TAF inundation zone supports 45 elderberry shrubs (six with six beetle exit holes) with two additional shrubs within 100 feet of
Listed Vernal Pool Branchiopod Locations in Project Study Area

SOURCE: USGS, 1993 (base map); Jones & Stokes Associates, 1992; and ESA, 2007
the inundation zone (ESA, 2005). The Inlet/Outlet Pipelines study area supports 10 elderberry shrubs with no identified exit holes (ESA, 2005).

Elderberry shrubs do not occur near the Delta Intake Facilities, Conveyance Facilities (except in the Inlet/Outlet Pipelines construction area), Recreation Facilities, or Power Options 1 and 2.

**Federal or State Species of Special Concern**

**Midvalley Fairy Shrimp** (*Branchinecta mesovallensis*). Midvalley fairy shrimp occur in small, shallow, short-lived vernal pools, vernal swales, and artificial ephemeral wetland habitats. They are found in Sacramento, Solano, Yolo, Contra Costa, San Joaquin, Madera, Merced, and Fresno Counties. Of 65 reported occurrences, the three records from Contra Costa County occur about 5.5 miles northeast, 5.5 miles east, and 3.8 miles east of the inundation boundary (CDFG, 2008). Midvalley fairy shrimp populations have not been found the Los Vaqueros Reservoir vicinity.

Based on its known range, this species is considered unlikely in the Los Vaqueros Watershed.

Habitat for this species does not occur in the study areas for the Delta Intake Facilities, Power Options 1 and 2, or Expanded Transfer Facility. For Conveyance Facilities, potential habitat was identified in 16 vernal pools on the Transfer-Bethany Pipeline and a single swale on the Delta-Transfer Pipeline. This species was not detected during branchiopod surveys (ESA, 2008a). Midvalley fairy shrimp have not been documented in the vernal pool complex near Byron Airport. Though potentially suitable habitat is available in limited locations, the likelihood of encountering midvalley fairy shrimp in the project area is considered low.

**Curved-foot Hygrotus Diving Beetle** (*Hygrotus curvipes*). Hygrotus beetles are predatory diving beetles in both their adult and larval stages that feed on small aquatic invertebrates (Borror and White, 1970). They occur in stock ponds, irrigation channels, roadside drainages, slow-moving creeks, ponds, and alkali pools.

CDFG (2008) documents 21 extant occurrences of Hygrotus beetles in Contra Costa and Alameda Counties. This aquatic insect occurs in several wetland sites and stock ponds within the Los Vaqueros Watershed, favoring alkaline vernal pools and drying portions of creeks (Hafernik, 1988). In a 1988 survey, individuals were found in stock ponds throughout the Los Vaqueros Watershed, though not in flowing portions of creeks (Hafernik, 1988).

Diving beetle habitat does not occur near the Delta Intake Facilities or Expanded Transfer Facility. Suitable habitat is present in 16 alkali and vernal pools identified in the Transfer-Bethany Pipeline alignment (ESA, 2008a), but not in other pipeline corridors. For Power Supply Option 2, a handful of alkali pools north of the Skinner Delta Fish Protective Facility that provide potential diving beetle habitat would be spanned by powerlines. Habitat is absent from the Western substation site and PG&E facility sites.
Amphibians

Federal or State Threatened and Endangered Species

California Tiger Salamander (*Ambystoma californiense*). California tiger salamanders are principally an upland species found in annual grasslands and in the grassy understory of valley-foothill hardwood habitats in Central and Northern California. They require underground refuges (usually ground squirrel or other small mammal burrows), where they spend the majority of their annual cycle. Between December and February, when seasonal ponds begin to fill, adult California tiger salamanders engage in mass migrations to aquatic sites during a few rainy nights and are explosive breeders (Barry and Shaffer, 1994).

During drought years when ponds do not form, adults may spend the entire year in upland environments, while juveniles may spend 4 to 5 years in their upland burrows before reaching sexual maturity and breeding for the first time (Petranka, 1998; Trenham et al, 2000). Adult tiger salamanders swiftly disperse after breeding and have been documented to migrate up to 129 meters (423 feet) the first night after leaving a breeding pond (Loredo et al., 1996). Adult California tiger salamanders readily aestivate in grasslands near ponds and at great distances from breeding ponds. Adults are known to travel distances greater than 1 kilometer (0.62 mile) from breeding ponds and have been documented at distances of 2 kilometers (1.2 miles) or more (Orloff, 2007). Typical aestivation sites include the burrows of California ground squirrels and valley pocket gophers (*Thomomys bottae*).

California tiger salamanders occur in the foothill grasslands of the Mt. Diablo Range and throughout the Los Vaqueros Watershed. Seven tiger salamander breeding occurrences are known in the project footprint in the Los Vaqueros Watershed (Figure 4.6-7). California tiger salamanders are expected to use grassland and woodland habitat throughout the Los Vaqueros Watershed, including the PG&E substation site under Power Option 2, for aestivation, foraging, and dispersal.

California tiger salamander habitat is not present at the Delta Intake Facilities, Western substation facilities under Power Option 1, or Western powerline alignments under Power Options 1 and 2. Upland aestivation habitat is present at the PG&E substation site under Power Option 2.

The Delta-Transfer Pipeline traverses cultivated and agricultural lands and ruderal areas that do not provide aquatic breeding habitat for the California tiger salamander; however, at least four agricultural impoundments in the eastern portion of the alignment provide potential breeding habitat. Of these, two impoundments occur in close proximity to the Expanded Transfer Facility (the closest of these are 0.15 mile north and south of the alignment, just east of the Expanded Transfer Facility) and another is in a walnut orchard 0.75 mile east of the Expanded Transfer Facility. East of the Expanded Transfer Facility, the Delta-Transfer Pipeline alignment traverses grazed annual grasslands for a distance of 1.2 miles before transitioning into agricultural lands further east. Because of the local impoundments, aestivating California tiger salamanders could be encountered in the 1.2-mile stretch extending east from the Expanded Transfer Facility.

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4 Aestivation is a state of dormancy similar to hibernation that occurs during summer and fall.
Figure 4.6-7
Distribution of California Tiger Salamander Occurrences in the Los Vaqueros Watershed

SOURCE: USGS, 1993 (base map); CNDDDB, 2007; and ESA, 2008
CDFG (2008) documents California tiger salamander populations in portions of the Transfer-LV Pipeline that parallel Walnut Boulevard in the Los Vaqueros Watershed. Within the watershed, this species is expected in moderate to high densities at all times of the year. Breeding habitat is present in slow-moving portions of Kellogg Creek upstream from Walnut Boulevard, but is not generally present at the two stream crossing locations. Breeding habitat is additionally present in at least five created mitigation ponds below Los Vaqueros Dam. Beyond the study area, potential breeding habitat occurs in at least two and possibly more stock ponds within 0.25 mile of the alignment.

Five California tiger salamander populations are noted within 0.25 mile of the Transfer-Bethany Pipeline (CDFG, 2008), and three additional breeding sites were identified during biological surveys in spring 2008 (B. Pittman, pers. obs.). One known breeding site and four potential breeding sites near Armstrong Road are within the immediate project area. In winter 2008, California tiger salamander larvae were also collected from a roadside ditch on the northern portion of Armstrong Road, but this feature dried before larvae could metamorphose (ESA, 2008a). Most of the Transfer-Bethany Pipeline alignment traverses grasslands that may support this species in some capacity (e.g., aestivation, foraging, or migration). Known and potential California tiger salamander breeding sites are present within 0.5 mile of the alignment along Vasco Road, Armstrong Road, and areas further south (CDFG, 2008).

California tiger salamanders are presumed present in low to moderate densities in undisturbed annual grasslands habitat in the Expanded Transfer Facility study area, though breeding habitat is absent from the Expanded Transfer Facility study area.

**California Red-Legged Frog (Rana draytonii).** California red-legged frogs are largely aquatic frogs found at ponds and slow-moving streams with permanent or semipermanent water. This species opportunistically migrates into upland habitats, due to normal dispersal behavior. This species may aestivate in upland environments when aquatic sites are unavailable or environmental conditions are inhospitable. If water is unavailable, they shelter from dehydration in a variety of refuges, including boulders, downed wood, moist leaf litter, and small mammal burrows.

Historically, the California red-legged frog occurred along the coast from the vicinity of Point Reyes National Seashore, Marin County, and inland from Redding, Shasta County, southward to northwestern Baja California, Mexico (Jennings and Hayes, 1994). The majority of California red-legged frog occurrences in the San Francisco Bay Area are from Contra Costa and Alameda Counties.

California red-legged frogs are documented throughout the Los Vaqueros Watershed. The CNDDB reports 96 California red-legged frog occurrences in and near the watershed with breeding habitat at greater than 11 created wetlands or stock ponds in the Los Vaqueros Reservoir Expansion footprint (CDFG, 2008) (Figure 4.6-8). Stock ponds in the watershed support some of the highest densities of California red-legged frog in the region (East County HCPA, 2006). Adult, sub-adult, and juvenile frogs actively disperse through annual grasslands in search of cover and breeding habitat. CCWD actively manages habitat for this species within the watershed, including non-native predator (i.e., American bullfrog, *Lithobates catesbeianus*) exclusion and control.
Figure 4.6-8
Distribution of California Red-Legged Frog Occurrences in the Los Vaqueros Watershed

SOURCE: USGS, 1993 (base map); CNDDB, 2007; and ESA, 2007
The Delta-Transfer Pipeline alignment traverses cultivated and agricultural lands and ruderal areas that do not provide aquatic breeding habitat for the California red-legged frog; however, at least four agricultural impoundments within 1 mile of the alignment, as well as Kellogg Creek, provide potential breeding habitat. Of these, three impoundments occur in close proximity (as close as 0.15 mile) to the Expanded Transfer Facility at the western end of the pipeline alignment. Another impoundment is in a walnut orchard, 0.75 mile east of the Expanded Transfer Facility.

The Delta-Transfer Pipeline parallels within 100 feet a portion of lower Kellogg Creek for about 2.4 miles, which prompted a study of California red-legged frog habitat in this area. Unlike portions of the creek in the Los Vaqueros Watershed, near the Delta-Transfer Pipeline the stream is a fast-flowing, maintained irrigation channel with no backwater areas or off-channel amphibian refugia. Due to its managed condition and rapid, year-round flows, the lower portion of Kellogg Creek does not support California red-legged frog breeding. East of the Expanded Transfer Facility, the alignment traverses grazed annual grasslands for a distance of 1.2 miles before transitioning into agricultural lands further east. Red-legged frogs could be encountered in this area during normal animal movement, but are not expected to inhabit the barren upland portions of the alignment on a sustained basis.

California red-legged frogs can be expected year-round in any aquatic or semiaquatic environments in or near the Transfer-LV Pipeline. These environments include the entirety of Kellogg Creek from the Expanded Transfer Facility to Los Vaqueros Dam, natural and artificial ponds (including the two settling ponds west of the Expanded Transfer Facility), and alkali meadows, seeps, or drainages in the local area. Red-legged frogs are expected to use ephemeral drainages on a seasonal basis during movements, especially after the onset of rain in the fall (Tatarian, 2004). Additionally, adult, sub-adult, and juvenile frogs are expected to migrate intermittently through annual grasslands and other upland habitats.

Breeding habitat is present in slow-moving portions of Kellogg Creek upstream from Walnut Boulevard, but is not generally present at the two crossing locations. Red-legged frog breeding is documented from the five created mitigation ponds just below Los Vaqueros Dam (CCWD, unpublished GIS data). Potential breeding habitat occurs in at least two and possibly more stock ponds within 0.25 mile of the alignment.

At least ten California red-legged frog breeding sites were identified within 0.5 mile of the Transfer-Bethany Pipeline. Occupied sites are documented from both instream impoundments and stock ponds along the alignment. This species generally requires long periods of standing water and is not expected to breed in many of the ephemeral pools along Armstrong Road (but may be otherwise present at these sites). One known breeding site and potential breeding habitat in Brushy Creek are within the Transfer-Bethany Pipeline alignment. Virtually the entire alignment traverses upland habitat that could support this species. Known and potential California red-legged frog breeding sites are present at regular intervals along Vasco Road, Armstrong Road, and areas further south (CDFG, 2008). This species could be encountered during transient migrations through the Expanded Transfer Facility, but is not expected to inhabit the site on a continual basis.
Based on the absence of suitable habitat or sightings, California red-legged frogs are not expected in the study areas for Power Option 1 or 2. Available aquatic habitats on the Western powerline alignment are limited to irrigated agricultural ditches that provide an unpredictable source of water. The PG&E substation site supports upland habitats that are removed from aquatic sites and California red-legged frogs are not expected at this site.

Reptiles

Federal or State Threatened and Endangered Species

Alameda Whipsnake (*Masticophis lateralis euryxanthus*). Alameda whipsnakes are dependent upon open chaparral, sage scrub, and coastal scrub. However, telemetry data indicate that although home ranges are centered on such shrub communities, they extensively use adjacent habitats, including grassland, oak savanna, and occasionally oak-bay woodland (Swaim, pers. comm., 2007). Alameda whipsnakes use grassland habitats for periods of up to several weeks, with males using grassland habitats more frequently in the mating season and females using grassland habitats after mating occurs. Rock outcrops are an important feature of Alameda whipsnake habitat because they provide retreat opportunities and promote lizard populations (USFWS, 2002; 2005b).

While Alameda whipsnakes are regularly observed in nonscrub areas, the ultimate role of such habitat in the life history of this snake species is still emerging. The loss of neighboring nonscrub habitat could reduce overall habitat quality for whipsnakes (Swaim, pers. comm., 2007). While it is not fully understood how far or often Alameda whipsnakes venture away from scrub habitat, or whether such movements represent individuals that have become permanently separated from scrub habitat, recent studies by Swaim (pers. comm.) indicate that the snakes routinely move several miles farther from scrub habitat than previously described.

Historically, Alameda whipsnakes were probably found in the coastal scrub and oak woodland communities of the East Bay in Contra Costa, Alameda, western San Joaquin, and northern Santa Clara Counties (USFWS, 2002). Currently, they are only found in the inner Coast Range in western and central Contra Costa and Alameda Counties (USFWS, 2002). Five isolated populations of Alameda whipsnake are now recognized within its historical range: Tilden–Briones, Oakland–Las Trampas, Hayward–Pleasanton Ridge, Sunol–Cedar Mountain, and Mt. Diablo–Black Hills (USFWS, 1997a).

The Los Vaqueros Watershed falls within the range of the Mt. Diablo–Black Hills population of Alameda whipsnake; thus, the Alameda whipsnake is presumed extant in the chaparral habitats of the southwestern portion of the watershed, and adjoining nonscrub habitat. The CNDDB notes occurrences of the Alameda whipsnake within the watershed vicinity, and Alameda whipsnakes have been recorded in upland scrub habitat in the southwestern portion of the watershed where the quality of habitat is very high (Jones and Stokes, 1990). In 2003 and 2004, field surveys also found Alameda whipsnakes within the watershed, and all age classes (adult, sub-adult, and young of the year) were found in these surveys (D. McGriff, pers. comm., 2004). Moreover, Alameda whipsnake have been documented from at least three grassland areas that do not include chaparral habitat (ESA, 2004).
Alameda whipsnake habitat is not present near any other facilities associated with the project alternatives.

**Federal or State Species of Special Concern**

**Western Pond Turtle** (*Actinemys marmorata*). Western pond turtles are commonly found in ponds, lakes, marshes, rivers, streams, and irrigation ditches with rocky or muddy substrates surrounded by aquatic vegetation. These watercourses usually are within woodlands, grasslands, and open forests, between sea level and 6,000-foot elevation. Turtles bask on logs or other objects when water temperatures are lower than air temperatures. Nests are located at upland sites, often up to 0.25 mile from an aquatic site (Jennings and Hayes, 1994; Stebbins, 2003; Zeiner et al., 1988–1990).

Western pond turtles are uncommon and discontinuously distributed throughout California west of the Cascade-Sierran crest, with isolated populations in the Mojave River area and Andreas Canyon (Jennings and Hayes, 1994). Western pond turtle populations occur throughout the Marsh Creek Watershed and Kellogg Creek within the Los Vaqueros Watershed (East County HCPA, 2006; CDFG, 2008).

Within the watershed, a variety of habitats such as creeks, ponds, and drainages, as well as semipermanent marsh, alkali marsh, riparian woodland, and some grasslands, provide pond turtle habitat. They correspond to lacustrine, nontidal freshwater permanent emergent, and valley/foothill riparian NCCP habitats within the watershed. Western pond turtles are known throughout the watershed. Western pond turtle populations are present in Adobe Creek (west arm of Kellogg Creek), along Upper and Lower Kellogg Creek, in several created wetlands and stock ponds, and in drainages within the watershed (Jones and Stokes, 1990; Dave Sterner, pers. comm.; CDFG, 2008). Of the six stock ponds, five created wetlands, and several drainages in the study area, one stock pond, one created wetland, and two drainages are known to support the western pond turtle. The stock pond is along Horseshoe Creek in a southeastern arm of the reservoir, the created wetland is along an unnamed drainage in an eastern arm of the reservoir, and the drainages are Upper and Lower Kellogg Creek.

Within the construction easement for Los Vaqueros Dam and associated Inlet/Outlet Pipelines, five western pond turtle occurrences are known from created wetlands, with suitable habitat in Lower Kellogg Creek. In addition, one stock pond along Adobe Creek is within the construction easement for the proposed westside access road, and one occurrence is within the stockpile study area. Western pond turtles may be present in aquatic habitats and upland areas within roughly 0.5 mile of aquatic sites.

The occurrence nearest to the Old River Intake and Pump Station is almost 2 miles south at Clifton Court Forebay (CDFG, 2008). While no pond turtle occurrences are reported near the study area for the new Delta Intake and Pump Station, Old River and Middle River may provide suitable aquatic habitat, and nearby levee banks and agricultural lands may provide suitable egg-laying habitat for this species. Therefore, western pond turtle may sporadically occur in and near the new Delta Intake and Pump Station study area.
The Delta-Transfer Pipeline traverses mostly cropland, but several aquatic sites occur within the study area that may be used by the western pond turtle. No CCWD or CNDDDB pond turtle occurrences are reported within the study area; the nearest occurrence is 1.5 miles to the south (CDFG, 2008). However, western pond turtles can be expected to occur in association with Kellogg Creek and the numerous larger irrigation canals (e.g., Byron-Bethany Canal) in agricultural portions of the study area.

Three pond turtle occurrences are reported in the Transfer-LV Pipeline study area (CDFG, 2008). Reported locations include areas along Lower Kellogg Creek where several stock ponds and created wetlands support western pond turtles. All ponds, wetlands including Kellogg Creek, stock ponds, and adjacent upland habitat are suitable for the western pond turtle.

The Transfer-Bethany Pipeline crosses several small creeks that may support wetlands and habitat for western pond turtles. This species is expected to occur in and near aquatic sites that provide suitable aquatic habitat.

Western pond turtles may be present in irrigation and drainage features within the Western powerline alignment under Power Options 1 and 2, with breeding and movement in project area upland habitat potentially within the alignments and at the Western substation siting zone under Power Option 1. An occurrence is noted near Italian Slough, west of the Skinner Delta Fish Protective Facility (CDFG, 2008). Aquatic habitat does not occur at the Western substation site. Because western pond turtles can persist with unpredictable water sources, they may be present in and near agricultural ditches that parallel and cross the alignment at various locations. Western pond turtles may be present in upland habitat near the proposed PG&E substation under Power Option 2.

**San Joaquin Whipsnake (Coachwhip) (*Masticophis flagellum ruddocki*).** San Joaquin whipsnakes use open, dry areas with little or no tree cover. In the western San Joaquin Valley, they occur in valley grassland and saltbush scrub associations and are known to climb shrubs and bushes to view prey and potential predators. They use small mammal burrows for refuge and probably for egg-laying sites as well (Jennings and Hayes, 1994).

San Joaquin whipsnakes range from the eastern edge of the San Joaquin Valley from Colusa County southward to Kern County and into the inner South Coast Ranges, with an isolated population in the Sutter Buttes. Of 65 occurrences recorded in the CNDDDB, five are from Alameda, Contra Costa, and San Joaquin Counties (CDFG, 2008).

In 1980, a San Joaquin whipsnake was identified in the footprint of the Los Vaqueros Reservoir Dam (CDFG, 2008). No other occurrences are reported in the Los Vaqueros Watershed or near any other project facilities. The watershed provides suitable open grassland habitat for San Joaquin whipsnakes; therefore, this species can be expected in grassland habitat throughout the study area.

This species is not expected in the Delta Intake Facilities study area due to the lack of suitable habitat. For Conveyance Facilities, San Joaquin whipsnakes are expected to sporadically occur in...
low densities in annual grasslands within the Delta-Transfer Pipeline, Transfer-LV Pipeline, and Transfer-Bethany Pipeline alignments, and in grasslands near the Expanded Transfer Facility. Based on the availability of suitable habitat, this species may also occur in grasslands in the study areas for Power Option 2.

**Coast Horned Lizard (Phrynosoma coronatum frontale).** The coast horned lizard occurs in several habitat types, including areas with an exposed gravelly-sandy substrate containing scattered shrubs, clearings in riparian woodlands, dry uniform chamise chaparral, and annual grassland with scattered perennial seepweed or saltbush. Horned lizard populations reach maximum abundance in sandy loam areas and on alkali flats often dominated by iodine bush. Coast horned lizards use small mammal burrows or burrow into loose soils under surface objects during extended periods of inactivity or hibernation (Jennings and Hayes, 1994). This species is not documented from the Los Vaqueros Watershed, and the nearest documented sighting is about 1.2 miles west of Byron Hot Springs and 0.5 mile west of the Transfer-Bethany Pipeline (CFDG, 2008).

Alkali areas with sandy loam soils and alkali flats have limited distribution in the project area. High quality habitat is present in the Power Option 2 Western powerline alignment, just north of the Skinner Delta Fish Protective Facility and would be spanned by powerlines.

**Birds**

**Federal or State Threatened and Endangered Species**

**Swainson’s Hawk (Buteo swainsoni).** Swainson’s hawks are large migratory hawks that nest in North America and winter in southern South America. Swainson’s hawks begin arriving in California in late February and depart for their wintering grounds in early September (Woodbridge, 1998). Nests are typically constructed in sturdy trees within or near agricultural lands, riparian corridors, and roadside trees. Nests are composed of a platform of sticks, bark, and fresh leaves. Swainson’s hawks reside in the Central Valley from March though October, with eggs typically laid in April and early May (peaking in late April) (Bradbury, pers. comm.).

The Swainson’s hawk nesting range is restricted to portions of the Central Valley and Great Basin regions, where suitable habitat is still present (Shuford and Gardali, 2008). The highest density currently is in the Central Valley, between Sacramento and Modesto, and in the northern San Joaquin Valley (Woodbridge, 1998). Because much of the project area traverses annual grasslands, potential nesting sites are limited in the project area.

Neither CCWD nor the CNDDB report Swainson’s hawks nesting in the Los Vaqueros Watershed, with a single nest site reported near out-of-watershed facilities. The *Contra Costa Breeding Bird Atlas* (2005) notes nesting in the area northeast of the watershed and CCWD staff have observed individual Swainson’s hawks in the watershed. Grassland and riparian communities in the watershed may provide limited foraging habitat; however, agricultural lands are this species’ primary foraging grounds. Though not identified during CCWD or ESA surveys, Bradbury (pers. comm.) considers that Swainson’s hawk may nest in the watershed.
For Conveyance Facilities, the Delta-Transfer Pipeline does not support Swainson’s hawk nesting habitat, but a cottonwood tree 300 feet from the alignment supported nesting in 2006 (CDFG, 2008) (Figure 4.6-9). This is an active agricultural area.

For the Transfer-LV Pipeline alignment, habitat in the study area is a mixture of agriculture lands and grasslands that provide foraging habitat. The patchy cottonwood riparian corridor of Kellogg Creek may provide suitable nesting habitat for Swainson’s hawk, but nesting has not been documented from this area. While most of the project pipeline alignments traverse annual grasslands habitat and agricultural lands that are devoid of nesting sites, Swainson’s hawk may nest in individual trees scattered along pipeline study areas.

Nesting habitat is not present at the Delta Intake Facilities, Expanded Transfer Facility, or within the study areas for Power Options 1 and 2 and nesting is unlikely near other facilities.

**Bald Eagle (Haliaeetus leucocephalus).** Bald eagles occupy a wide range of habitats, including woodlands, forests, grasslands, and wetlands. They winter throughout California near lakes, reservoirs, rivers, and some rangelands and coastal wetlands. Nesting is usually restricted to mountainous habitats near reservoirs, lakes, and rivers. Bald eagles usually nest in large coniferous trees within 1 mile of permanent water. They forage on large water bodies or rivers with easily approached snags and other perches (Zeiner et al., 1988–1990).

The nearest reported bald eagle nest sites are reported at Del Valle Reservoir in Alameda County, 15 miles southeast of the Los Vaqueros Watershed (CDFG, 2008); and since 2006, bald eagles have also nested at San Pablo Reservoir in Contra Costa County, about 25 miles west of the watershed (CDFG, 2008).

Bald eagles winter in small numbers near Los Vaqueros Reservoir, and remain in the area into the spring and summer months. Winter roosting sites in the watershed have been observed in valley/foothill woodland and forest habitats. Before the establishment of the existing reservoir, bald eagles were not documented from the watershed, although anecdotal information suggests that they occasionally wintered in the Kirker Creek drainage, near the City of Pittsburg (D. Sterner, pers. comm.). As of 2008, bald eagles are not nesting within the Los Vaqueros Watershed. Habitat suitability within the watershed is limited by the relative lack of tall conifers available for nesting. The *Contra Costa Breeding Bird Atlas* (2005) does not report bald eagles in the regional project vicinity.

Outside the watershed, the project area does not provide bald eagle nesting or foraging habitat.

**Federal or State Species of Special Concern**

**Cooper’s Hawk (Accipiter cooperii).** Cooper’s hawks nest in dense forested habitats near freshwater and forage mostly on small birds and mammals, although they will take reptiles and amphibians. The peak nesting season is May through July, although it can occur anywhere from March to August (Zeiner et al., 1988–1990). Nesting is described within the Los Vaqueros Watershed, about 2.75 miles west from the existing dam (Brady and Associates, 1996). The
Contra Costa Breeding Bird Atlas (2005) also indicates that Cooper’s hawks are a possible breeder in the western portion of the watershed, and confirms nesting farther to the west.

This species is expected to nest in the wooded portions of the Transfer-LV Pipeline and Transfer-Bethany Pipeline study areas. Nesting habitat is not present at the Delta Intake Facilities, Expanded Transfer Facility, or within the study areas for Power Options 1 and 2, and nesting is unlikely near other facilities.

Sharp-shinned Hawk (*Accipiter striatus*). The sharp-shinned hawk occupies a wide variety of forests and woodland habitats, ranging from mixed deciduous forests, riparian woodlands, to oak woodlands, among others. Like the Cooper’s hawk, this species forages in dense forested habitats near freshwater and forages mostly on small birds, though they will take small mammals, frogs, lizards, and insects.

This species was not described in the Los Vaqueros Resource Management Plan (Brady and Associates, 1996), which characterized special status wildlife species known to occur in the Los Vaqueros Watershed. The Contra Costa Breeding Bird Atlas (2005) indicates that sharp-shinned hawks are a possible breeder west of the Los Vaqueros Watershed, but does not identify nest sites in the watershed. Similarly, the CNDDB reports no nesting occurrences within 10 miles of the Los Vaqueros Watershed. However, suitable nesting and foraging habitat is present throughout woodlands in the Los Vaqueros Watershed, and this species may be present.

Sharp-shinned hawks are expected to nest in the wooded portions of the Transfer-LV Pipeline and Transfer-Bethany Pipeline study areas. Nesting habitat is not present at the Delta Intake Facilities, Expanded Transfer Facility, or within the study areas for Power Options 1 and 2, and nesting is unlikely near other facilities.

Tricolored Blackbird (Nesting Colony) (*Agelaius tricolor*). Tricolored blackbirds are a colonial species that nest in dense vegetation in and around freshwater wetlands. When nesting, tricolored blackbirds generally require freshwater wetland areas large enough to support colonies of 50 pairs or more. They prefer freshwater emergent wetlands with tall, dense cattails or tules for nesting, but will also breed in thickets of willow, blackberry, wild rose, or tall herbs. During the nonbreeding season, flocks are highly mobile and forage in grasslands, croplands, and wetlands (Zeiner et al., 1988–1990).

Tricolored blackbirds are locally common throughout the Central Valley and coastal areas south of Sonoma County. The East County HCP/NCCP (East County HCPA, 2006) considered tricolored blackbirds a sporadic resident of their inventory area.

The CNDDB notes four tricolored blackbird occurrences near the watershed, but nesting has not been documented within the watershed. Two are about 3 miles north from the existing dam and the other two are about 3 and 5 miles, respectively, southeast of the watershed. Grasslands and freshwater permanent wetlands in the watershed provide suitable nesting habitat for tricolored blackbirds, and tricolored blackbirds are known to use the watershed during the nonbreeding season (Jones and Stokes, 1990). During project surveys, no nesting colonies were found in the
watershed (Jones and Stokes, 1989); however, the *Contra Costa Breeding Bird Atlas* (2005) cites breeding within the watershed and confirms breeding east and south of the watershed. Tricolored blackbirds may sporadically breed in the watershed where suitable habitat is available.

Potential nesting habitat is present on the opposite side of Old River from the new Delta Intake and Pump Station, but nesting has not been observed at this location. Along the Delta-Transfer Pipeline, suitable breeding sites may occur on the fringes of agricultural areas and in unmaintained irrigation canals throughout the study area. On the Transfer-LV Pipeline, in addition to multiple nesting sites that are available in Kellogg Creek, cropland habitats within the study area may provide suitable tricolored blackbird nesting sites.

A tricolored blackbird breeding colony was documented about 800 feet west of the Transfer-Bethany Pipeline and two more occurrences are reported 2.5 miles south of this alignment (CDFG, 2008). This alignment traverses annual grassland communities that are broken by small creek drainages that could support a tricolored blackbird nesting colony.

Tricolored blackbird nesting could occur in mustard fields and annual grassland communities on the Western powerline alignment under Power Options 1 and 2, or in association with agricultural drainages on these alignments. Breeding may occur locally to the Western substation siting zone under Power Option 1. This species is not expected at new PG&E facilities under Power Option 2.

**Golden Eagle (*Aquila chrysaetos*).** Golden eagles nest in open areas on cliffs and in large trees, often constructing multiple nests in one breeding territory (Zeiner et al., 1988–1990). They prefer open habitats such as rolling grasslands, deserts, savannahs, and early successional forest and shrub habitats, with cliffs or large trees for nesting and cover (Zeiner et al., 1988–1990).

Portions of seven golden eagle breeding territories have been documented in the Los Vaqueros Watershed and nesting areas change slightly from year-to-year. Four of these territories were active in 2002; two failed and three young were fledged from the other two nests (CCWD, 2002). This species is a resident breeder within the watershed and the area is also used by migrant eagles during the nonbreeding season.

One historic breeding site was identified in the watershed study area 16 feet from the edge of the proposed westside access road. Several nest sites occur within 2 miles of the inundation boundary and other in-watershed facilities (e.g., the dam, Inlet/Outlet Pipelines construction area, recreational facilities, westside access road, and eastside trail). As eagles abandon nest sites in some years and start new ones in other locations, the visual representation of eagle nest sites in the watershed tends to overstate the number of active eagle nests during a given year (i.e., many nest sites are inactive or historic) ([Figure 4.6-10](#)).

Golden eagle foraging habitat is present in all project study areas; however, potential breeding sites only occur in the watershed, and along portions of the Transfer-LV Pipeline within the watershed.
Bethany Reservoir Tie-In

Stockpile Area

Expanded Transfer Facility

Delta-Transfer Pipeline

Transfer-Bethany Pipeline

Transfer-LV Pipeline

AIP Intake and Pump Station

New PG&E Substation (Power Option 1)

New Western Substation (Power Option 2)

New PG&E Substation (Power Option 2)

Expanded Old River Intake and Pump Station (Alternatives 1 and 2)

AIP Intake and Pump Station

Clifton Court Forebay

Victoria Canal

South Bay Aqueduct

California Aqueduct

Delta-Mendota Canal

Clifton Court Forebay

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**Figure 4.6-10**

Goldern Eagle Nesting Sites in the Project Study Area

**SOURCE:** USGS, 1993 (base map); Jones & Stokes Associates, 1992; and ESA, 2007
Western Burrowing Owl. Western burrowing owls are relatively small, semicolonial owls, and are mostly residents of open dry grasslands and desert areas. They occupy burrows for both breeding and roosting. They use burrows excavated by ground squirrels and other small mammals and will use human-made burrows and cavities. Where the number and availability of natural burrows is limited, owls may occupy human-made burrows such as drainage culverts, cavities under piles of rubble, discarded pipe, and other tunnel-like structures (Zeiner et al., 1988–1990). Burrowing owls hunt from perches and are opportunistic feeders. They consume arthropods, small mammals (e.g., meadow voles), birds, amphibians, and reptiles. Insects are often taken during the day, while small mammals are taken at night (Zeiner et al., 1988–1990).

The Contra Costa Breeding Bird Atlas (2005) confirms owl breeding within and just to the east of the watershed, but not near the reservoir. Surveys conducted before the reservoir’s development documented up to 10 pairs of owls within the watershed (Jones and Stokes, 1989). These occurrences were mostly in the eastern portion of the watershed with a few occurrences from the southern watershed and several in the northern end of the watershed (nesting status unknown).

Burrowing owls have been casually observed in non-project portions of the watershed (B. Pittman, pers. obs.) but their distribution is not specifically tracked by watershed staff. Occurrences are generally 1 to 2 miles from the inundation zone. The nearest CNDDB occurrence is about 1 mile east of the 275-TAF reservoir study area.

Potential burrowing owl nesting habitat is present on the fringes of agricultural lands and in annual grasslands in the study area along the Delta-Transfer Pipeline, Transfer-LV Pipeline, Transfer-Bethany Pipeline, and to a lesser extent at the Expanded Transfer Facility. A CDFG-documented population was observed within the Western powerline alignment under Power Option 2 (CDFG, 2008). Though nesting habitat is unavailable over most of the study areas for Power Options 1 and 2, due to agricultural activities and pasture irrigation, burrowing owls are presumed present on the fringes of agricultural lands and in uncultivated annual grasslands in both alignments.

Short-Eared Owl (Asio flammeus). The short-eared owl is an open-country bird that is seen most often at dawn and dusk. Short-eared owls usually nest on dry ground in depressions that are concealed by vegetation, sometimes nesting within burrows. Breeding is from early March through July with a typical clutch size of five to seven eggs. This owl is a widespread winter migrant with resident populations in portions of California (Shuford and Gardali, 2008). The short-eared owl is one of the most widely distributed owls in the world.

No breeding records or winter sightings are reported from the Los Vaqueros Watershed or near any project facilities. Breeding occurrences are not documented in the Los Vaqueros Watershed vicinity by the Contra Costa Breeding Bird Atlas (2005) or by CDFG (2008); however, this owl may occur sporadically in annual grasslands throughout the project area.

Northern Harrier. Northern harriers are found in a wide variety of habitats from annual grasslands up to lodgepole pines and alpine meadow habitats. They are known to frequent meadows, grasslands, open rangelands, desert sinks, and freshwater and saltwater emergent
wetlands. Harriers are seldom found in wooded areas. Nests are constructed amid shrubby vegetation usually in emergent wetlands or near a river or lake. They may also nest in grasslands, grain fields, or sagebrush flats several miles from water (Zeiner et al., 1988–1990). Northern harriers are commonly observed foraging over croplands, marshlands, or grasslands within the project region.

The watershed provides suitable open grassland nesting habitat for northern harrier. The nearest breeding occurrences to the Los Vaqueros Watershed are 6 miles southwest and 9 miles east of the existing dam (CDFG, 2008). The Contra Costa Breeding Bird Atlas (2005) indicates that breeding is probable within the watershed, confirmed east of the watershed, and possible north of the watershed. Based on the availability of suitable habitat, this species may nest near marshland habitats in the watershed.

Due to disturbances caused by facilities and levee maintenance, and ongoing farming activities, northern harriers are unlikely to nest in tall grasslands in the Delta Intake Facilities study area.

The Delta-Transfer Pipeline traverses open cropland and grassland habitat that is suitable for harrier nesting. This species may also nest in alkali grasslands and tall fields in the Delta-Transfer Pipeline study area. The Transfer-LV Pipeline, Transfer-Bethany Pipeline, and study areas for Western powerlines under Power Options 1 and 2 traverse open grassland habitat that is suitable for northern harrier foraging and nesting. The breeding occurrence identified east of the dam is a 1989 sighting south of Clifton Court Forebay, about 4 miles east of the Transfer-Bethany Pipeline alignment (CDFG, 2008).

The Expanded Transfer Facility is in open grassland habitat suitable for foraging, but the grasslands are generally too tall and weedy to support harrier nesting.

**White-Tailed Kite (Elanus leucurus) (Nesting).** White-tailed kites forage in open grasslands, meadows, farmlands, and emergent wetlands. They typically nest in oak woodlands or trees, especially along marsh or river margins, although they will use any suitable tree or shrub that is of moderate height. They are rarely found far from agricultural areas (Zeiner et al., 1988–1990).

The watershed provides suitable open foraging and nesting habitat for white-tailed kite. The Contra Costa County Breeding Bird Atlas (2005) reports kite breeding in the watershed. The CNDDB occurrence closest to the watershed is about 7.5 miles southeast of the inundation boundary, in Contra Costa County (CDFG, 2008). This species may nest in oaks, cottonwoods, and other trees within the watershed.

The Delta-Transfer Pipeline, Transfer-LV Pipeline, and Transfer-Bethany Pipeline traverse open cropland and grassland habitat that is suitable for foraging, and wooded areas suitable for nesting. Cropland and grasslands habitat within the Western powerline alignment and at the Expanded Transfer Facility are not suitable for nesting. Though no occurrences are identified in these areas by the CNDDB or Contra Costa County Breeding Bird Atlas, this species may nest in the study area wherever habitat conditions are appropriate.
California Horned Lark (*Eremophila alpestris*). California horned larks are brown songbirds that form large flocks for foraging and roosting. They build grass-lined nests directly on the ground, in dry, open habitats with sparse vegetation. This species is a common to abundant resident songbird in a variety of open habitats. Range-wide, California horned larks breed in level or gently sloping shortgrass prairie, montane meadows, barren fields, opens coastal plains, fallow grain fields, row crops, and alkali flats.

Horned larks range across North America from Alaska and the Canadian arctic southward to southern Mexico. Though no occurrences are identified in the Los Vaqueros Watershed by the CCWD, CNDDB, or *Contra Costa County Breeding Bird Atlas*, this species is expected to nest in short grasslands that occur throughout the study area.

This species is persistently present in portions of the Altamont Hills in Alameda and Contra Costa counties where regular grazing helps to maintain annual grasses at a short height (B. Pittman, pers. obs.). This species is expected to breed and forage in short annual grasslands within the Los Vaqueros Watershed and at the following facilities: the westernmost 1.2 miles of the Delta-Transfer Pipeline; the entirety of the Transfer-Bethany Pipeline and Transfer-LV Pipeline alignments; within the Western powerline alignment under both Power Options, and at proposed PG&E facilities under Power Option 2.

Prairie falcon (*Falco mexicanus*). Habitat use of the prairie falcon includes annual grasslands to alpine meadows, but they are also associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas. In California this species is a year-round resident in suitable habitat throughout most of the state. In the Central Valley, prairie falcons are typically only observed during winter and not during the nesting season (CDFG, 1983).

Eastern Contra Costa and Alameda Counties are within the year-round range of the prairie falcon. Breeding habitat, which includes cliffs and bluffs, is extremely limited near facilities associated with the project alternatives. As a result, the likelihood of encountering prairie falcon nest sites is considered low at all facilities tied to the project alternatives.

Loggerhead Shrike (*Lanius ludovicianus*). Loggerhead shrikes are a semipermanent resident California species that occurs in abundance in the Central Valley and Central Coast where shrub habitats and open woodlands are available. Shrikes generally forage on the fringes of open habitats where suitable hunting perches are available. This species typically hunts from dead trees, tall shrubs, utility wires and fences, impaling their prey on sharp twigs, thorns, or barbed wire.

The breeding distribution of this species is not well characterized by the CNDDB; however, loggerhead shrike populations are readily encountered within appropriate habitat in the outer Coast Range of eastern Contra Costa and Alameda Counties (B. Pittman, pers. obs.). Populations are known from wooded riparian corridors and grazed lands, with breeding often occurring in blackberry and willows ranging in size from individual shrubs to dense thickets.

Shrikes are common throughout California and are expected to occur in moderate to high densities throughout the project area where shrubby wooded habitat provides adequate cover and nesting sites.
Within the Los Vaqueros Watershed, loggerhead shrike may be encountered near wooded drainages or areas with moderate to dense shrub cover. Habitat in the watershed occurs sporadically in and next to Kellogg Creek and tributary drainages. Due to the lack of perch sites and cover, this species is not expected to breed near the Delta Intake Facilities, but may be encountered sporadically on each of the pipeline alignments where shrubby vegetation is present. This species may breed sporadically within the study areas for Power Option 1 and 2.

Osprey (*Pandion haliatus*). Ospreys are a unique species that build stick platform nests on top of large dead-topped trees or snags. Nests are occasionally built on cliffs, human-made structures, or the ground. Ospreys are closely tied to large bodies of clear water that produce fish and are surrounded by ponderosa pine or mixed conifer habitats. Tall trees and snags are required for breeding, foraging, and cover. Nests are usually built within 1,500 feet of fish-productive water, but may be built up to a mile from water (Zeiner et al., 1988–1990).

During the breeding season ospreys can be found in Northern California from the Cascade Ranges south to Lake Tahoe and along the coast south to Marin County. They are also uncommonly found breeding along the Colorado River (Zeiner et al., 1988–1990). Historically, they bred throughout much of California (Remsen, 1978). Osprey nesting occurrences are scattered throughout Northern California, with concentrations in Humboldt and Lassen Counties (CDFG, 2008). One breeding occurrence is reported from San Joaquin County, along the Mokelumne River.

The *Contra Costa County Breeding Bird Atlas* (2005) cites osprey breeding in the watershed and areas east of the watershed. Nesting has been noted in the watershed by CCWD staff and the potential exists that they may breed in oak woodlands or large snags (i.e., dead trees) throughout the watershed. Ospreys are unlikely to breed in study areas outside the watershed.

**Mammals**

*Federal or State Threatened and Endangered Species*

**San Joaquin Kit Fox.** The San Joaquin kit fox is a permanent resident of arid grasslands and open scrubland, where friable soils are present. Dens are required year-round for reproduction, shelter, temperature regulation, and protection from predators (USFWS, 1998). Historically their habitat included native alkali marsh and saltbush scrub of the valley floor, but the availability of such habitats has diminished markedly due to agricultural conversion. Grasslands with friable soils are considered the principal habitat for denning, foraging, and dispersal, while open oak woodlands provide lower quality foraging and dispersal habitat. Kit foxes will use habitats that have been extensively modified by humans, including grasslands and scrublands with active oil fields, wind turbines, and agricultural matrices (USFWS, 1998). In the northern portion of its range, California ground squirrels are a chief component of the kit fox diet (Hall, 1983).

San Joaquin kit foxes occur only in and around the Central Valley, inhabiting open habitat in the San Joaquin Valley and surrounding foothills. Kit fox population densities are greatest in the southern portion of their range. Kit fox populations in the northern portion of their range are highly fragmented and sparsely distributed (*Figure 4.6-11*) (Orloff et al., 1986).
Figure 4.6-11
Regional Distribution of San Joaquin Kit Fox

SOURCE: CDF, 2002; USDA, 2006; CNDDB, 2006; ESRI, 2006; and ESA, 2008

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In the northern portion of its range, kit fox are present primarily in foothill grasslands, because much of their former habitat on the valley floor has been eliminated. The northern population is known to have different habitat characteristics than the southern population. Orloff found that the northern population habitats have steeper slopes than the southern population, with slopes of up to 40 degrees in the northern population and dens on slopes ranging from 2 to 14 percent (Orloff et al., 1986). Thus, slope is an important consideration to keep in mind when considering potential project effects to kit fox and the suitability of mitigation lands for this species.

While kit foxes have been observed to use areas with low to moderate slopes (Morrell, 1971, 1972; O'Farrell et al., 1980; O'Farrell and McCue, 1981; Orloff et al., 1986), this species preferentially dwell and migrate on relatively flat or low-gradient slopes (e.g., less than 15 degrees) as opposed to more extreme slopes (Orloff et al., 1986; Larsen, pers. comm.).

Most studies only quantify the slopes where dens are found, and do not quantify slopes in areas of dispersal. Morrell (1971) studied kit fox in Kern County and found that most dens are in flat or gently sloping ground; some are on hillsides up to 30 degrees. Dens on very steep slopes were rare. Koopman et al. (2001) conducted a telemetry study in Kern County and found that most kit foxes used slopes that were generally less than 6 degrees. The mean slope for movements was 3.3 degrees (range = 0 to 71 degrees) with only 0.9 percent of movements on slopes greater than 6 degrees. A study at Camp Roberts in Monterey County showed that the average slope of hillsides with dens was 19 degrees (Reese et al., 1992).

The CNDDB reports 21 kit fox occurrences from Contra Costa, San Joaquin, and Alameda Counties, and numerous others are reported from other sources such as unpublished USFWS data. The watershed is in the northwestern extent of the San Joaquin kit fox range. Ten kit fox sightings are reported in the watershed vicinity, the most recent from September 2008 in close proximity to the Los Vaqueros Watershed Administrative Offices (Howard, pers. comm.), and prior to that from the period between 1987 and 1989, in areas now flooded by Los Vaqueros Reservoir (H.T. Harvey & Associates, 1997; CCWD, 2007; CDFG, 2008). Recent kit fox observations from the regional vicinity include a sighting at Brushy Peak in 2002 and Vasco Caves in 2001 and 2002 (CDFG, 2003).

In the upper Kellogg Creek portion of the watershed, two potential north-to-south kit fox movement corridors (passageways with unbroken grasslands) are generally recognized. Such corridors serve to maintain connectivity between blocks of annual grasslands habitat. The corridor to the west of the reservoir is composed of annual grasslands, roughly 500 to 1,800 feet in width, on a moderate east-facing slope. The corridor is interrupted in two locations by oak woodlands that measure roughly 80 feet and 300 feet in width with gentle to moderate topography. Although a potential movement corridor, kit fox use has not been documented in this area.

Annual grasslands east of the reservoir provide a considerably wider migration pathway with kit fox activity verified in the corridor in September 2008 (Howard, pers. comm.). From the base of Los Vaqueros Dam to the northeastern edge of the watershed, the width of this corridor is about 2 miles.
Outside of the watershed, high quality kit fox habitat occurs on each of the pipeline alignments, with lower quality, albeit potential habitat at the Expanded Transfer Facility and near the Delta Intake Facilities. Kit fox occurrence data is maintained by USFWS and generally not distributed publicly.

Along the Delta-Transfer Pipeline, portions of open grasslands and agricultural lands south of SR 4 provide San Joaquin kit fox habitat. This portion of the alignment, which runs from SR 4 to the Expanded Transfer Facility, provides varying degrees of habitat quality for kit foxes. The highest quality areas are annual grasslands within 1.2 miles of the Expanded Transfer Facility, followed by moderate quality areas further east that support walnut orchards and fallow agricultural fields.

The Transfer–LV Pipeline traverses annual grassland habitats that could support kit fox denning, foraging, or dispersal. The linear extent of potential San Joaquin kit fox habitat in this alignment is 4.4 miles.

Nearly the entire Transfer-Bethany Pipeline traverses annual grassland or alkali meadow habitats that could be used for kit fox denning, foraging, or dispersal. This alignment traverses the eastern kit fox dispersal corridor where kit foxes have been sighted within the last 15 years (CDFG, 2008; USFWS file data). The linear extent of San Joaquin kit fox habitat in this alignment is 7.5 miles in Contra Costa County and 1.4 miles in Alameda County (tunnel portion of alignment).

For the Expanded Transfer Facility, the likelihood of encountering kit foxes is considered low due to the tall, ungrazed mustards and other herbaceous vegetation that dominate this site.

The Western powerline alignments and substation under Power Options 1 and 2 are located in moderate to high quality kit fox habitat, and suitable habitat is similarly available at the proposed PG&E facilities under Power Option 2.

**Federal or State Species of Special Concern**

Because little information is available on the local distribution of bat species in Alameda and Contra Costa counties, the likelihood of encountering special status bat species was estimated from species range maps, which for the bats considered includes most of the State of California, and an evaluation of available habitat in the project study areas. Available data sources identify the only special status bat roost site as 10 miles from proposed facilities. This pallid bat (*Antrozous pallidus*) roost is greater than 6 miles north of the Los Vaqueros Watershed. Thus, while detailed distribution data is not available for the following species, they are included herein because they are not well studied in the project region, and because potentially suitable habitat is available in the Los Vaqueros Watershed. Habitat for these species is generally lacking in project study areas outside of the watershed.

**Pallid Bat (*Antrozous pallidus*)**. Pallid bats inhabit low elevation (< 6,000 feet) rocky arid desert lands and canyonlands, shrub-steppe grasslands, and higher elevation coniferous forests (> 7,000 feet). Pallid bats roost in rock crevices, unoccupied buildings, hollows in large trees, and under bridges. They are most abundant in xeric (dry) ecosystems, including the Great Basin, Mojave, and Sonoran Deserts (WBWG, 2005).
This is the most widely described special status bat species in central California and in the project region, with the nearest occurrences 6 miles north of the Los Vaqueros Watershed (CDFG, 2008). Though not verified within the Los Vaqueros Watershed, habitat for this species is available in large hollow trees, snags, or under loose bark in the watershed study area. Though rock outcrops are common along ridgelines, open rock crevices that could support bat roosts are uncommon in the 275-TAF zone and in project study areas.

Pallid bat habitat is considered limited in portions of the project area outside the watershed, thus, this species is only expected within the watershed.

**Townsend’s Big-Eared Bat (Corynorhinus townsendi).** Townsend’s big-eared bats have been reported in a wide variety of habitat types including coniferous forests, mixed mesophytic forests, deserts, native prairies, riparian communities, active agricultural areas, and coastal habitat, ranging from sea level to 3,300 meters (WBWG, 2005). Their most typical habitat is arid western desert scrub and pine forest regions. The CNDDB does not report any locations for this species in the State of California (CDFG, 2008).

Townsend’s big-eared bats occur throughout the west with their distribution strongly correlated with the availability of caves and cave-like roosting habitat, including abandoned mines. Habitat may be available in large trees in the watershed study area, but their more typical cave habitat is absent from this area. Cave habitat in the eastern portion of the Los Vaqueros Watershed is greater than 500 feet from the project study area.

Though not verified within the Los Vaqueros Watershed, habitat for this species is available in large hollow trees, snags, or under loose bark in the watershed study area. Though rock outcrops are common along ridgelines, open rock crevices that could support bat roosts are uncommon in the 275-TAF zone and in project study areas.

Habitat for this species does not occur in study areas outside the watershed.

**Greater Western Mastiff Bat (Eumops perotis californicus).** The greater western mastiff bat prefers open, semiarid to arid habitats with low elevation and rugged, rocky areas that have suitable crevices for roosting. They roost in buildings and trees, provided they have adequate drops to allow them to take flight (Williams, 1986; Zeiner et al., 1988–1990). Greater western mastiff bats are uncommon, widespread residents of the San Joaquin and Salinas Valleys and coastal lowlands south of San Francisco Bay (Williams, 1986; Zeiner et al., 1988–1990).

The nearest documented occurrences are an 1899 collection near Hayward and a 1957 observation from near Oakdale, both greater than 20 miles from the study area (CDFG, 2008).

Open grassland, canyons, and woodland communities in the watershed provide habitat for greater western mastiff bats; however, based on available species distribution data that identifies low densities in the project region, this species is considered unlikely in the project area. Habitat for this species does not occur in study areas outside the watershed.
Small-Footed Myotis Bat (*Myotis ciliolabrum*). Small-footed myotis is distributed in deserts, chaparral, riparian zones, western coniferous forest, and pinyon-juniper forest. Individuals are known to roost singly or in small groups in cliff and rock crevices, buildings, concrete overpasses, caves, and mines.

The range of the small-footed myotis includes much of the State of California and the western half of North America (CDFG, 2005). Roost sites are not documented within 100 miles of the Los Vaqueros Watershed (CDFG, 2008). Based on the described distribution of roost sites and lack of cliffs and rock crevices in the Los Vaqueros Watershed study area, a low likelihood exists that this species would be encountered in the watershed.

Due to the lack of suitable structural habitat in study areas outside the watershed, this species is not expected in these areas.

Long-Eared Myotis Bat (*Myotis evotis*). The long-eared myotis bat is found predominantly in coniferous forests, typically only at higher elevations in southern areas (between 7,000 and 8,500 feet). Individuals roost under exfoliating tree bark, and in hollow trees, caves, mines, cliff crevices, sinkholes, and rocky outcrops on the ground. They also sometimes roost in buildings and under bridges. Pregnant long-eared myotis bats often roost at ground level in rock crevices, fallen logs, and even in the crevices of sawed-off stumps, but they cannot rear young in such vulnerable locations.

These bats are endemic to the west, ranging from southwestern Canada, south through California into Baja, eastward through northern Arizona and New Mexico, and north into the Dakotas (WBWG, 2005). The nearest described sightings are about 60 miles to the north in Chiles Valley (Napa County) and 95 miles to the east in Stanislaus National Forest (Tuolumne County) (CDFG, 2008). Based on this species’ described range, which includes much of California, it cannot be ruled out from the project area. However, the likelihood that it may roost in trees and rocky outcrops in the watershed is low.

Due to the lack of suitable structural habitat in study areas outside the watershed, this species is not expected in these areas.

Fringed Myotis Bat (*Myotis thysanodes*). The fringed myotis bat is most common in dry woodlands (oak, pinyon-juniper, ponderosa pine), and is found in a wide variety of habitats including desert scrub, mesic coniferous forest, grassland, and sage-grass steppe. Night and day roosts include caves, mines, and buildings (typically abandoned). Hibernacula include caves and buildings, but not much is known about their wintering whereabouts (WBWG, 2005).

Fringed myotis bats range through much of western North America from southern British Columbia, Canada south to Chiapas, Mexico, and from Santa Cruz Island in California east to the Black Hills of South Dakota.

The nearest described occurrence is a 2005 observation near Crystal Springs Reservoir (San Mateo County), about 40 miles west of the Los Vaqueros Watershed (CDFG, 2008). Based on this
species’ described range, which includes much of California, it cannot be ruled out in the project area. However, the likelihood that it may roost in rocky outcrops in the watershed is low.

Due to the lack of suitable structural habitat in study areas outside the watershed, this species is not expected in these areas.

**Long-Legged Myotis Bat** (*Myotis volans*). The long-legged myotis bat is especially dependent on wooded habitats from pinyon-juniper to coniferous forests, usually at 4,000- to 9,000-foot elevations. This species uses abandoned buildings, cracks in the ground, cliff crevices, exfoliating tree bark, and hollows within snags as summer day roosts; caves and mine tunnels as hibernacula (WBWG, 2005). Radio-tracking studies have identified maternity roosts beneath bark and in other cavities.

Long-legged myotis bats are one of western America’s most widely distributed bat species. Long-legged myotis bats range across western North America from southeastern Alaska, British Columbia, and Alberta in Canada to Baja California and central Mexico. It occurs throughout the western United States from the Pacific coast to the Great Plains and central Texas.

The nearest described observation is a 1999 sighting from Don Pedro Reservoir (Tuolumne County), 75 miles east of the Los Vaqueros Watershed (CDFG, 2008). However, based on this species’ geographic range, which is described as much of California, it cannot be ruled out from the project area. However, the likelihood that it may roost in trees and rocky outcrops in the watershed is low.

Due to the lack of suitable structural habitat in study areas outside the watershed, this species is not expected in these areas.

**Yuma Myotis Bat** (*Myotis yumanensis*). Yuma myotis bats are usually associated with permanent sources of water, but also with natural water catchment basins in the arid West (WBWG, 2005). They occur in a variety of habitats including riparian, arid scrublands, deserts, and forests. Occasionally roosting in mines or caves, these bats are most often found in buildings or bridges. Bachelors also sometimes roost in abandoned cliff swallow nests, but tree cavities were probably the original sites for most nursery roosts.

The nearest described observation is a 2003 sighting in the City of Pleasanton (Alameda County), 12 miles southwest of the Los Vaqueros Watershed (CDFG, 2008). Based on this species’ described range, which is much of California, it cannot be ruled out from the project area. However, the likelihood that it may roost in trees and rocky outcrops in the watershed is low.

Due to the lack of suitable structural habitat in study areas outside the watershed, this species is not expected in these areas.

**San Joaquin pocket mouse** (*Perognathus inornatus inornatus*). The San Joaquin pocket mouse lives in dense annual grasslands, saltbush scrub, and oak savannah habitats, exploiting the topography of flat ground and low hills. It is usually found in areas with friable soils, constructing its small burrows in sandy soil near bases of bushes. Microhabitats include dense grass, dirt roadsides, and rock outcroppings. Sparse iodine bush scrub and short grasslands habitat in the
Western powerline alignment provide the best available habitat in the project area for this species, and provides the only described local occurrence of this species (CDFG, 2008).

Grasslands with friable soils on the Transfer-Bethany Pipeline and at the Western substation site provide high quality habitat where this species could occur. Non-native annual grasslands throughout the project area provide potential, though lesser quality habitat.

**American Badger (Taxidea taxus).** In California, American badgers occupy a diversity of habitats. Grasslands, savannas, and mountain meadows near the timberline are preferred, though they can be found in deserts as well. The principal requirements seem to be sufficient food, friable soils, and relatively open, uncultivated ground.

In California, badgers range throughout the state, except for the humid coastal forests of northwestern California in Del Norte County and the northwestern portion of Humboldt County (Williams, 1986). This species is expected to occur in low densities in grassland habitats throughout the project area, with populations identified in the Los Vaqueros Reservoir footprint and just north of the existing reservoir (Jones and Stokes, 1988; ESA, 2004).

American badgers may be encountered on the Delta-Transfer Pipeline, Transfer-LV Pipeline, and Transfer-Bethany Pipeline, and at other in-watershed and out-of-watershed facilities. Grasslands on the Western powerline alignment, Western substation site, and PG&E facilities site may also support this species.

**Plants**

Figures 4.6-12 and 4.6-13 show the known distribution of special-status plants within the watershed and outside the watershed, respectively.

**Federal or State Threatened and Endangered Species**

**Contra Costa Goldfields.** Contra Costa goldfields is a small spring annual in the sunflower family (Asteraceae). Habitat for this species occurs in vernal pools, swales and moist flats within alkaline playas, valley and foothill grasslands, and cismontane woodland below a 1,500-foot elevation (CNPS, 2008). The species is often found in association with other endemic vernal pool plants such as coyote thistle, smooth goldfields (*Lasthenia glaberrima*), flatface downingia (*Downingia pulchella*), and common mousetail (CDFG, 2008).

Historically, Contra Costa goldfields were known from the north coast, the southern Sacramento Valley, the San Francisco Bay Area, and the southern coast. Currently, it is known to occur in Mendocino, Napa, Marin, Contra Costa, Alameda, Solano, Sonoma, and Monterey Counties, and is believed to be extirpated from Santa Barbara and Santa Clara Counties (CNPS, 2008). CDFG (2008) reports four occurrences in Contra Costa County and four in Alameda County.

No occurrences of Contra Costa goldfields are known within the watershed, with the nearest occurrence reported 11 miles north of Los Vaqueros Dam (CDFG, 2008). Based on protocol-level survey findings, this species is not expected to occur in the study area for any proposed facilities.
Figure 4.6-12
Distribution of Special-Status Plants in the Los Vaqueros Watershed

Los Vaqueros Reservoir Expansion Project EIS/EIR, 2011

SOURCE: USGS, 1993 (base map); CNDDB, 2007; and ESA, 2007
Figure 4.6-13
Distribution of Special-Status Plants Along Pipeline Routes Outside of the Los Vaqueros Watershed

SOURCE: USGS, 1993 (base map); and ESA, 2007
Federal or State Species of Special Concern

**Heartscale (Atriplex cordulata).** Heartscale is a low-growing annual herb in the goosefoot family (Chenopodiaceae). It grows in sandy, saline, or alkaline flats or scalds, in chenopod scrub, meadows, and valley and foothill grassland at less than 1,230-foot elevations (CNPS, 2008). Heartscale often grows in association with other atriplex, saltgrass, alkali heath, and common tarweed (*Hemizonia pungens*) (CDFG, 2008). Like other *Atriplex* species, heartscale is relatively tolerant of disturbance.

Heartscale is known within the southern Sacramento Valley to the San Joaquin Valley. Its current distribution ranges from Glenn and Butte Counties in the north to Kern County in the south (CNPS, 2008). Two populations are recorded in the Livermore vicinity in Alameda County, though no occurrences are reported in Contra Costa or San Joaquin Counties (CDFG, 2008).

Potential habitat is only available at a few distinct sites on the Transfer-Bethany Pipeline alignment and at the Western substation site (Power Option 1), which is spanned by powerlines under Power Option 2, where final botanical surveys were delayed due to site access constraints. Based on the spring 2008 survey findings (ESA, 2008), which did not identify this species, and the species’ described distribution, a low likelihood exists that this species may be encountered in this area. No other project facilities support this species.

**Brittlescale (Atriplex depressa).** Brittlescale is associated with alkaline or clay soils in chenopod scrub, playas, vernal pools, or seeps, and in valley grassland at less than 1,050-foot elevations (CNPS, 2008). It often occurs in the alkali soils of the Pescadero and Solano series (East County HPA, 2006).

Populations occur in semibarren areas of saline and alkaline meadows with other atriplex, alkali heath, salt grass, alkali mallow, meadow barley (*Hordeum brachyantherum*), common tarweed, and bush seepweed. Brittlescale is sometimes associated with other rare plants such as palmate-bracted bird’s-beak and San Joaquin saltbush (CDFG, 2008).

Brittlescale is known within the southern end of the Sacramento Valley through the San Joaquin Valley. It is currently known within Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Madera, Merced, Solano, Tulare, and Yolo Counties. The CNDDB has 52 known occurrences and all are presumed extant (CDFG, 2008). However, it is believed that some of these occurrences may be misidentified lesser saltscale (*Atriplex miniscula*) (East County HCPA, 2006). The distribution of this species in the project area is shown on Figure 4.6-12 and Figure 4.6-13.

Brittlescale has been recorded in the Los Vaqueros Watershed downstream from the Los Vaqueros Reservoir (CDFG, 2008). These three occurrences were found during surveys conducted in the watershed in 1988. About 500 plants were found 0.8 mile south of Marsh Creek Road, another 500 were observed about 0.6 mile north of Vasco Road, and 150 plants were found on the western side of the reservoir spillway south of Los Vaqueros Dam (Jones and Stokes, 1988).

Agricultural land and annual grassland in the study area for the Delta Intake Facilities, Delta-Transfer Pipeline, Transfer-LV Pipeline, and Expanded Transfer Facility do not provide habitat for this species. Alkali wetlands and alkali grasslands within in the Transfer-Bethany Pipeline
study area provide suitable habitat for brittlescale. Alkali wetlands and alkali grasslands east of Vasco Road and along Armstrong Road provide suitable habitat for this species. Initial spring 2008 surveys identified potential habitat in alkali grasslands at a few distinct locations on the Transfer-Bethany Pipeline alignment near Armstrong Road. Final botanical surveys of these areas were delayed in 2008 due to site access constraints, thus, there remains a moderate potential that several small brittlescale populations occur in this area.

**San Joaquin Spearscale (Atriplex joaquiniana).** San Joaquin spearscale is known within the eastern side of the southern inner Coast Ranges, the southern end of the Sacramento Valley, and the San Joaquin Valley. Historically, the species’ range extended from Glenn County in the north to Tulare County in the south, but it is currently assumed to be extirpated from Santa Clara, San Joaquin, and Tulare Counties (CNPS, 2008).

This species is known to occur in alkali wetlands and along alkaline watercourses in the Los Vaqueros Watershed. The occurrences recorded from the lower Los Vaqueros Watershed, below the existing reservoir, include some of the largest recorded populations for this species (Jones and Stokes, 1988; ESA, 2007). The majority of in-watershed occurrences are along the Lower Los Vaqueros Watershed and within 1 to 2.5 miles of Los Vaqueros Dam (CDFG, 2008). No occurrences are recorded within the inundation zone; however, the stockpile area is just north of one population (CDFG, 2008). The distribution of this species in the project area is shown on Figures 4.6-12 and 4.6-13.

Based on focused survey findings (ESA, 2008b), San Joaquin spearscale is absent from the Delta Intake Facilities, Delta-Transfer Pipeline, Transfer-LV Pipeline, and Expanded Transfer Facility study areas. For the Transfer-Bethany Pipeline, several San Joaquin spearscale populations were identified in alkali wetlands and alkali grasslands south of Armstrong Road, in alkali grasslands habitats that were outside the pipeline study area (CDFG, 2008; ESA 2008b). Several populations were identified in the Western substation study area that can be avoided through appropriate siting of the substation within the study area (ESA, 2008b).

**Brewer’s Dwarf-Flax (western flax) (Hesperolinon breweri).** Brewer’s dwarf flax occurs on serpentine, sandstone, and volcanic soils in chaparral, woodlands, and valley foothill grasslands between 100- and 2,300-foot elevations (CNPS, 2008; East County HCPA, 2006). The species is generally found on slopes in areas with low-growing vegetation and in association with toyon, manzanita, chamise, foothill pine, buckbrush, scrub oak, sticky monkeyflower, yarrow, purple needlegrass, and slender wild oats (CDFG, 2008).

The species range is described as the Vaca Mountains at the southern end of the inner North Coast Range in Napa and Solano Counties and continuing into the Altamont Hills in Contra Costa County (Hickman, 1993). The distribution of this species in the project area is shown on Figure 4.6-13.

Six occurrences are reported in the watershed vicinity (see Figure 4.6-13). One occurrence was reported in the southern portion of Round Valley in 1987 with greater than 1,000 individuals. The other five occurrences were found during watershed surveys conducted in 1988. This species was observed during special-status plant surveys conducted for this project in six distinct populations
totaling about 1,850 individuals (ESA, 2007). Population sizes range from 100 to 500 plants. One population is within the study area and two mapped populations within this occurrence are known to occur within 150 feet of the westside access road and may be directly impacted by implementation of this project component. Another, smaller population south of this population consists of about 200 plants, and is within the study area (ESA, 2007).

Brewer’s dwarf-flax is not expected in study areas outside the watershed.

**Rose-Mallow** (*Hibiscus lasiocarpus*). Rose-mallow is a perennial, rhizomatous herb in the mallow family (Malvaceae). Habitat for this species occurs in freshwater wetlands and freshwater marshes in California and elsewhere in North America. This species range includes the northern and central Sacramento Valley. It is currently known from San Joaquin, Solano, Contra Costa, Sacramento, Sutter, Colusa, Glenn, and Butte Counties (CNPS, 2008). The distribution of this species in the project area is shown on Figure 4.6-12.

Habitat for this species in the project area only occurs on the banks of Old River, near the Delta Intake Facilities. Two plants occur within a 1-square-meter area roughly 1,400 feet north of the Delta Intake Facilities, a colony with fewer than 15 plants occurs 1,100 feet south of the facilities, and a single plant occurs across Old River (CDFG, 2008). These populations are outside the Expanded Old River Intake and Pump Station project area. A colony consisting of fewer than 15 plants occurs at the site for the new Delta Intake and Pump Station. No other populations are known or were identified during focused botanical surveys in spring 2008 (ESA, 2008b).

**Mason’s Lilaeopsis** (*Lilaeopsis masonii*). Mason’s lilaeopsis occurs on tidally influenced mudflats and mud-banks of sloughs and rivers, freshwater and brackish marsh, and riparian scrub. The species typically grows in saturated clay substrates that are inundated by tidal action or waves on a regular basis. Common associates of this species include bulrush, bugleweed (*Lycopus* spp.), marsh pennywort (*Hydrocotyle* spp.), rushes, spikerush, loosestrife (*Lythrum* spp.), dock (*Rumex* spp.), coyote thistle, willow, cattail, and horsetail (*Equisetum* spp.) (CDFG, 2008). It is often found in association with other special-status plants including Delta mudwort, Delta tule pea, and Suisun Marsh aster (*Aster lentus*) (CDFG, 2008).

Mason’s lilaeopsis is distributed though the Sacramento-San Joaquin River Delta and sloughs, Suisun Marsh, and Lower Napa River. The local distribution of this plant outside the watershed is shown on Figure 4.6-12. Two small colonies were identified on the banks of Old River near the Delta Intake Facilities, 5,000 feet north and 1,200 feet south of Expanded Old River Intake and Pump Station. The south population is about 700 feet north of the new Delta Intake and Pump Station site. This species is considered absent from the project area (ESA, 2007; 2008b).

**Existing Mitigation Commitments for Special-Status Species**

This section presents mitigation commitments from the three USFWS BOs that were issued for the existing Los Vaqueros Reservoir to address project effects on San Joaquin kit fox, bald eagle, California red-legged frog, Alameda whipsnake, longhorn fairy shrimp, and vernal pool fairy shrimp.
USFWS FESA Biological Opinion for San Joaquin Kit Fox and Bald Eagle. Formal USFWS consultation on the effects of the existing Los Vaqueros Reservoir on the San Joaquin kit fox (federally endangered) and bald eagle (formerly federally threatened, now delisted; state endangered) resulted in a BO from USFWS (USFWS 1-1-92-F-48, September 3, 1993). The BO lists several terms and conditions that the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and CCWD must comply with. Measures that affect long-term management in the watershed include:

- “CCWD shall acquire and protect in perpetuity a total of 7,544 acres of habitat for San Joaquin kit fox, which includes 6,513 acres within the watershed and 1,031 acres in two separate mitigation areas outside the watershed (BO pg 23), depending upon final assessment of all impacts from the project.” (Note that recreational impacts to San Joaquin kit fox habitat were lower than initially anticipated. As a result, the required amount of dedicated conservation easement became 5,837 acres. As of December 2008, 4,150 acres have been conveyed to CDFG and an additional 1,856 acres are proposed to be conveyed to CDFG (see Figure 4.6-14)). “The habitat will be managed by CCWD under a USFWS- and CDFG-approved habitat management plan. This acreage amounts to a 3:1 mitigation ratio (compensation lands: impacted lands) for project impacts to San Joaquin kit fox habitat.”

- “CCWD shall develop a recreation plan that addresses potential effects on San Joaquin kit fox and bald eagle in the watershed. USFWS and CDFG shall have approval authority over the plan to ensure that any potential effects on these species are reduced to an ‘insignificant level.’”

- “CCWD shall monitor bald eagles in the watershed to help determine the effects of recreation on bald eagle use of the area and the mortality rates resulting from wind turbines in the project area. These effects shall be studied by CCWD using a USFWS- and CDFG-approved monitoring and study plan.”

USFWS FESA Biological Opinion for California Red-Legged Frog and Alameda Whipsnake. Formal consultation concerning the effects of the existing Los Vaqueros Reservoir on the California red-legged frog (federally threatened) and a conference report on the effects on the Alameda whipsnake (federally threatened) resulted in a BO from USFWS (USFWS 1-1-96-F-151, November 8, 1996) (USFWS, 1996). As with the previous BO, this opinion lists several nondiscretionary terms and conditions that Reclamation and CCWD must comply with. Conditions that affect long-term management for these species in the watershed include the following:

- “CCWD shall monitor the extent and quality of California red-legged frog habitat to ensure that it does not decline over time. If any mitigation sites (ponds and wetlands) that were specifically created for California red-legged frog fail to support successfully reproducing California red-legged frogs for at least 1 year within the next 5 years from the date of this BO, the site shall be replaced at a 3:1 ratio.”

- “Wetlands that are identified for California red-legged frog mitigation must maintain adequate water levels throughout the year to provide suitable California red-legged frog breeding habitat. Mitigation includes 12.21 acres of wetlands, 10.59 acres of riparian, and 11.23 acres of stock ponds.”
Los Vaqueros Trail Adjustment

275 TAF Borrow Area

4150 ACRES

Existing Reservoir (100 TAF)

275 Inundation Area

160 TAF Inundation Area

Potential New PG&E Transmission Line

CCWD Los Vaqueros Watershed Property Line

County Boundary

EASEMENTS

- Conveyed to CDFG
- Submitted to CDFG but Not Recorded

Marina Road
Westside Access Road/Trail
Eastside Trail Connectors
Existing Eastside Roads
Existing Public Trails
Delta-Transfer Pipeline
Transfer-LV Pipeline
Transfer-Bethany Pipeline

SOURCE: USGS, 1993 (base map); CNDDB, 2007; and ESA, 2007

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Figure 4.6-14

Location of San Joaquin Kit Fox Easements within Los Vaqueros Watershed
• “Wetland and riparian habitats downstream of Los Vaqueros Dam site shall be monitored to ensure those areas are maintained as wetland habitats.”

• “All alkali marsh mitigation wetlands shall be planted with bulrush at densities specified in the BO. The vegetation at these sites shall be monitored as they mature to ensure that they remain suitable for California red-legged frogs.”

• “Monitor all stock ponds, created ponds, and semipermanent and alkali marsh mitigation wetlands in April, July, August, September, October, and once in winter of every year for water level, stage of California red-legged frog development, and presence of bullfrogs. Report the results of this monitoring effort by January 15 of every year of the project.”

• “Livestock fencing in areas specified in the BO must be maintained in perpetuity to protect California red-legged frog habitat.”

• “CCWD shall prepare and submit for approval to USFWS a Predator Management Plan for the project area. The plan will include measures to reduce or eliminate habitat for bullfrogs, monitoring for the presence of bullfrogs and their egg masses, dewatering stock ponds with bullfrogs, and success criteria.”

• “Changes in land uses identified in the watershed management program and the resource management plan shall not occur without additional consultation with USFWS.”

• “Visitor use shall be limited and pets shall be prohibited from Drainage Units D, E, F, and G. No recreational activities shall be allowed in the California red-legged frog mitigation sites (see Figure 4.6-15 for mitigation site locations). See Figure 4.6-16 for access restrictions in the watershed.”

• “Mosquito abatement and the application of any herbicides or pesticides in the project area must be approved by USFWS.”

• “No construction activities, public vehicle traffic (including trams), bikes, or recreational facilities shall be allowed within 500 feet of chaparral or scrub, excluding Old Vasco Road, which enters the reservoir site from the south.”

• “No off-road travel within 500 feet of chaparral or scrub shall be allowed without prior approval by USFWS. See Figure 4.6-16 for access restrictions in the watershed.”

• “Vehicle speed limits of 15 mph must be observed within 500 feet of Alameda whipsnake habitat.”

• “No additional firebreaks will be constructed in chaparral without USFWS approval.”

USFWS FESA Biological Opinion for Fairy Shrimp (Two Species). For the existing Los Vaqueros Reservoir, USFWS issued a conference report (USFWS, 1993b), clarification letter, and adoption of the Conference Opinion as a BO with modifications to terms and conditions (USFWS, 1995) for the longhorn fairy shrimp (Branchinecta longiantenna; federally endangered) and the vernal pool fairy shrimp (federally threatened).
Los Vaqueros Trail Adjustment

Mitigation Ponds
Existing Stock Ponds
Stream Management Areas

Marina Road
* Westside Access Road/Trail
** Eastside Trail Connectors
• Existing Eastside Roads
- Existing Public Trails

Existing Reservoir (100 TAF)
275 TAF Inundation Area
160 TAF Inundation Area
CCWD Los Vaqueros Watershed Property Line

Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110
Figure 4.6-15
Location of Wetlands Created for California Red-Legged Frog and Stockponds within the Los Vaqueros Watershed

SOURCE: USGS, 1993 (base map); and ESA, 2006
Los Vaqueros Trail Adjustment

CCWD – No Public Access
Low Intensity Recreation
No Traffic or Construction Activities
Stream Management Areas
Wind Energy Easement
Restricted Access Boundary

Marina Road
Westside Access Road/Trail
Eastside Trail Connectors
Existing Eastside Roads
Existing Public Trails

Existing Reservoir (100 TAF)
275 TAF Inundation Area
160 TAF Inundation Area
CCWD Los Vaqueros Watershed
Property Line

SOURCE: USGS, 1993 (base map); CCWD, 2007; and ESA, 2007

Figure 4.6-16
Existing Access Restrictions within the Los Vaqueros Watershed
These two species of federally listed invertebrates were originally addressed in a conference report by USFWS in 1993 when they were still proposed for listing. After the conference report was issued, both species were formally listed. Therefore, USFWS adopted the conference report into its BO in 1995 after modifying several terms and conditions. Measures that affect long-term management in the watershed include:

- “Human use in the easternmost portion of the Kellogg Creek watershed and in Conservation Area 1…shall be restricted to activities associated with wind energy generation, dry-land farming, grazing, and administration by CCWD. Public use shall be restricted to research and occasional educational activities conducted under the supervision of CCWD staff or other designated land management agencies. This use designation corresponds to the No-Use designation in the conceptual recreation plan. Lands just east of the reservoir will be managed by CCWD to allow low-intensity dispersed recreation use. The eastern boundary of the area shall be fenced to prevent human access to the more restricted easternmost lands and this fence and the Kellogg Creek vernal pools area shall be patrolled to ensure that no trespassing happens and that the fence remains intact. Accepted uses in the lands just east of the reservoir include hiking and boat landing, and associated activities such as picnicking. Except as may be provided under Term and Condition 1b, major facilities shall not be located in this area. This use designation corresponds to the Controlled-Use category in the conceptual recreation plan (USFWS, 1995).”

- “Several areas in the watershed shall be set aside from most human activities. These areas include the easternmost portion of the watershed and Conservation Area 1. (See Figure 4.6-16 for access restrictions in the watershed.) Lands just east of the reservoir shall only have low-intensity, dispersed recreation use. Excluded areas shall be fenced and patrolled to exclude public access.”

- “The Kellogg Creek vernal pool complex and a 200-foot buffer are within lands for which a conservation easement has been granted to CDFG.”

Stage II EIS/EIR – Golden Eagle Monitoring Requirements. Compliance with the federal MBTA, the Bald Eagle Protection Act, and mitigation measures adopted through the CEQA/NEPA process required CCWD to monitor nesting golden eagles. In addition, activities such as construction and recreation should avoid disturbing nesting golden eagles. To accomplish this avoidance, CCWD seasonally closes and reroutes recreation trails that pass within 0.5 mile of nesting golden eagle sites and halts watershed operations in the vicinity of active nests.

Existing Conservation Commitments

CDFG CESA Memorandum of Understanding for San Joaquin Kit Fox. CDFG and CCWD signed a CESA memorandum of understanding for the existing Los Vaqueros Reservoir on February 16, 1994, which outlines several conservation measures that were included in the BO for this species. Measures include acquiring the conservation areas mentioned previously for this species and legally conveying the easements to CDFG, monitoring of kit fox habitat, and several construction-related measures. Other measures include prohibiting the widespread use of rodenticides in the watershed.
Sensitive Habitats

Sensitive habitats include vegetation communities and wetlands that are regulated by resource agencies or are identified in local or regional plans and policies. Sensitive habitats in the study area include oak woodlands, riparian vegetation, emergent marsh, vernal pools, and alkali meadows. Sensitive natural communities in the project area include saline emergent marshlands (alkali meadow, alkali seep, and cismontane alkali marsh), freshwater marsh, northern claypan vernal pool, and valley needlegrass grassland. These sensitive habitats are discussed in Appendix D.

Stage II EIR/EIS and USFWS Fish and Wildlife Coordination Act Report – Oak Woodland Monitoring Requirements. As required for water reclamation projects by the mitigation adopted during the CEQA/NEPA process and the Fish and Wildlife Coordination Act, a Fish and Wildlife Coordination Act Report and Final Recommendations were prepared by USFWS for the existing Los Vaqueros Reservoir. As part of the report, USFWS prepared and submitted a valley oak and blue oak savanna mitigation plan to CCWD that addressed the mitigation requirements of both the CEQA/NEPA and Fish and Wildlife Coordination Act processes. The plan requires the creation or enhancement of a total of 394 acres of valley oak woodland and savanna and between 16 and 67 acres of blue oak woodland (Fish and Wildlife Coordination Act requirement only). A range for blue oak mitigation was established to address the range of potential impact anticipated for the recreation facilities plan that was still in development at the time. Development of the maximum recreation facilities concept requires up to 67 acres of blue oak mitigation.

USACE Section 404 Permit – Wetlands. For the existing Los Vaqueros Reservoir, impacts on wetlands and other waters of the United States regulated under CWA, Section 404, were authorized under an individual permit (Permit No. 199000070) from USACE. Wetlands created for mitigation must meet the Section 404 permit performance standards for both vegetation and hydrology. Mitigation is considered successful if, after 6 years of monitoring, about 80 percent of each wetland type has met USACE’s criteria for vegetation and hydrology performance. Wetland creation and enhancement requirements are presented for each wetland type in Table 4.6-5.

<table>
<thead>
<tr>
<th>Wetland Type</th>
<th>Impacts (Acres)</th>
<th>Mitigation Commitment (Acres)</th>
<th>Mitigation Commitment (Type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkali marsh</td>
<td>2.06</td>
<td>4.12</td>
<td>creation</td>
</tr>
<tr>
<td>Semipermanent marsh</td>
<td>3.64</td>
<td>7.33</td>
<td>creation</td>
</tr>
<tr>
<td>Vernal pool</td>
<td>0.01</td>
<td>0.02</td>
<td>creation</td>
</tr>
<tr>
<td>Willow-cottonwood riparian</td>
<td>0.38</td>
<td>0.76</td>
<td>creation</td>
</tr>
<tr>
<td>Seasonal wetlands</td>
<td>N/A</td>
<td>6.48</td>
<td>creation</td>
</tr>
<tr>
<td>Alkali grassland and meadow</td>
<td>3.23</td>
<td>30.50</td>
<td>enhancement</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9.32</strong></td>
<td><strong>49.21</strong></td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: USACE, Section 404 Permit 1990-0070.
4.6.2 Environmental Consequences

Methodology

The impact analysis for biological resources was based on consideration of the following:

- Construction activities and the expected maximum area of ground disturbance
- Long-term operations and the associated area of potential effect
- Existing habitat conditions
- Known or presumed occurrence of sensitive habitats and protected species within or near proposed alternative sites

As defined in Table 4.6-6, the following terms are used in this analysis to distinguish areas of potential direct impact from areas of potential indirect impact: “project area” or “project site” refers to the area of potential direct effects that could be physically modified by proposed facilities or activities; “project study area” refers to the area where biological resources were evaluated outside of the proposed facility site boundaries, but where potential indirect effects could occur.

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Project Area (Surveyed for Direct Project Impacts)</th>
<th>Project Study Area (Area Surveyed to Assess Indirect Project Impacts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expanded Reservoir</td>
<td>Maximum extent of surface water inundation, plus 25-feet</td>
<td>A 1,000-foot buffer was physically surveyed for biological resources; the Los Vaqueros Watershed and surrounding watersheds were analyzed to assess regional impacts to special status wildlife species</td>
</tr>
<tr>
<td>Facilities within Los Vaqueros Watershed</td>
<td>Footprint of proposed facilities</td>
<td>150-foot buffer surrounding facilities was physically surveyed; the Los Vaqueros Watershed and surrounding watersheds were analyzed to assess regional impacts to special status wildlife species</td>
</tr>
<tr>
<td>New Delta Intake and Pump Station and Power Supply Infrastructure</td>
<td>Footprint of proposed facilities</td>
<td>A 150-foot buffer surrounding facilities was physically surveyed; areas up to 1.0 mile were assessed for special status wildlife species</td>
</tr>
<tr>
<td>Pipelines</td>
<td>200-foot-wide easement for the Delta-Transfer Pipeline and Transfer-LV Pipeline; 300-foot-wide easement for the Transfer-Bethany Pipeline</td>
<td>500-foot wide corridor centered on the alignment was physically surveyed; areas up to 1.0 mile were assessed for special status wildlife species</td>
</tr>
</tbody>
</table>

SOURCE: ESA, 2008

The evaluation of project impacts on special status plant and wildlife species was based either on known population locations or an assessment of habitat that would be affected. Impacts to special-status species were assessed in terms of potential changes in the amount and distribution of suitable habitat, the relative importance of the affected habitats, and the potential for direct loss.
of individuals. The distribution of special status plant and wildlife species that may occur in the project study area, as identified in Table 4.6-4, is organized by project component in Table 4.6-7.

Habitat disturbance impacts were defined as temporary or permanent. A temporary impact generally lasts less than one growing season. To better distinguish long-term impacts from permanent impacts, the category of “long-term temporary impact,” is used for western pond turtle and San Joaquin kit fox. This term is used in this section to describe temporary habitat disturbances with a duration lasting longer than one growing season. Permanent impacts, as used in this section, are those that would permanently alter the landscape with no return to pre-project conditions. USFWS generally considers “long-term temporary” effects (i.e., effects with a duration of greater than one growing season) as permanent effects.

Habitat Compensation

The habitat mitigation and compensation ratios presented in this section were derived based on guidance provided in the Multi-Species Conservation Strategy (MSCS) (CALFED, 2000) and input provided during ongoing strategic planning meetings with CDFG and USFWS staff from 2004 to 2008. A summary of habitat compensation ratios relevant to this analysis is provided in Section 4.6.3, and represents both low and high habitat compensation ratios.

The baseline habitat value of impacted lands within the watershed was evaluated using USFWS’ Habitat Evaluation Procedure (HEP), which will also be used to establish HEP values for replacement lands. Thus, while mitigation values are presented as a range for selected special-status species and sensitive habitats, final habitat compensation values (e.g., whether temporary impacts to San Joaquin kit fox habitat are mitigated at a 1:1 or 3:1 ratio [compensation lands: impacted lands]) will be determined by how well replacement lands approximate impacted habitat values, and if lower quality habitat can be successfully restored. Higher mitigation ratios are appropriate if mitigation lands are deemed only partially suitable or require some degree of enhancement to balance HEP habitat values.

The MSCS ratios are considered initial guidelines; the permitting agencies will determine project requirements on a case-by-case basis. However, the MSCS compensation ratios provide guidance on the appropriate nature and magnitude of compensation needed to adequately mitigate species- and habitat-based impacts.

Significance Criteria

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in CEQA Guidelines, Appendix G. These thresholds also encompass the factors taken into account under NEPA to assess an impact in terms of its context and intensity.

An alternative would result in a significant impact on terrestrial biological resources if it would:

- 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 CDFG or USFWS
### TABLE 4.6-7
SPECIAL-STATUS SPECIES WITH POTENTIAL TO BE AFFECTED, SORTED BY PROJECT FACILITY

<table>
<thead>
<tr>
<th>Special-Status Species</th>
<th>Status: Fed/State/ CNPS/ CALFED</th>
<th>275-TAF/ Inundation Zone</th>
<th>Watershed Recreation Facilities</th>
<th>Transfer - Los Vaqueros Pipeline</th>
<th>Transfer Station</th>
<th>Delta- Transfer Pipeline</th>
<th>Transfer- Bethany Pipeline</th>
<th>Delta Intake Facilities</th>
<th>Power Option 1</th>
<th>Power Option 2</th>
<th>NCCP Habitat Associations</th>
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<tr>
<td><strong>Invertebrates</strong></td>
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<td><strong>FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES</strong></td>
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</tr>
<tr>
<td>Branchinecta longiantenna Longhorn fairy shrimp</td>
<td>FE/ST/---/m</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
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<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Branchinecta lynchii Vernal pool fairy shrimp</td>
<td>FT/ST/---/m</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Potential</td>
<td>Known</td>
<td>Unlikely</td>
<td>Potential</td>
<td>Unlikely</td>
<td>NSW</td>
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<tr>
<td>Desmocerus californicus dimorphus Valley elderberry longhorn beetle</td>
<td>FT/ST/---/R</td>
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<td>Known</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Potential</td>
<td>Unlikely</td>
<td>Potential</td>
<td>NSW</td>
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<td><strong>FEDERAL OR STATE SPECIES OF SPECIAL CONCERN</strong></td>
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<tr>
<td>Branchinecta mesovallensis Midvalley fairy shrimp</td>
<td>---/ST/---/m</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Potential</td>
<td>Potential</td>
<td>Unlikely</td>
<td>Potential</td>
<td>Unlikely</td>
<td>NSW</td>
</tr>
<tr>
<td>Hygrotus curvipes Curved-foot hygrotus diving beetle</td>
<td>FSC/ST/---/m</td>
<td>Potential</td>
<td>Potential</td>
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<td>Potential</td>
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<td>NSW</td>
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<td><strong>Amphibians</strong></td>
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<tr>
<td><strong>FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES</strong></td>
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</tr>
<tr>
<td>Ambystoma californiense California tiger salamander</td>
<td>FT/CSC/---/m</td>
<td>Known</td>
<td>Known</td>
<td>Known</td>
<td>Potential</td>
<td>Unlikely</td>
<td>Potential</td>
<td>Unlikely</td>
<td>Potential</td>
<td>Unlikely</td>
<td>Potential</td>
</tr>
<tr>
<td>Rana draytonii California red-legged frog</td>
<td>FT/CSC/---/m</td>
<td>Known</td>
<td>Known</td>
<td>Known</td>
<td>Potential</td>
<td>Unlikely</td>
<td>Potential</td>
<td>Unlikely</td>
<td>Potential</td>
<td>Unlikely</td>
<td>VFW</td>
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<td><strong>Reptiles</strong></td>
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<td><strong>FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES</strong></td>
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</tr>
<tr>
<td>Masticophis laterals euryxanthus Alameda whipsnake (=Alameda striped racer)</td>
<td>FT/ST/---/m</td>
<td>Known</td>
<td>Potential</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>VFR, Gr, US, VFW</td>
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</tbody>
</table>
### TABLE 4.6-7 (Continued)

**SPECIAL-STATUS SPECIES WITH POTENTIAL TO BE AFFECTED, SORTED BY PROJECT FACILITY**

<table>
<thead>
<tr>
<th>Special-Status Species</th>
<th>Status: Fed/State/ CNPS/ CALFED</th>
<th>Potential Species Occurrence in Project Study Area</th>
<th>NCCP Habitat Associations</th>
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<td>Watershed Restoration Facilities</td>
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<td>FEDERAL OR STATE SPECIES OF SPECIAL CONCERN (cont.)</td>
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<tr>
<td><em>Actinemys marmorata</em></td>
<td>~/CSC/~m</td>
<td>Known</td>
<td>Known</td>
</tr>
<tr>
<td>Western pond turtle</td>
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<td></td>
</tr>
<tr>
<td><em>Masticophis flagellum ruddocki</em></td>
<td>~/CSC/~m</td>
<td>Known</td>
<td>Potential</td>
</tr>
<tr>
<td>San Joaquin whipsnake (=coachwhip)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Phrynosoma coronatum</em></td>
<td>~/CSC/~m</td>
<td>Potential</td>
<td>Potential</td>
</tr>
<tr>
<td>Coast horned lizard</td>
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<td><strong>Birds</strong></td>
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<td>FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES</td>
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<tr>
<td><em>Buteo swainsoni</em></td>
<td>~/ST/~m</td>
<td>Potential</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Swainson’s hawk</td>
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<tr>
<td><em>Haliaeetus leucocephalus</em></td>
<td>~/BEPA-FD/SE-CFP/~m</td>
<td>Potential</td>
<td>Potential</td>
</tr>
<tr>
<td>Bald eagle</td>
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<td>FEDERAL OR STATE SPECIES OF SPECIAL CONCERN</td>
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<tr>
<td><em>Accipiter cooperi</em></td>
<td>~/CSC/~m</td>
<td>Potential</td>
<td>Potential</td>
</tr>
<tr>
<td>Cooper’s hawk</td>
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<tr>
<td><em>Accipiter striatus</em></td>
<td>~/CSC/~m</td>
<td>Potential</td>
<td>Potential</td>
</tr>
<tr>
<td>Sharp-shinned hawk</td>
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<tr>
<td><em>Aquila tricolor</em></td>
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<td>Potential</td>
<td>Potential</td>
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<td>Tricolored blackbird</td>
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<td><em>Aquila chrysaetos</em></td>
<td>~/BEPA/CSC-CFP/~m</td>
<td>Known</td>
<td>Potential</td>
</tr>
<tr>
<td>Golden eagle</td>
<td></td>
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<tr>
<td><em>Athene cuniculatrix hypuga</em></td>
<td>~/CSC/~m</td>
<td>Known</td>
<td>Known</td>
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<tr>
<td>Western burrowing owl</td>
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<tr>
<td><em>Asio flammeus</em></td>
<td>~/CSC/~m</td>
<td>Potential</td>
<td>Unlikely</td>
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<tr>
<td>Short-eared owl</td>
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</table>
### TABLE 4.6-7 (Continued)
SPECIAL-STATUS SPECIES WITH POTENTIAL TO BE AFFECTED, SORTED BY PROJECT FACILITY

<table>
<thead>
<tr>
<th>Special-Status Species</th>
<th>FEDERAL OR STATE SPECIES OF SPECIAL CONCERN (cont.)</th>
<th>FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES</th>
<th>FEDERAL OR STATE SPECIES OF SPECIAL CONCERN</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Circus cyaneus</td>
<td>Vulpes macrotis mutica</td>
<td>Antrozous pallidus</td>
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<tr>
<td></td>
<td>Northern harrier</td>
<td>San Joaquin kit fox</td>
<td>Pallid Bat</td>
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<tr>
<td></td>
<td>Eulanus leucurus</td>
<td></td>
<td>Corynorhinus townsendii</td>
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<tr>
<td></td>
<td>White-tailed (=black shouldered) kite (nesting)</td>
<td></td>
<td>Townsend’s big-eared bat</td>
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<tr>
<td></td>
<td>Eremophila alpestris actica</td>
<td></td>
<td>Eumops perforis Californicus</td>
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<td></td>
<td>California horned lark</td>
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<td>Greater Western Mastiff Bat</td>
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<tr>
<td></td>
<td>Falco mexicanus</td>
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<td>Myotis ciliolabrum</td>
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<td>Prairie falcon (nesting)</td>
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<td>Small-footed myotis Bat</td>
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<td>Lanius ludovicianus</td>
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<td>Loggerhead shrike</td>
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<tr>
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<td>Pandion haliaetus</td>
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<td>Osprey</td>
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<th>Potential Species Occurrence in Project Study Area</th>
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<td>Status: Fed/State/ CNPS/ CALFED</td>
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<td>NCCP Habitat Associations</td>
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<th>Special-Status Species</th>
<th>Status: Fed/State/ CNPS/ CALFED</th>
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<tr>
<td>Birds (cont.)</td>
<td>Potential</td>
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<td>Federal or State Species of Special Concern (cont.)</td>
<td>Federal or State Threatened and Endangered Species</td>
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<td>Northern harrier</td>
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<tr>
<td>Eulanus leucurus</td>
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<td>White-tailed (=black shouldered) kite (nesting)</td>
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<td>Eremophila alpestris actica</td>
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<td>Pandion haliaetus</td>
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<td>Osprey</td>
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**SPECIAL-STATUS SPECIES WITH POTENTIAL TO BE AFFECTED, SORTED BY PROJECT FACILITY**

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<th>Special-Status Species</th>
<th>Status: Fed/State/ CNPS/ CALFED</th>
<th>NCCP Habitat Associations</th>
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<td><strong>FEDERAL OR STATE SPECIES OF SPECIAL CONCERN (cont.)</strong></td>
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<tr>
<td><em>Myotis evotis</em></td>
<td>Potential Potential Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely N/A</td>
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<tr>
<td>Long-eared myotis bat</td>
<td>FSC/--/----</td>
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<tr>
<td><em>Myotis thysanodes</em></td>
<td>Potential Potential Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely N/A</td>
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<td>Fringed myotis bat</td>
<td>FSC/--/----</td>
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<tr>
<td><em>Myotis volans</em></td>
<td>Potential Potential Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely N/A</td>
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<tr>
<td>Long-legged myotis bat</td>
<td>FSC/--/----</td>
<td></td>
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<tr>
<td><em>Myotis yumanensis</em></td>
<td>Potential Potential Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely N/A</td>
<td></td>
</tr>
<tr>
<td>Yuma myotis bat</td>
<td>FSC/CSC/--/--</td>
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<tr>
<td><em>Perognathus inornatus inornatus</em></td>
<td>Potential Potential Potential Potential Potential Potential Potential Potential Gr (alkali)</td>
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</tr>
<tr>
<td>San Joaquin pocket mouse</td>
<td>--/CSC/--/--</td>
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<tr>
<td><em>Taxidea taxus</em></td>
<td>Potential Potential Potential Potential Potential Potential Potential Potential Gr</td>
<td></td>
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<tr>
<td>American badger</td>
<td>--/CSC/--/--</td>
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</tbody>
</table>

| **Plants**               |                                  |                           |
| **FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES** |                                  |                           |
| *Lasthenia conjugens*    | Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely NSW |
| Contra Costa goldfields  | FE/--/1B/m |                           |
| **FEDERAL OR STATE SPECIES OF SPECIAL CONCERN** |                                  |                           |
| *Atriplex cordulata*     | Unlikely Unlikely Unlikely Unlikely Unlikely Potential Potential Potential Potential |
| Heartscale               | --/--/1B/-- |                           |
| *Atriplex depressa*      | Unlikely Known Unlikely Unlikely Unlikely Potential Potential Potential Potential |
| Brittlescale             | --/--/1B/m |                           |
| *Atriplex joaquiniana*   | Unlikely Known Unlikely Unlikely Unlikely Known Known Known Known NSW, Gr |
| San Joaquin spearscale   | --/--/1B/m |                           |
| *Hesperolinon breweri*   | Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely | Gr, US, VFW |
| Brewer's dwarf-flax (=western flax) | --/--/1B/m |                           |
### Table 4.6-7 (Continued)

**SPECIAL-STATUS SPECIES WITH POTENTIAL TO BE AFFECTED, SORTED BY PROJECT FACILITY**

<table>
<thead>
<tr>
<th>Special-Status Species</th>
<th>Status: Fed/State/ CNPS/ CALFED</th>
<th>NCCP Habitat Associations</th>
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<th>Watershed Restoration Facilities</th>
<th>Transfer - Los Vaqueros Pipeline</th>
<th>Transfer - Delta - Transfer Pipeline</th>
<th>Transfer - Bethany Pipeline</th>
<th>Delta - Intake Facilities</th>
<th>Power Option 1</th>
<th>Power Option 2</th>
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<tbody>
<tr>
<td><em>Hibiscus lasiocarpus</em></td>
<td>Rose-mallow</td>
<td>--/--/2/m</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Known</td>
<td>Unlikely</td>
<td>NFE</td>
<td></td>
</tr>
<tr>
<td><em>Lilaeopsis masonii</em></td>
<td>Mason’s lilaeopsis</td>
<td>--/SR/1B</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Unlikely</td>
<td>Known</td>
<td>Unlikely</td>
<td>TFE</td>
</tr>
</tbody>
</table>

**Key to Potential Species Occurrence in Project Study Area:**

- **Known** = Species with known distribution in the study area;
- **Potential** = Species with potential to occur in the study area based on species’ range and the presence of potentially suitable habitat;
- **Unlikely** = Species is unlikely to occur based on focused survey findings and/or lack of suitable habitat. Species not observed during appropriately timed focused surveys and considered absent from project study area.

**TAF = thousand acre-feet**

**STATUS CODES:**

**Federal (U.S. Fish and Wildlife Service):**

- BEPA = Bald Eagle Protection Act
- FE = Listed as Endangered by the Federal Government
- FT = Listed as Threatened by the Federal Government
- FPE = Proposed for Listing as Endangered
- FPT = Proposed for Listing as Threatened
- FSC = (Former) Federal Species of Special Concern (list is no longer maintained)
- FC = Candidate for Federal listing

**State (California Department of Fish and Game):**

- SE = Listed as Endangered by the State of California
- ST = Listed as Threatened by the State of California
- SR = Listed as Rare by the State of California (plants only)
- CSC = California species of special concern
- CFP = California fully protected species

**California Native Plant Society (CNPS):**

- List 1A = Plants believed extinct
- List 1B = Plants rare, threatened, or endangered in California and elsewhere
- List 2 = Plants rare, threatened, or endangered in California but more common elsewhere
- List 3 = Plants about which more information is needed
- List 4 = Plants of limited distribution

**Sources:** CNPS, 2008; CDFG, 2008; ESA, 2007

---

**CALFED:** (CALFED Bay-Delta Program Multi-Species Conservation Strategy [MSCS] Species Goals)

- **R** = Recovery. Recover species’ populations within the MSCS focus area to levels that ensure the species’ long-term survival in nature.
- **r** = Contribute to recovery. Implement some of the actions deemed necessary to recover species’ populations within the MSCS focus area.
- **m** = Maintain. Ensure that any adverse effects on the species that could be tied to implementation of CALFED actions will be fully offset through implementation of actions beneficial to the species.

**Natural Community Conservation Plan Habitat Type:**

- **Gr** = Grassland
- **La** = Lacustrine
- **NFE** = Nontidal Freshwater Emergent
- **NSW** = Natural Seasonal Wetland
- **SE** = Saline Emergent
- **TFE** = Tidal Freshwater Emergent
- **UC** = Upland Cropland
- **US** = Upland Scrub
- **VFR** = Valley/Foothill Riparian
- **VFW** = Valley/Foothill Woodland Forest
• Have a substantial adverse impact on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by CDFG or USFWS

• Have a substantial adverse effect on federally protected wetlands as defined by CWA Section 404 (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 wildlife species or with established native resident or migratory native wildlife corridors, or impede the use of 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 habitat conservation plan

Impact Summary

Table 4.6-8 provides a summary of the impact analysis for biological resources issues based on proposed actions outlined in Chapter 3.

Impact Analysis

No Project/No Action Alternative

Under the No Project/No Action Alternative, no new facilities would be constructed and no existing facilities would be altered, expanded, or demolished. Implementation of this alternative would neither temporarily nor permanently affect wetlands or other waters of the United States, special status species or their habitat, or sensitive plant communities. Movement corridors and nursery sites for wildlife would remain unchanged. The No Project/No Action Alternative would not conflict with any policies protecting biological resources or approved HCPs or NCCPs, nor degrade the quality of the environment.

Construction

Impact 4.6.1: Project construction would affect the following NCCP habitat types (CDFG sensitive plant communities in parentheses): Natural Seasonal Wetland (i.e., bulrush-cattail series, northern claypan vernal pool, bush seepweed and saltgrass series), Valley/Foothill Riparian (i.e., Fremont cottonwood series and valley oak series), Grassland (i.e., purple needlegrass series), and Valley/Foothill Woodland Forest (i.e., blue oak series). (Less than Significant with Mitigation)

Sensitive plant communities in the project study area are shown on Figure 4.6-17, Figure 4.6-18, and Figure 4.6-19. Project impacts, organized by facility and alternative, are presented in Table 4.6-9.
### TABLE 4.6-8
SUMMARY OF IMPACTS – BIOLOGICAL RESOURCES

<table>
<thead>
<tr>
<th>Impact</th>
<th>Project Alternatives</th>
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<tr>
<td></td>
<td>Alternative 1</td>
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<td>4.6.1: Project construction would affect the following NCCP habitat types (CDFG sensitive plant communities in parentheses): Natural Seasonal Wetland (i.e., bulrush-cattail series, northern claypan vernal pool, bush seepweed and saltgrass series), Valley/Foothill Riparian (i.e., Fremont cottonwood series and valley oak series), Grassland (i.e., purple needlegrass series) and Valley/Foothill Woodland Forest (i.e., blue oak series).</td>
<td>LSM</td>
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<tr>
<td>4.6.2: Project construction could affect potentially jurisdictional wetlands or waters, and streambeds and banks regulated by CDFG.</td>
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</tr>
<tr>
<td>4.6.3: Project construction could affect populations of special-status plant species including brittlescale, San Joaquin spearscale, Brewer’s dwarf-flax, and rose-mallow.</td>
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<td>4.6.4: Project construction would result in impacts on California red-legged frog and California tiger salamander, including aquatic breeding habitat and upland aestivation habitat for these species.</td>
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<tr>
<td>4.6.5: Project construction would result in direct and indirect impacts on existing populations of and habitat for the western pond turtle.</td>
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</tr>
<tr>
<td>4.6.6: Project construction under Alternatives 1, 2, and 3 would result in direct and indirect impacts on listed vernal pool fairy shrimp and their habitat, and on the non-listed midvalley fairy shrimp and curved-foot hygrotes diving beetle.</td>
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</tr>
<tr>
<td>4.6.7: Project construction would have temporary and permanent impacts on potential San Joaquin kit fox habitat and permanently reduce potential regional movement opportunities in one location for this species.</td>
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<tr>
<td>4.6.8: Project construction would result in temporary and permanent loss of habitat for burrowing owls.</td>
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<td>4.6.9: Project construction and operation activities would result in direct and indirect impacts on existing populations of and habitat for the golden eagle, bald eagle, and Swainson’s hawk.</td>
<td>LSM B (bald eagle)</td>
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<td>4.6.10: Project construction and increased reservoir water levels would result in temporary and permanent loss of potential and occupied habitat for Alameda whipsnake.</td>
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<td>4.6.11: Project construction activities could result in direct and indirect impacts on the valley elderberry longhorn beetle and its habitat.</td>
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<td>4.6.12: Project construction activities could affect active breeding bird nest sites and new powerlines could affect migratory birds.</td>
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<td>4.6.13: Project construction activities under Alternatives 1 and 2 could affect designated critical habitat for listed species (vernal pool fairy shrimp and Contra Costa goldfields).</td>
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<td>4.6.14: Project construction activities could affect nonlisted special-status reptile species (San Joaquin coachwhip and coast horned lizard).</td>
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<td>4.6.15: Project construction activities could affect nonlisted special-status mammal species (American badger, special-status bats, and San Joaquin pocket mouse).</td>
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4.6 Biological Resources

TABLE 4.6-8 (Continued)
SUMMARY OF IMPACTS – BIOLOGICAL RESOURCES

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<tr>
<td>including waterfowl and shorebirds.</td>
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<td>4.6.17: The project would not result in conflicts with local and</td>
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</tr>
<tr>
<td>regional conservation plans, or local plans or ordinances protecting</td>
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<tr>
<td>biological resources.</td>
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<td>4.6.18: Project construction would not make a cumulatively</td>
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<tr>
<td>considerable contribution to cumulative effects on special-status</td>
<td></td>
</tr>
<tr>
<td>species and habitats.</td>
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</table>

SU = Significant and Unavoidable
LSM = Less-Than-Significant Impact with Mitigation
LS = Less-Than-Significant Impact
NI = No Impact
B = Beneficial Impact
CDFG = California Department of Fish and Game
NCCP = Natural Community Conservation Plan

Alternative 1

Los Vaqueros Reservoir Expansion (including appurtenant facilities) and Recreational Facilities

The reservoir expansion and construction of other facilities in the watershed, including appurtenant facilities, access roads, and Recreation Facilities (referred to in this section as other in-watershed facilities), have the potential to result in losses to the following sensitive plant communities: bulrush-cattail series, saltgrass series, Fremont cottonwood series, valley oak series, purple needlegrass series, and blue oak series.

As shown in Table 4.6-9, about 2.5 acres of cattail-bulrush habitat would be permanently affected by dam construction. About 0.08 acre of saltgrass series (alkali marsh) habitat would be permanently impacted in the 275-TAF inundation zone in stock ponds and stream channels north and east of the reservoir.

Reservoir expansion to 275 TAF would inundate and permanently eliminate 0.94 acre of Fremont cottonwood habitat. An additional 0.07 acre of cottonwood habitat could be directly affected during construction of the westside access road (0.05 acre) and eastside trail (0.02 acre) (Table 4.6-9). During construction the reservoir would be drained and flows to Kellogg Creek would be bypassed around the dam at a flow rate of about 5 cubic feet per second. The downstream reach of Kellogg Creek would receive bypassed flows during the construction period and would also continue to receive flows from the lower watershed during this period. Downstream releases are specifically intended to maintain habitat quality within the Kellogg Creek riparian corridor and maintain the health of cottonwood woodlands and bulrush/cattail habitat downstream of the dam.
Figure 4.6-17
Potential Direct Impacts to Sensitive Plant Communities in the Los Vaqueros Watershed

SOURCE: USGS, 1993 (base map); CNDDB, 2007; and ESA, 2007
Los Vaqueros Reservoir Expansion Project EIS/EIR. 201110
Figure 4.6-18
Potential Direct Impacts to Sensitive Plant Communities in the Vicinity of the Delta Intake and Pump Station Facilities and Along the Delta-Transfer Pipeline

SOURCE: USGS, 1993 (base map); and ESA, 2008

Los Vaqueros Reservoir Expansion Project EIS/EIR 201110
Bethany Reservoir Tie-In
Stockpile Area
Expanded Transfer Facility
Delta-Transfer Pipeline
Transfer-LV Pipeline
Transfer-Bethany Pipeline
160 TAF Borrow Area
New PG&E Substation (Power Option 2)
New Western Substation (Power Option 1)
Staging Area
Camino Diablo
1075
Walnut Boulevard
Byron Highway
Vasco Road
Bixler Road
ALAMEDA COUNTY
CONTRA COSTA COUNTY
Bethany Reservoir
SEE INSET
STATE LINE
California Aqueduct
SEE INSET
Potential Direct Impacts to Sensitive Plant Communities in the Vicinity of the Transfer-Bethany Pipeline and Western Transmission Line

Figure 4.6-19

SOURCE: USGS, 1993; and ESA, 2008
### TABLE 4.6-9

SENSITIVE PLANT COMMUNITY IMPACTS BY PROJECT COMPONENT (ACRES)\(^a\)

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\(^a\) Data includes temporary and permanent losses.

\(^b\) Losses to Other In-Watershed Facilities do not include losses to In-Watershed Facilities.

\(^c\) Losses to Power Option 1 do not include losses to Power Option 2.
TABLE 4.6-9 (Continued)
SENSITIVE PLANT COMMUNITY IMPACTS BY PROJECT COMPONENT (ACRES)a

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Alternatives 1 and 2</th>
<th>Alternative 3</th>
<th>Alternative 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Temporary</td>
<td>Permanent</td>
<td>Total</td>
</tr>
<tr>
<td>Power Option 2c</td>
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<tr>
<td>Northern claypan vernal pool</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Bulrush-cattail series</td>
<td>&lt;0.1</td>
<td>0.00</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Bush seepweed</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Fremont cottonwood</td>
<td>&lt;0.1</td>
<td>0.00</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Total Impacts to Sensitive Habitats</td>
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<tr>
<td>Bush seepweed series</td>
<td>6.73</td>
<td>1.32</td>
<td>8.05</td>
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<td>Blue oak series</td>
<td>5.73</td>
<td>87.40</td>
<td>93.14</td>
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<td>Bulrush-cattail series</td>
<td>1.40</td>
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<td>4.11</td>
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<td>Fremont cottonwood series</td>
<td>0.18</td>
<td>0.99</td>
<td>1.18</td>
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<tr>
<td>Northern claypan vernal pool</td>
<td>0.93</td>
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<td>Purple needlegrass series</td>
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<td>Saltgrass series</td>
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<td>1.56</td>
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<td>Valley oak series</td>
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<td>31.83</td>
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<td>Valley oak mitigation plantings</td>
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</tr>
<tr>
<td>Blue oak mitigation plantings</td>
<td>0.00</td>
<td>9.02</td>
<td>9.02</td>
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</tbody>
</table>

Notes:

a “Temporary” impacts, as used in this analysis, include habitats that would be degraded or similarly impaired, with features being restored in situ to emulate pre-project conditions. “Permanent” impacts are those that would permanently destroy features, with compensatory mitigation provided in alternate locations.
b Other in-watershed facilities under Alternatives 1, 2, and 3 include the marina, marina access road, borrow area, picnic areas, trailhead parking, westside access road, eastside trail, stockpile area, and parking areas. Facilities under Alternative 4 include the above facilities, and 160-TAF borrow area.
c Note that plant community impacts for Power Supply Infrastructure do not include the acreage of features that will be avoided by facilities or spanned by powerlines.

About 29.15 acres of valley oak series habitat would be inundated and 0.95 acre could be affected by construction of the westside access road and other in-watershed facilities. About 68.61 acres of blue oak series would be affected by inundation, and another 5.73 acres would be temporarily and 18.79 acres permanently affected by construction of the other in-watershed facilities.

Reservoir expansion would permanently flood about 0.34 acre of purple needlegrass series habitat. For other in-watershed facilities, the westside access road would permanently affect 0.23 acre of this habitat and temporarily affect 0.09 acre. The permanent impact area for purple needlegrass habitat includes 0.06 acre that could be periodically affected by wave action along the shoreline during reservoir operations. This impact is considered permanent because it would periodically result in the degradation or removal of grassland throughout the lifetime of reservoir operations.

About 0.38 acre of bush seepweed habitat would also be temporarily affected by construction of in-watershed facilities.

In addition to the above impacts, prior onsite mitigation commitments for terrestrial oak woodland habitat would be removed by grading, dewatering, trenching, and other construction activities related to dam modification and/or permanently flooded due to reservoir expansion to 275 TAF. Permanent habitat losses would include the inundation of 125 acres of mitigation (i.e., planted) valley oak savannah, 3.03 acres of valley oak woodland, and 9.02 acres of blue oak woodland. Additionally, about 4.1 acres of mitigation valley oak savannah would be permanently lost to construction of the dam and associated Inlet/Outlet Pipelines.

**Delta Intake and Pump Station**

The new Delta Intake and Pump Station would permanently affect 0.22 acre of bulrush-cattail habitat and temporarily affect 0.08 acre on the banks of Old River.

**Delta-Transfer Pipeline**

Small, intermittent stands of saltgrass series habitat (0.30 acre total) are scattered throughout the Delta-Transfer Pipeline alignment (see Figure 4.6-17). Trenching and grading activities would temporarily disturb some areas. After construction is completed, disturbed areas would be restored to pre-project conditions.

Up to 1.63 acres of valley oak riparian vegetation along Kellogg Creek within this pipeline corridor could be temporarily disturbed during grading and trenching to install the pipeline, and restored after project completion. The existing easement is south of the creek, but some disturbance could occur if the construction corridor is constrained by other features.

**Transfer-LV Pipeline**

A limited amount of saltgrass series habitat (0.22 acre) in the watershed could be temporarily affected (see Figure 4.6-17) by trenching and grading activities. After construction, disturbed areas would be restored to pre-project conditions.
The pipeline intersection with Kellogg Creek, west of the Transfer Facility, could temporarily affect about 0.11 acre of Fremont cottonwood habitat, 0.24 acre of bulrush-cattail habitat, and 0.10 acre of valley oak habitat, which would be restored after project implementation.

**Transfer-Bethany Pipeline**

Roughly 0.23 acre of bulrush-cattail habitat could be temporarily affected along the Transfer-Bethany Pipeline crossings of Brushy Creek and other unnamed drainages along the corridor. Trenching and grading in the vicinity of these streams could also temporarily disturb up to 0.22 acre of bush seepweed vegetation as identified in Table 4.6-9. These areas would be restored after the project is completed.

Saltgrass series habitat (0.95 acre) is present within and right next to sections of this pipeline alignment. Project construction in the vicinity of this habitat could indirectly affect water quality in these features. Ground-disturbing activities such as trenching and grading, vegetation clearing, and construction materials storage could result in the direct loss of habitat and/or degradation of water quality. Seasonal wetlands would be restored wherever feasible, but it may not always be possible to restore all ponds on site; therefore, impacts could be permanent in limited areas.

Surveys identified 0.86 acre of northern claypan vernal pool habitat in the Transfer-Bethany Pipeline study area. For the purpose of this impact analysis it is presumed that this project component would temporarily affect up to 0.86 acre of northern claypan vernal pool habitat. These areas would be restored after the project is completed.

**Power Supply Infrastructure**

**Power Option 1: Western Only.** Under Option 1, the proposed 69-kilovolt double-circuit powerline alignment would traverse primarily agricultural areas in use for crops, irrigated pasturelands, and grazed annual grasslands. Several portions of the Western powerline alignment support Natural Seasonal Wetlands (bulrush-cattail, bush seepweed, northern claypan vernal pool) that would be spanned by powerlines. These areas are north and east of the Western substation siting zone (see Figure 4.6-18). Natural Seasonal Wetland habitat (bush seepweed) was also identified at the proposed Western substation site. Due to flexibility in facilities siting, the Western substation location would be sited within the study area to avoid and minimize impacts to sensitive plant communities.

It is expected that sensitive plant communities would be avoided by project design, largely by spanning Natural Seasonal Wetland habitats with powerlines. Although no sensitive plant community impacts are expected, Mitigation Measure 4.6.1b will be implemented to ensure that final siting plans consider, minimize, and avoid impacts to sensitive plant communities.

**Power Option 2: Western and PG&E.** As with Option 1, under this option the proposed 69-kilovolt double-circuit powerline alignment would traverse primarily agricultural areas in use for crops, irrigated pasturelands, and grazed annual grasslands, spanning Natural Seasonal Wetlands (bulrush-cattail, bush seepweed, northern claypan vernal pool). Because no sensitive plant
communities exist in the area of the proposed PG&E substation or powerline (ESA, 2008b), no impacts would occur to sensitive plant communities.

**Summary for Alternative 1**

Under Alternative 1, the project would directly impact sensitive plant communities within and outside the Los Vaqueros Watershed, and affect mitigation plantings that compensated for impacts from the existing Los Vaqueros Reservoir. Blue oak woodlands and valley oak woodlands would see the greatest impacts by area; however, impacts would also be incurred to seasonal wetlands and native grassland habitat. These impacts would be significant prior to mitigation, but can be mitigated to a less-than-significant level through the incorporation of onsite and offsite mitigation. Mitigation Measure 4.6.1a seeks to avoid and minimize impacts to sensitive plant communities, and Mitigation Measure 4.6.1b provides compensation for impacts through habitat creation, enhancement, and preservation of affected sensitive plant communities.

As a component of Alternative 1, water flows in Kellogg Creek would bypass the dam construction site, thus, specific mitigation is not required to provide flows to maintain riparian habitat in Kellogg Creek.

**Alternative 2**

Potential impacts to sensitive plant communities under Alternative 2 would be the same as those discussed for Alternative 1 and are considered significant before the implementation of mitigation measures. Project impacts, organized by facility and alternative, are presented in Table 4.6-9.

Alternative 2-related impacts would be reduced to a less-than-significant level through the implementation of Mitigation Measures 4.6.1a and 4.6.1b.

**Alternative 3**

Alternative 3 would result in most of the same impacts described for Alternative 1, except that this alternative does not include construction of the new Delta Intake and Pump Station or the Transfer-Bethany Pipeline. Therefore, this alternative would impact 2.34 fewer acres of sensitive plant communities than Alternative 1.

Instead of the new Delta Intake and Pump Station, this alternative includes the Old River Intake and Pump Station Expansion. However, there would be no physical disruption either on land or in the Old River channel associated with expansion of this facility, and thus no additional impact to sensitive plant communities associated with this alternative.

Impacts to sensitive plant communities resulting from implementation of Alternative 3 would be significant prior to the implementation of mitigation measures. These impacts would be reduced to a less-than-significant level through the implementation of Mitigation Measures 4.6.1a and 4.6.1b.
**Alternative 4**

A 160-thousand-acre-feet (TAF) reservoir expansion and construction of in-watershed facilities would result in permanent losses to the same sensitive plant communities as Alternative 1 (except for Northern claypan vernal pool habitat), but to a reduced extent because of its reduced inundation area and elimination of new pipelines. Because the reservoir would not be fully drained for construction under this alternative, there would be no disruption of reservoir releases downstream to Kellogg Creek. Thus, providing water to this area through a bypass system would be unnecessary.

Permanent impacts to bulrush-cattail habitat plant communities would occur as a result of dam construction (1.95 acres) and other in-watershed facilities (0.09 acre). Saltgrass series habitat (0.08 acre) would be permanently affected in association with stock ponds and channels that would be inundated by reservoir expansion. About 16.42 acres and 17.55 acres of valley oak and blue oak series habitat, respectively, would be permanently impacted by reservoir expansion. Other in-watershed facilities could temporarily impact 0.43 acre of valley oak and permanently impact 0.94 acres. Also, 3.25 acres of blue oak could be temporarily impacted and 11.84 acres permanently impacted by in-watershed facilities under this alternative. Similar to the other alternatives, in-watershed facilities would temporarily impact 0.38 acre of bush seepweed series habitat. The westside access road and eastside trail for Alternative 4 would temporarily impact 0.02 acre and permanently impact 0.07 acre of Fremont cottonwood series habitat and the westside access road would impact 0.12 acre of purple needlegrass series habitat (0.04 acre temporary, 0.08 acre permanent).

Onsite mitigation commitments for terrestrial oak woodland habitat would also be impacted by reservoir expansion to 160 TAF. Permanent habitat losses would include the inundation of 125 acres of mitigation (i.e., planted) valley oak savannah, 3.03 acres of valley oak woodland, and 9.02 acres of blue oak woodland.

The 160-TAF borrow area does not support sensitive plant communities; thus, no impacts are anticipated from this project element.

Under Alternative 4, the project would have fewer permanent and temporary effects upon sensitive plant communities compared with Alternative 1, but impacts would remain significant prior to mitigation. Alternative 4 would have less impact upon valley oak and blue oak series habitat (17.79 acres and 32.64 acres for Alternative 4 versus 31.83 acres and 93.14 acres for Alternative 1, respectively), bulrush-cattail habitat (2.03 acres versus 4.11 acres), bush seepweed habitat (0.38 acre versus 8.05 acres), saltgrass series habitat (0.8 acre versus 1.6 acre), Fremont cottonwood series (0.09 acre versus 1.18 acre) and purple needlegrass series habitat (0.12 acre versus 0.66 acre). Impacts to oak mitigation plantings and commitments would be comparable under both alternatives. The implementation of Mitigation Measures 4.6.1a and 4.6.1b would reduce project impacts to a less-than-significant level.
Mitigation Measures

The distribution and extent of sensitive plant communities has been mapped and documented for all project facilities, both within and outside the watershed. Mitigation Measures 4.6.1a and 4.6.1b include sensitive resource avoidance, impact minimization, restoration of temporarily disturbed sensitive plant communities, and compensation for permanent, unavoidable losses through restoration, enhancement, creation, and preservation; implementation of these measures would reduce the impacts on sensitive plant communities from construction of all facilities to a less-than-significant level.

Compensation measures presented in this section have been integrated into a comprehensive biological resources mitigation and compensation program, which is presented in Section 4.6.3.

**Measure 4.6.1a:** Based on the documented distribution of sensitive plant communities, CCWD shall implement avoidance and minimization measures to minimize impacts on sensitive plant communities during project construction. To the extent feasible, project design shall minimize impacts on sensitive plant communities. Exclusion and/or silt fencing shall be installed to buffer avoided areas.

Natural Seasonal Wetland habitat (bush seepweed) shall be avoided within the Western substation study area by siting facilities to avoid to this plant community.

**Measure 4.6.1b:** Where avoidance of sensitive plant communities is not possible, CCWD shall provide compensation through habitat creation, enhancement, and preservation, both within and outside the watershed, for temporary and permanent impacts on the following sensitive plant communities that will be affected by the project:

- **Natural Seasonal Wetland (Bulrush-cattail Series, Northern Claypan Vernal Pool, Bush Seepweed, and Saltgrass Series)**
  - CCWD shall implement Mitigation Measure 4.6.2, presented below, to minimize, and compensate for impacts to sensitive plant communities associated with jurisdictional wetlands and other waters of the United States.

- **Valley Oak, Blue Oak Woodlands, and Fremont Cottonwood Series**
  - CCWD shall develop an oak woodland mitigation and monitoring plan to outline mitigation and monitoring obligations for impacts resulting from increased reservoir levels and construction activities. This plan shall include restoration, enhancement, and/or preservation sites; thresholds of success; monitoring and reporting requirements; site-specific designs for site restoration/enhancement activities; and long-term maintenance activities as set forth in the following bullets.
  - Under the oak woodland mitigation and monitoring plan, CCWD shall acquire or dedicate land suitable for blue oak woodland and riparian woodland (valley oak and Fremont cottonwood series) restoration, enhancement, and preservation. If restoration is feasible, then a ratio of at least 2:1 shall be used. If preservation (with enhancement) is used, at least a 3:1 ratio shall be implemented to offset losses.
• Due to the limited availability of suitable mitigation lands in the watershed, CCWD shall purchase blue oak mitigation lands outside of the watershed.

• CCWD shall coordinate acquisition of woodland mitigation lands with USFWS to minimize potential conflicts with regional San Joaquin kit fox planning efforts, which seek to maintain open grasslands movement corridors.

• CCWD shall submit the mitigation and monitoring plan to the appropriate regulatory agencies for approval.

Purple Needlegrass Grasslands

• CCWD shall seed disturbed areas within this habitat area with native grass seed collected within or in the vicinity of impacts. Additional seed could be used to supplement seed mixes, but seed shall be from locally collected (within the ecoregion) source material and shall be appropriately selected for site conditions.

• Consistent with MSCS guidance (CALFED, 2000) and coordination with CDFG and USFWS, mitigation for loss of this plant community shall be provided by preservation and enhancement of mitigation lands at a minimum of a 2:1 mitigation ratio to compensate for permanent losses.

• CCWD shall develop and implement a native grassland restoration and enhancement plan to identify potential seed collection sites, quantities of seed required, potential enhancement areas within the Los Vaqueros Watershed, potential enhancement activities, and other measures required to maintain the sustainability of native grassland restoration and enhancement areas.

Impact Significance after Mitigation: Less than Significant.

Impact 4.6.2: Project construction could affect potentially jurisdictional wetlands or waters, and streambeds and banks regulated by CDFG. (Less than Significant with Mitigation)

Before disturbing any jurisdictional water features, CCWD would obtain all required permit approvals from USACE, CDFG, Regional Water Quality Control Board (RWQCB), and all other agencies with permitting responsibilities for construction activities within jurisdictional waters.

Alternative 1

Wetlands and other waters of the United States or the State of California under regulatory jurisdiction of USACE, RWQCB, and/or CDFG occur in and near the study area (see Table 4.6-10, Figure 4.6-20, Figure 4.6-21, Figure 4.6-22, Figure 4.6-23). A discussion of potential impacts on sensitive aquatic habitat (e.g., Fremont cottonwood habitat) is provided above under Impact 4.6.1.
### TABLE 4.6-10
WETLAND IMPACTS BY PROJECT COMPONENT

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Temporary Impacts*</th>
<th>Permanent Impacts</th>
<th>Total Impact to Section 404 Jurisdictional Area (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ALTERNATIVES 1 AND 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-watershed Facilities</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir Inundation Footprint and Dam</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>Nontidal Freshwater Permanent Emergent</td>
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<td>2.50</td>
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<td>1.79</td>
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<td>Lacustrine</td>
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<td><strong>In-watershed Total</strong></td>
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<td>New Delta Intake and Pump Station</td>
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<td>0.67</td>
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<td>Transfer-Bethany Pipeline</td>
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<td>&lt;0.1</td>
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<tr>
<td>Prior Wetland Commitments</td>
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</tr>
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<td>Valley/Foothill Riparian</td>
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<td>3.05</td>
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<td>Freshwater Emergent Wetland</td>
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<td>1.57</td>
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<td><strong>Total</strong></td>
<td>7.29</td>
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<td><strong>ALTERNATIVE 3</strong></td>
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<td>In-watershed Facilities (same as Alternative 1)</td>
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<td>Old River Intake and Pump Station Expansion</td>
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<td>0</td>
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<td>Delta-Transfer Pipeline</td>
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<td>Transfer-LV Pipeline</td>
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<td>Power Supply Infrastructure (Options 1 and 2)</td>
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<td>&lt;0.1</td>
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<td>Prior Wetland Commitments</td>
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<td>Valley/Foothill Riparian</td>
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<td>3.05</td>
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<tr>
<td>Freshwater Emergent Wetland</td>
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<td>1.57</td>
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<td><strong>Total</strong></td>
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TABLE 4.6-10 (Continued)
WETLAND IMPACTS BY PROJECT COMPONENT

<table>
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<tr>
<th>Project Component</th>
<th>Temporary Impacts*</th>
<th>Permanent Impacts</th>
<th>Total Impact to Section 404 Jurisdictional Area (Acres)</th>
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<tr>
<td><strong>ALTERNATIVE 4</strong></td>
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<tr>
<td>In-watershed Facilities</td>
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<tr>
<td>Reservoir Inundation Footprint and Dam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nontidal Freshwater Permanent Emergent</td>
<td>0.0</td>
<td>1.95</td>
<td>1.95</td>
</tr>
<tr>
<td>(13 Features)</td>
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<tr>
<td>Natural Seasonal Wetland</td>
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<td>0.71</td>
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<tr>
<td>(16 Features)</td>
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<tr>
<td>Lacustrine</td>
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<tr>
<td>(2 Features)</td>
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<td>Subtotal</td>
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<td>Other In-watershed Facilities</td>
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<td>Nontidal Freshwater Permanent Emergent</td>
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<td>Natural Seasonal Wetland</td>
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<td>Valley/Foothill Riparian</td>
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<td>0.03</td>
<td>0.04</td>
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<td>Lacustrine</td>
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<td>Total</td>
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* “Temporary” impacts, as used in this wetlands analysis, include those that would partially or fully alter wetland features, with features being restored or recreated in situ to emulate pre-project conditions. “Permanent” impacts are those that would result in the permanent loss of wetland features with compensatory mitigation provided at alternate locations.


Los Vaqueros Reservoir Expansion, Other In-watershed Facilities, and Recreational Facilities

Potential jurisdictional features in the watershed study area include one perennial channel (Lower Kellogg Creek), nine intermittent channels (including Upper Kellogg Creek, Adobe Creek, Mallory Creek, Fig Pig Gulch, Savannah Creek, Buckeye Canyon, Horseshoe Creek, and several unnamed drainages), 123 ephemeral channels (including Lost Cave Creek, Mariposa Creek, and Silva Creek), 5 ponds, 56 permanent emergent wetlands, 51 natural seasonal wetlands, and 27 riparian wetlands. Results of the delineation identified a total of 57.4 acres of wetlands and “other waters” in the watershed study area.

Expansion of the reservoir and construction of other in-watershed facilities would result in the permanent fill of 5.88 acres and temporary fill of 0.02 acre of potentially jurisdictional wetlands or other waters of the United States (Table 4.6-10; Figure 4.6-20 and Figure 4.6-21).

“Temporary” impacts, as used in this wetlands analysis, include those that would partially or fully alter wetland features, with features being restored or recreated in situ to emulate pre-project conditions. “Permanent” impacts are those that would permanently inundate wetland features with compensatory mitigation provided in alternate locations.
Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110

Figure 4.6-20
Potentially Jurisdictional Wetlands in the Vicinity of the Los Vaqueros Reservoir

SOURCE: USGS, 1993 (base map); ESRI, 2006; CCWD, 2007; CCC, 2007; MWH, 2007; and ESA, 2007

Los Vaqueros Reservoir (100 TAF)
275 TAF Inundation Area
160 TAF Inundation Area
Transfer-LV Pipeline
Marina Road
Westside Access Road
CCWD Los Vaqueros Watershed Property Line

POTENTIALLY JURISDICTIONAL WETLANDS
- Lacustrine
- Managed Seasonal Wetland
- Natural Seasonal Wetland
- Nontidal Freshwater Permanent Emergent
- Valley/Foothill Riparian

275 TAF Borrow Area
Expanded Dam Footprint (275 TAF)
Transfer-LV Pipeline

SOURCE: USGS, 1993 (base map); ESRI, 2006; CCWD, 2007; CCC, 2007; MWH, 2007; and ESA, 2007

Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110

Figure 4.6-20
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Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110

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Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110

Figure 4.6-20
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SOURCE: USGS, 1993 (base map); ESRI, 2006; CCWD, 2007; CCC, 2007; MWH, 2007; and ESA, 2007

Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110

Figure 4.6-20
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SOURCE: USGS, 1993 (base map); ESRI, 2006; CCWD, 2007; CCC, 2007; MWH, 2007; and ESA, 2007

Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110

Figure 4.6-20
Potentially Jurisdictional Wetlands in the Vicinity of the Los Vaqueros Reservoir

SOURCE: USGS, 1993 (base map); ESRI, 2006; CCWD, 2007; CCC, 2007; MWH, 2007; and ESA, 2007

Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110

Figure 4.6-20
Potentially Jurisdictional Wetlands in the Vicinity of the Los Vaqueros Reservoir

SOURCE: USGS, 1993 (base map); ESRI, 2006; CCWD, 2007; CCC, 2007; MWH, 2007; and ESA, 2007

Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110

Figure 4.6-20
Potentially Jurisdictional Wetlands in the Vicinity of the Los Vaqueros Reservoir

SOURCE: USGS, 1993 (base map); ESRI, 2006; CCWD, 2007; CCC, 2007; MWH, 2007; and ESA, 2007

Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110

Figure 4.6-20
Potentially Jurisdictional Wetlands in the Vicinity of the Los Vaqueros Reservoir

SOURCE: USGS, 1993 (base map); ESRI, 2006; CCWD, 2007; CCC, 2007; MWH, 2007; and ESA, 2007
Potentially Jurisdictional Wetlands in the Vicinity of Other In-Watershed Facilities

SOURCE: USGS, 1993 (base map); and ESA, 2007

Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110

Figure 4.6-21
Figure 4.6-22
Potential Jurisdictional Wetlands in the Vicinity of the Delta Intake and Pump Station Facilities and Along the Delta-Transfer Pipeline

SOURCE: USGS, 1993 (base map); and ESA, 2008

Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110
Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110

Figure 4.6-23
Potentially Jurisdictional Wetlands in the Vicinity of the Transfer-Bethany Pipeline and Western Transmission Line

SOURCE: USGS, 1993; and ESA, 2008
About 0.78 acre of the prior onsite wetland mitigation commitments for riparian habitat would be permanently flooded to accommodate an increase in reservoir levels to 275 TAF. In addition, about 2.27 acres of riparian mitigation habitat would be disturbed by grading, dewatering, trenching, and other construction activities within the Inlet/Outlet Pipelines construction area.

About 1.57 acres of the prior onsite mitigation commitments for freshwater emergent wetland habitat would be permanently inundated by reservoir expansion, as follows: (1) the spring mitigation site, which has one 0.15-acre emergent marsh; (2) the Clear Lake mitigation site, which has four emergent marsh features totaling 1.24 acres; and (3) the Canyon mitigation site, which has one 0.18-acre emergent marsh.

**New Delta Intake and Pump Station**

The new Delta Intake and Pump Station would permanently impact about 0.1 acre of emergent wetlands (cattail) habitat on the west bank of Old River. The new intake and fish screen would be 182 feet long and would impact about 0.13 acre of open water (182 feet by 30 feet). Additionally, the facility footprint would impact about 0.1 acre of emergent wetlands in engineered irrigation canals and ditches within agricultural portions of the project area. Temporary impacts to about 0.5 acre of open water would result from sheet-pile installation and dewatering of the construction area, and from excavation around the expanded fish screen intake.

**Delta-Transfer Pipeline**

Eight drainages cross along the Delta-Transfer pipeline alignment. Of these, four are small, maintained irrigation channels that do not support emergent vegetation and are likely not jurisdictional. The alignment traverses four blue-line\(^5\) drainages. Of these, two are large, maintained, unvegetated drainage ditches near the town of Discovery Bay where the alignment parallels SR 4. These potentially jurisdictional features are about 15 feet wide, with an initial anticipated impact of 0.07 acre each. The other two features are alkali wetlands, one from the above-described area and the other just east of Vasco Road. The first of these features is a deep, trapezoidal channel that supports iodine bush, saltgrass, and a few willows. This feature measures about 40 feet across at the top of the bank and 15 feet at ordinary high water. The anticipated impact to jurisdictional wetlands at this site would be about 0.07 acre. The second feature, the blue-line drainage near Vasco Road, supports a broad alkali swale dominated by saltgrass and saltbush (*Atriplex* sp.) that varies in width from an estimated 10 feet to 40 feet. The total anticipated impact to this feature is 2.97 acres.

After pipeline installation, the drainage features would be restored on site. No access vaults would be installed within the jurisdictional drainages that occur along the pipeline corridor. Thus, installation of the pipeline would result in the temporary impacts of 2.97 acre and no permanent impacts to potential jurisdictional features.

\(^5\) A blue-line stream is one that flows for most or all of the year and is distinguished on U.S. Geological Survey topographic maps with a solid blue line.
**Expanded Transfer Facility**

No potentially jurisdictional features were identified in the Expanded Transfer Facility study area; therefore, no impacts are anticipated at this location.

**Transfer-LV Pipeline**

The Transfer-LV Pipeline alignment traverses Kellogg Creek at six locations, of which five are within the watershed. The character of Kellogg Creek varies between crossing sites, with two sites showing ephemeral flows and four sites supporting perennial water.

Of the two locations with ephemeral conditions, one is between the Transfer Station Facility and Walnut Boulevard, and the other is in the watershed, north of CCWD’s administrative office. These locations are generally unvegetated (or indistinct from surrounding upland non-native grassland), but are steeply incised. Construction methods are open trench construction at all crossing locations.

Kellogg Creek demonstrates perennial conditions at four crossing locations in the watershed. These areas support some willow scrub and scattered oaks but portions of the banks are unvegetated except for non-native annual grasses and ruderal species.

Installation of the pipeline would result in temporary impacts to 0.67 acre and no permanent impacts to potential jurisdictional features. Kellogg Creek would be avoided within the remainder of the construction right-of-ways.

**Transfer-Bethany Pipeline**

Fifteen potentially jurisdictional drainages are on the Transfer-Bethany Pipeline alignment, including Brushy Creek (at Armstrong Road), six small, ephemeral unnamed drainages tributary to Brushy Creek, and eight unnamed tributaries to various unnamed channels in the Delta. Of these, five unnamed features are characterized as intermittent alkali swales that generally support saltbush (*Atriplex* sp.), saltgrass, and associated saline-adapted species. These intermittent features vary in width from narrow incised channels to broad alkaline meadows greater than 40 feet wide. Another five unnamed intermittent drainages are generally unvegetated (or indistinct from surrounding upland non-native grassland), but are incised. Lastly, the alignment crosses Brushy Creek where the drainage crosses Armstrong Road. Brushy Creek is an intermittent stream that is somewhat degraded due to cattle access. Brushy Creek supports some cattails (*Typha* sp.) but portions of the banks are unvegetated except for non-native annual grasses and ruderal species.

Installation of the pipeline would result in estimated temporary impacts to 3.03 acres of wetland and permanent impacts to twelve seasonal pools or topographic depressions totaling 0.86 acre that occur in or next to the Transfer-Bethany Pipeline.

**Power Supply Infrastructure**

**Power Option 1: Western Only.** Agricultural irrigation ditches and small seasonal wetlands are present throughout the Western powerline alignment. The proposed Western substation and powerlines occur primarily in existing agricultural areas, in use for crops, irrigated pasturelands, and
grazed annual grasslands. Jurisdictional wetlands were identified on the Western substation study area. Because the study area is larger than the footprint, the proposed substation can be sited to avoid impacts to Natural Seasonal Wetlands based on 2008 wetland and rare plant survey findings.

**Power Option 2: Western and PG&E.** Agricultural irrigation ditches and small seasonal wetlands are present throughout the Western powerline alignment and would be spanned without impact.

Kellogg Creek is the only identified jurisdictional wetland in the PG&E study area. Powerlines would traverse the creek at two locations and poles would be sited outside of the creek corridor. Wetlands do not occur at the PG&E substation site. Therefore, wetland impacts are not anticipated from the PG&E substation and distribution line.

**Summary for Alternative 1**

Under Alternative 1, the project would directly impact wetland features both within and outside the Los Vaqueros Watershed and would affect mitigation wetlands created to compensate for the existing Los Vaqueros Reservoir. Within the watershed, Permanent Emergent Wetlands would experience the greatest permanent impacts by area (2.54 acres in 17 features). Permanent impacts would also be incurred to Natural Seasonal Wetlands (1.85 acres in 29 features), Riparian Wetlands (0.24 acre in one feature) and Lacustrine Wetlands (1.25 acre in 4 features). Impacts related to Alternative 1 would be significant prior to mitigation, but can be mitigated to a less-than-significant level through the incorporation of avoidance strategies, Best Management Practices, and onsite and offsite compensatory mitigation. Temporary impacts would be eliminated by site restoration and by removal of the cofferdam at the completion of in-channel work for the new Delta Intake and Pump Station. Impacts associated with Alternative 1 would be reduced to a less-than-significant level through the implementation of Mitigation Measure 4.6.2a, which seeks to avoid and minimize effects to wetlands and other waters to the greatest extent practicable and Mitigation Measure 4.6.2b, which provides compensation for impacts through wetland restoration or creation.

**Alternative 2**

Potential impacts to jurisdictional wetlands and waters, or streambeds and banks under Alternative 2 would be the same as those discussed for Alternative 1. These impacts are significant before the implementation of mitigation measures. Impacts would be reduced to a less-than-significant level through implementation of Mitigation Measures 4.6.2a and 4.6.2b.

**Alternative 3**

This alternative involves expansion of the Old River Intake and Pump Station and does not include construction of the new Delta Intake and Pump Station or the Transfer-Bethany Pipeline. Potential impacts to jurisdictional wetlands, waters of the United States, or streambeds and banks under Alternative 3 would be the same as those discussed for Alternative 1 with respect to the 275 TAF reservoir expansion and other in-watershed facilities, but less overall without the new Delta Intake and Pump Station and Transfer-Bethany Pipeline. Under this alternative, expansion
of the Old River Intake and Pump Station would not involve physical site modification or disturbance on either the land or in the water, so there would be no impact to wetlands or waters at that project site. As shown in Table 4.6-10, total temporary impact would be 3.76 acres and the permanent effect would be 10.60 acres, compared to 7.29 acres temporary and 11.75 acres permanent impact for Alternative 1.

Anticipated impacts to jurisdictional wetlands and other waters of the United States are considered significant prior to mitigation. Impacts would be reduced to a less-than-significant level through implementation of Mitigation Measures 4.6.2a and 4.6.2b.

**Alternative 4**

Alternative 4 would result in much less impact to wetlands and waters than Alternative 1 because this alternative does not include many of the facilities required under Alternative 1 (i.e., no new or expanded pump station, no physical expansion of the Transfer Facility, and no new pipeline or electrical transmission facilities). Alternative 4 would result in the permanent fill or inundation of 3.65 acres of potentially jurisdictional wetlands or other waters of the United States and 0.04 acre of temporary impacts (Table 4.6-10), compared to 11.75 acres permanent and 7.29 acres of temporary impacts associated with Alternative 1.

Jurisdictional wetlands are not present in the 160-TAF borrow area. A temporary bridge crossing over Kellogg Creek would be required to provide equipment access to the borrow site. Stream intrusion would be minimal with installation activities performed on the top of the bank. The area of stream that would be shaded during borrow activities is estimated to be 0.1 acre (8 feet by 60 feet).

Bulrush-cattail and saltgrass series habitat (alkali marsh) at the Kellogg Creek wetland mitigation sites would be affected during construction. Mitigation wetlands would be filled and/or graded to accommodate construction activities within the construction area for the Inlet/Outlet Pipelines. About 0.78 acre of the onsite mitigation commitments for riparian habitat and 1.24 acres of emergent marsh would be permanently flooded by the expanded 160 TAF reservoir. In addition, about 2.27 acres of riparian mitigation habitat would be disturbed by grading, trenching, and other construction activities for the Inlet/Outlet Pipelines.

This impact is significant prior to mitigation. The implementation of Measures 4.6-2a, which seeks to avoid and minimize effects to wetlands and other waters to the greatest extent practicable, and Measure 4.6-2b, which includes mitigation for impacts to jurisdictional features, would reduce the impacts to a less-than-significant level.

**Mitigation Measures**

**Measure 4.6.2a:** Final project design shall avoid and minimize the fill of wetlands and other waters to the greatest practicable extent. Areas that are avoided shall be subject to best management practices under the General National Pollutant Discharge Elimination System Permit, as described in **Measure 4.5.1**.
The fill of wetlands at the proposed Western substation site shall be avoided by siting facilities within the study area so as to avoid impacts to such areas.

**Measure 4.6.2b:** Where jurisdictional wetlands and other waters cannot be avoided, to offset temporary and permanent impacts that would occur as a result of the project, restoration and compensatory mitigation shall be provided through the following mechanisms:

1. Purchase or dedication of land to provide wetland preservation, restoration or creation. If restoration is available and feasible, then a ratio of at least 2:1 shall be used. If a wetland needs to be created, at least a 3:1 ratio shall be implemented to offset losses. Where practical and feasible, onsite mitigation shall be implemented.

2. A wetland mitigation and monitoring plan shall be developed by a qualified biologist in coordination with CDFG, USFWS, USACE, and/or RWQCB that details mitigation and monitoring obligations for temporary and permanent impacts to wetlands and other waters as a result of construction activities. The plan shall quantify the total acreage lost, describe mitigation ratios for lost habitat, annual success criteria, mitigation sites, monitoring and reporting requirements, and site specific plans to compensate for wetland losses resulting from the project.

3. The mitigation and monitoring plan shall be submitted to the appropriate regulatory agencies for approval.

**Impact Significance after Mitigation:** Less than Significant.

**Impact 4.6.3:** Project construction could affect populations of special-status plant species including brittlescale, San Joaquin spearscale, Brewer’s dwarf-flax, and rose-mallow. (Less than Significant with Mitigation)

The dates and findings of focused botanical surveys in the project study areas are presented in Table 4.6-3.

**Alternative 1**

**Los Vaqueros Reservoir Expansion, In-watershed Facilities, and Recreational Facilities**

Based on focused surveys, one special-status plant species was identified in oak woodland and upland scrub habitats that could be directly affected by reservoir inundation. Areas west of the reservoir support a 101.4-acre population of Brewer’s dwarf-flax (see Figure 4.6-12). Portions of the population composed of an unknown number of individual plants would be affected by relocation of the westside access road (1.0 acre) and inundation (0.13 acre).

A brittlescale population consisting of about 25 plants was identified south of the proposed staging and stockpile area (ESA, 2007; see Figure 4.6-12). A San Joaquin spearscale population was also verified south of the proposed staging and stockpile area. Both populations occur outside of the project area (CDFG, 2008).
New Delta Intake and Pump Station
A rose-mallow population consisting of fewer than 15 plants occurs at the site for the new Delta Intake and Pump Station. Other local populations are greater than 1,000 feet from new facilities and are outside the project area.

Delta-Transfer Pipeline
The Delta-Transfer Pipeline alignment primarily traverses lands that are developed or used for agriculture. Suitable habitat for special-status plant species was not identified in the study area; therefore, no impacts are expected (ESA, 2007).

Expanded Transfer Facility
Reconnaissance-level botanical surveys conducted at the Expanded Transfer Facility in 2007 showed the study area to be highly disturbed. Due to prior soil manipulation and high densities of non-native herbaceous plants, the site does not support special-status plant species and no impacts are anticipated (ESA, 2007).

Transfer-LV Pipeline
The majority of the Transfer-LV Pipeline alignment is within the watershed, and focused plant surveys indicate that no special-status plant species would be affected by pipeline construction. The segment from the watershed boundary to the Expanded Transfer Facility crosses a livestock pasture, a segment of Kellogg Creek, and maintained annual grassland. No suitable habitat for special-status plant species is available in the study area; therefore, no impacts are expected (ESA, 2007).

Transfer-Bethany Pipeline
Focused botanical surveys (ESA, 2008b) and database searches (CDFG, 2008) identified several San Joaquin spearscale populations in the alignment near Armstrong Road (Figure 4.6-13). Limited follow-up surveys would be required for both spearscale and brittlescale at a few distinct locations.

Power Supply Infrastructure
Power Option 1: Western Only. Based on focused botanical surveys in spring 2008, power poles are not expected to impact special-status plant populations (ESA, 2008b). San Joaquin spearscale populations identified in the Western powerline alignment would be avoided by siting the Western substation and power poles away from the spearscale populations. Limited follow-up surveys would be required to document the distribution of heartscale and brittlescale, though the likelihood of encountering these species in the alignment is considered low.

Power Option 2: Western and PG&E. San Joaquin spearscale populations identified in the Western powerline alignment would be avoided by siting the power poles away from the spearscale populations. Limited follow-up surveys would be required to document the distribution of heartscale and brittlescale, though the likelihood of encountering these species in the alignment is considered low.
Special-status plant populations were not identified in the PG&E study area (ESA, 2008b). Therefore, impacts are not anticipated from the PG&E substation and distribution line from the PG&E substation to the Transfer Facility.

**Summary of Alternative 1**

Under Alternative 1, the project would directly impact special-status plant populations including Brewer’s dwarf-flax, rose-mallow, and San Joaquin spearscale. An unknown number of individual Brewer’s dwarf-flax plants would be affected by inundation and relocation of the westside access road, a small population of rose-mallow would be affected at the new Delta Intake and Pump Station site, and a population of San Joaquin spearscale would be affected by the Transfer-Bethany Pipeline alignment. Limited follow-up surveys would be needed to assess the presence of heartscale and brittlescale populations that may be present in several distinct locations on the Transfer-Bethany Pipeline and on the Western powerline alignment.

Impacts related to Alternative 1 would be significant prior to mitigation, but can mitigated to a less-than-significant level through avoidance, protection, restoration, and habitat enhancement. Impacts associated with Alternative 1 would be reduced to a less-than-significant level through implementation of Mitigation Measure 4.6.3a, which strives to minimize impacts through avoidance strategies and protective measures; and Mitigation Measure 4.6.3b, which provides compensation for impacts through restoration and habitat enhancement.

**Alternative 2**

Alternative 2 would have identical impacts to special status plant populations as Alternative 1. This is considered a significant impact prior to mitigation. Impacts associated with Alternative 2 would be reduced to a less-than-significant level through implementation of Mitigation Measures 4.6.3a and 4.6.3b.

**Alternative 3**

Potential impacts to special-status plant species under Alternative 3 would be somewhat less than those described for Alternative 1. Without the Transfer-Bethany Pipeline, impacts to special-status plants would be limited to Brewer’s dwarf-flax within the watershed (as described for Alternative 1). Expansion of the Old River Intake and Pump Station proposed under this alternative only would not involve any physical site modification or disturbance either on the land or in the water. Therefore, expansion of this facility would not affect local rose-mallow populations.

Limited follow-up surveys would be needed to assess the presence of heartscale and brittlescale populations that may be present in several distinct locations on the Western powerline alignment.

Impacts to these species would be a significant impact prior to mitigation. Impacts associated with Alternative 3 would be reduced to a less-than-significant level through implementation of Mitigation Measure 4.6.3a and 4.6.3b.
Alternative 4

No special-status plant populations are known within the 160-TAF inundation zone and no populations would be affected in the surrounding study area (ESA, 2007) (Figure 4.6-13). The 160-TAF borrow area does not support special status plants. Impacts to special status plant populations would not occur under Alternative 4.

Mitigation Measures

Mitigation Measures 4.6.3a and 4.6.3b include focused plant surveys coupled with avoidance and minimization of impacts; harvesting, transplanting, and long-term maintenance of affected individuals; and the establishment of permanent mitigation sites that provide the specific habitat needs for each affected species. Implementation of these mitigation measures would reduce the impacts on special-status plant species to a less-than-significant level.

Measure 4.6.3a: Where necessary (see Figures 4.6-12 and 13), CCWD shall complete focused plant surveys on out-of-watershed pipeline alignments and facilities following CDFG and USFWS special-status plant survey guidelines. Comprehensive special-status plant surveys have been completed, except at a few sites on the Transfer-Bethany Pipeline alignment, within the Western substation siting zone (Power Option 1), and within the Western powerline alignment associated with Power Option 2 (i.e., within the siting zone for the new Western substation described above) and 2) and north of the Skinner Delta Fish Protective Facility (Power Option 2). Surveys shall document the location, extent, and size of *Atriplex* (brittlescale and heartscale) populations, if present, and shall be used to inform the planned avoidance of rare plant populations whenever possible. The Western substation shall be sited within the Western substation study area so as to avoid and minimize impacts to San Joaquin spearscale.

To the extent feasible, the final project design shall minimize impacts on known special-status plant populations within and next to the construction footprints. CCWD and its contractors will design facilities to avoid sensitive plant populations whenever feasible, and shall install exclusion fencing and/or silt fencing around sensitive plant populations with as large a buffer as possible to minimize the potential for direct and indirect impacts such as fugitive dust and accidental intrusion into sensitive areas. Dust and erosion control measures are described in Measure 4.5.1.

Measure 4.6.3b: Where avoidance is not feasible, CCWD shall compensate for the loss of special-status plants through the following steps:

- A qualified ecologist shall develop and implement a restoration and mitigation plan according to CDFG guidelines and in coordination with CDFG and USFWS. At a minimum, the plan shall include collection of reproductive structures from affected plants, a full description of microhabitat conditions necessary for each affected species, seed germination requirements, restoration techniques for temporarily disturbed occurrences, assessments of potential transplant and enhancement sites, success and performance criteria, and monitoring programs, as well as measures to ensure long-term sustainability. The mitigation plan shall apply to portions of the Los Vaqueros Watershed, portions of Transfer-Bethany Pipeline that require vernal pool restoration (i.e., near Byron Airport), and areas that support rose-mallow on the banks of Old River.
• Land that supports known populations of affected special-status plants shall be identified, enhanced, and protected within the watershed or acquired outside of the watershed at a ratio of 1.1:1 and protected in perpetuity with conservation easements.

Impact Significance after Mitigation: Less than Significant.

Impact 4.6.4: Project construction would result in impacts on California red-legged frog and California tiger salamander, including aquatic breeding habitat and upland aestivation habitat for these species. (Less than Significant with Mitigation)

Alternative 1

Los Vaqueros Reservoir Expansion, In-watershed Facilities, and recreational Facilities

Project construction has the potential to directly affect the California red-legged frog and California tiger salamander, permanently alter or inundate aquatic breeding sites for these species, and inundate upland aestivation sites. Permanent impacts on aquatic sites and upland aestivation habitat would generally occur as a result of reservoir inundation, while temporary impacts on upland aestivation areas would occur along pipeline corridors that traverse undeveloped, annual grasslands.

Direct impacts on known and potential aquatic breeding sites include the loss of 11 ponds in the 275-TAF reservoir inundation area. Five ponds in the Inlet/Outlet Pipelines construction area, each of which supports California red-legged frog breeding, would be avoided by project design; however, these ponds are subject to long-term temporary (i.e., greater than 1 year) dewatering during construction, as Los Vaqueros Reservoir will be unavailable as a water source during this period. Ten of the 11 inundated ponds support California red-legged frog breeding populations and four ponds support California tiger salamander breeding (see Figures 4.6-7 and 4.6-8 and Table 4.6-11). Eighteen stock ponds are dependent upon the reservoir for supplemental water.

A GIS analysis of potential and known breeding sites and available annual grassland and oak woodland upland habitats that occur within an accessible distance to breeding ponds (e.g., within 1 kilometer [0.62 mile]) indicates that all undisturbed annual grasslands and oak woodland habitats in the watershed may support aestivating California tiger salamanders or California red-legged frogs, and provide upland movement corridors for these species. The expansion of the Vaqueros Reservoir and associated in-watershed facilities would cause the direct and permanent loss of 976.2 acres of annual grasslands and 149.6 acres of oak woodlands, representing a total of 1,125.8 acres of upland aestivation and migratory habitat potentially occupied by these species (see Table 4.6-12). In the Inlet/Outlet Pipelines construction area, construction activities would last for 2 years. The areas of temporary disturbance would ultimately be restored to annual grasslands or oak woodland after project construction. An unknown number of California red-legged frogs and California tiger salamanders would be destroyed as a result of these impacts to upland habitat and aquatic habitat sites.
### TABLE 4.6-11
IMPACTS ON CALIFORNIA TIGER SALAMANDER AND CALIFORNIA RED-LEGGED FROG AQUATIC HABITAT

<table>
<thead>
<tr>
<th>Pond Name</th>
<th>Description</th>
<th>California Tiger Salamander</th>
<th>California Red-Legged Frog</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1W (To be avoided and dewatered)</td>
<td>Constructed alkali marsh pond with a supplemental water source; semipermanent water</td>
<td>Not identified</td>
<td>Breeding</td>
</tr>
<tr>
<td>N2W (To be avoided and dewatered)</td>
<td>Constructed alkali marsh pond with a supplemental water source; semipermanent water</td>
<td>Not identified</td>
<td>Breeding</td>
</tr>
<tr>
<td>N3W (To be avoided and dewatered)</td>
<td>Constructed alkali marsh pond with a supplemental water source; semipermanent water</td>
<td>Not identified</td>
<td>Breeding</td>
</tr>
<tr>
<td>N4W (To be avoided and dewatered)</td>
<td>Constructed alkali marsh pond with a supplemental water source; semipermanent water</td>
<td>Not identified</td>
<td>Breeding</td>
</tr>
<tr>
<td>N5W (To be avoided and dewatered)</td>
<td>Constructed alkali marsh pond with a supplemental water source; semipermanent water</td>
<td>Not identified</td>
<td>Breeding</td>
</tr>
<tr>
<td>K6W*</td>
<td>Constructed semipermanent marsh pond. No supplemental water provided</td>
<td>Not identified</td>
<td>Breeding</td>
</tr>
<tr>
<td>K7W*</td>
<td>Constructed semipermanent marsh pond. No supplemental water provided</td>
<td>Not identified</td>
<td>Breeding</td>
</tr>
<tr>
<td>K8W*</td>
<td>Constructed semipermanent marsh pond. No supplemental water provided</td>
<td>Not identified</td>
<td>Breeding</td>
</tr>
<tr>
<td>K9W*</td>
<td>Constructed semipermanent marsh pond. No supplemental water provided</td>
<td>Breeding</td>
<td>Present, breeding not known</td>
</tr>
<tr>
<td>D7*</td>
<td>Nonmitigation stock pond; permanent water. No supplemental water provided</td>
<td>Not identified</td>
<td>Breeding</td>
</tr>
<tr>
<td>D11*</td>
<td>Nonmitigation stock pond; permanent water. No supplemental water provided</td>
<td>Breeding</td>
<td>Breeding</td>
</tr>
<tr>
<td>F1</td>
<td>Constructed semipermanent marsh pond; water retention issues (2005)</td>
<td>Not identified</td>
<td>Not observed (2005)</td>
</tr>
<tr>
<td>F2</td>
<td>Nonmitigation stock pond; permanent water. No supplemental water provided</td>
<td>Not identified</td>
<td>Breeding</td>
</tr>
<tr>
<td>F4</td>
<td>Nonmitigation stock pond; permanent water. No supplemental water provided</td>
<td>Not identified</td>
<td>Breeding</td>
</tr>
<tr>
<td>F8*</td>
<td>Nonmitigation stock pond; permanent water. No supplemental water provided</td>
<td>Breeding</td>
<td>Breeding</td>
</tr>
<tr>
<td>F11W</td>
<td>Constructed semipermanent marsh pond. No supplemental water provided</td>
<td>Breeding</td>
<td>Breeding</td>
</tr>
</tbody>
</table>

Note: an asterisk (*) indicates the ponds that would be impacted under Alternative 4, and includes 7 of the 16 features. All 16 sites would be impacted under Alternatives 1, 2, or 3.
TABLE 4.6-12
IMPACTS ON CALIFORNIA TIGER SALAMANDER AND CALIFORNIA RED-LEGGED FROG UPLAND AESTIVATION HABITAT (ACRES)

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Grasslands</th>
<th>Oak Woodland</th>
<th>Other Habitats¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Permanent Impact</td>
<td>Temporary Impact</td>
<td>Permanent Impact - Oak Woodland</td>
</tr>
<tr>
<td>Alternatives 1 and 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-watershed Facilities²</td>
<td>976.2</td>
<td>45.8</td>
<td>149.5</td>
</tr>
<tr>
<td>Delta-Transfer Pipeline</td>
<td>0</td>
<td>24.2</td>
<td>0</td>
</tr>
<tr>
<td>Transfer-LV Pipeline</td>
<td>0</td>
<td>76.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Transfer-Bethany Pipeline</td>
<td>0</td>
<td>150.9</td>
<td>0</td>
</tr>
<tr>
<td>Expanded Transfer Facility</td>
<td>(1.2)³</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total - Alternatives 1 and 2</td>
<td>976.2</td>
<td>297.4</td>
<td>149.6</td>
</tr>
<tr>
<td>Alternative 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-watershed Facilities</td>
<td>976.2</td>
<td>45.8</td>
<td>149.5</td>
</tr>
<tr>
<td>Delta-Transfer Pipeline</td>
<td>0</td>
<td>24.2</td>
<td>0</td>
</tr>
<tr>
<td>Transfer-LV Pipeline</td>
<td>0</td>
<td>76.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Total - Alternative 3</td>
<td>976.2</td>
<td>146.5</td>
<td>149.6</td>
</tr>
<tr>
<td>Alternative 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-watershed Facilities</td>
<td>498.5</td>
<td>19.2</td>
<td>22.1</td>
</tr>
<tr>
<td>Total – Alternative 4</td>
<td>498.5</td>
<td>19.2</td>
<td>22.1</td>
</tr>
</tbody>
</table>

¹ Other habitats include lacustrine, natural seasonal wetland, saline emergent/nontidal freshwater, upland cropland, upland scrub, urban/disturbed, and valley/foothill riparian
² In-watershed facilities includes the PG&E substation. Habitat for California tiger salamander and California red-legged frog does not occur at the Western substation site.
³ Habitat at the Expanded Transfer Facility is considered low quality aestivation habitat for the California tiger salamander and California red-legged frog and is not included in the total below.

Water would be bypassed around Los Vaqueros Dam during construction so that water releases into lower Kellogg Creek would be maintained during construction. Water would also continue to enter the lower reach of the creek seasonally from other natural sources tributary to the creek (e.g., spring releases, surface runoff, and groundwater). With maintained flows, the quality and availability of breeding and nonbreeding (summer) habitat for California red-legged frogs is not expected to change markedly in Kellogg Creek.

New Delta Intake and Pump Station
Habitat for California red-legged frog and California tiger salamander does not occur near the new Delta Intake and Pump Station, therefore no impacts are anticipated at this location.

Delta-Transfer Pipeline
The Delta-Transfer Pipeline alignment traverses 24.2 acres of potentially occupied California red-legged frog and California tiger salamander aestivation habitat that occur over a linear distance of 1.2 miles (see Table 4.6-12). A 200-foot-wide construction corridor would result in a direct, temporary impact on 24.2 acres of potentially occupied upland habitat. One potential aquatic breeding
site occurs about 0.25 mile north of the pipeline alignment, but would not be directly or indirectly affected by construction.

**Transfer-LV Pipeline**

Along the Transfer-LV Pipeline alignment, 76.5 acres of potentially occupied aestivation habitat (ranging over 4.3 linear miles) could be temporarily affected (see Table 4.6-12). A 200-foot-wide construction corridor would have a direct, temporary impact on 76.5 acres of potentially occupied upland habitat. At least two aquatic sites are within 0.25 mile of the pipeline alignment that support breeding California red-legged frogs, and five California tiger salamander breeding ponds downstream from Los Vaqueros Dam could be affected by the pipeline construction. Additionally, the alignment crosses Kellogg Creek at three locations that could support red-legged frogs (nonbreeding habitat), and the creek corridor could be subject to major disturbances in the Inlet/Outlet Pipelines construction area. All pipeline impacts upon aestivation habitat would be temporary. California tiger salamanders are not known or expected to breed in Kellogg Creek.

**Transfer-Bethany Pipeline**

Along the Transfer-Bethany Pipeline alignment, 7.7 miles of potentially occupied California red-legged frog and California tiger salamander aestivation habitat could be temporarily affected (see Table 4.6-12). A 300-foot-wide construction corridor would result in a direct, temporary impact on 150.9 acres of potentially occupied upland habitat. At least two aquatic sites are within 0.25 mile of the pipeline alignment that could be affected by construction. The pipeline alignment crosses Brushy Creek along Armstrong Road and would temporarily affect aquatic habitat in the creek at that location. All pipeline impacts upon aestivation habitat would be temporary.

**Power Supply Infrastructure**

**Power Option 1: Western Only.** California tiger salamander and California red-legged frog do not occur within the Option 1 study area; thus, no impacts are anticipated from proposed facilities.

**Power Option 2: Western and PG&E.** California tiger salamanders and California red-legged frogs do not occur within the Option 2 study area for power facilities from Western; thus, no impacts are anticipated from proposed facilities.

The PG&E substation is proposed in an area that may provide suitable aestivation for California tiger salamanders, with potential breeding sites near Kellogg Creek, less than 0.5 mile west of proposed facilities. Therefore, the likelihood exists that migrating or aestivating adult salamanders or California red-legged frogs could be harmed during construction. This impact is treated as part of the in-watershed facilities impact acreage in Table 4.6-12.

**Expanded Transfer Facility**

Construction of the Expanded Transfer Facility could affect 1.2 acres of potentially occupied upland habitat for California tiger salamander. California red-legged frogs are expected to use this area only intermittently due to the lack of site cover, primarily to disperse between aquatic sites. Because this potential habitat is of low quality, it is not included in the acreage totals in Table 4.6-12.
Summary for Alternative 1

Under Alternative 1, the project would directly impact California red-legged frog and California tiger salamander individuals, aquatic breeding habitat, and upland aestivation habitat through inundation, reduction in supplemental water supplied from the reservoir to ponds, sustained dewatering of some ponds, and other construction activities. Upland aestivation and migratory habitat in the form of grasslands would see the greatest impact by area. In all cases, impacts related to Alternative 1 would be significant prior to mitigation, but can be mitigated to a less-than-significant level through avoidance and impact-minimization measures, through the incorporation of onsite and offsite compensatory mitigation, and through provision of supplemental water to pond breeding sites during construction. Under Alternative 1, flows would be maintained in lower Kellogg Creek using a bypass around Los Vaqueros Dam. Impacts associated with Alternative 1 would be reduced to a less-than-significant level through implementation of Mitigation Measure 4.6.4a, which serves to avoid and minimize species take, and Mitigation Measure 4.6.4b, which provides compensation for impacts through land acquisition and habitat management.

Alternative 2

Project impacts to California red-legged frog, California tiger salamander and habitat for these species due to project implementation under Alternative 2 would be the same as those discussed for Alternative 1 (Table 4.6-12). This is considered a significant impact prior to mitigation. Impacts associated with Alternative 2 would be reduced to a less-than-significant level through implementation of Mitigation Measures 4.6.4a and 4.6.4b.

Alternative 3

In the absence of the Transfer-Bethany pipeline, impacts to California red-legged frogs and California tiger salamanders and their habitat would be about 173 acres less than under Alternative 1 (Table 4.6-12). These species do not occur near the Expanded Old River Intake and Pump Station, thus impacts would not occur at this location. This impact is significant prior to mitigation. Implementation of Mitigation Measures 4.6.4a and 4.6.4b would reduce these potential impacts to a less-than-significant level.

Alternative 4

Under Alternative 4, project construction has the potential to directly affect California red-legged frogs and California tiger salamanders, permanently inundate aquatic breeding sites for these species, and inundate upland aestivation sites within the currently described migratory capabilities of each species. Permanent impacts on aquatic sites and upland aestivation habitat would be restricted to the area of reservoir inundation and borrow sites.

Direct impacts on known and potential aquatic breeding sites include the loss of seven ponds in the 160-TAF reservoir inundation area. As discussed for Alternative 1, five ponds below Los Vaqueros Dam could be subject to temporary dewatering during construction. Seven of the above ponds support California red-legged frog breeding populations and three support California tiger salamander breeding (see Figures 4.6-7 and 4.6-8 and Table 4.6-12).
The expansion of the Los Vaqueros Reservoir to 160 TAF and associated in-watershed facilities would cause the direct and permanent loss of 498.5 acres of annual grasslands and 22.1 acres of oak woodlands, a total of 520.6 acres of upland aestivation habitat potentially used by these species (see Table 4.6-12). Temporary disturbances to upland habitat would occur in the 160-TAF borrow area. Because the exact location of alluvial deposits within the borrow area is unknown, a borrow area zone was analyzed for impact analysis purposes (see Figure 3-18). As shown on the figure, in the general area proposed for borrow materials, restricted areas where no borrow activities would occur have been identified and would avoid impacts to California red-legged frog and California tiger salamander aquatic breeding habitat. The areas of temporary disturbance would ultimately be restored to annual grasslands after construction. An unknown number of California red-legged frogs and California tiger salamanders would be destroyed as a result of impacts to upland habitat and aquatic habitat sites.

This impact remains significant prior to mitigation. Implementation of Mitigation Measures 4.6.4a and 4.6.4b would reduce these potential impacts to a less-than-significant level.

**Mitigation Measures**

The implementation of Measure 4.6.4a, which includes measures to avoid and minimize take of individual frogs and salamanders, and Measure 4.6.4b, which provides for habitat compensation and enhancement, would reduce the impacts on California red-legged frogs and California tiger salamanders to a less-than-significant level.

**Measure 4.6.4a:** CCWD shall implement measures to minimize and avoid take of California red-legged frogs and California tiger salamanders. Before and during construction, the following actions shall minimize impacts on these species:

- CCWD shall submit the name and credentials of a biologist qualified to act as construction monitor to USFWS for approval at least 15 days before construction work begins. General minimum qualifications are a 4-year degree in biological sciences or other appropriate training and/or experience in surveying, identifying, and handling California tiger salamanders and California red-legged frogs.

- A USFWS-approved biologist shall survey the work sites 2 weeks before the onset of construction. If California tiger salamanders or California red-legged frogs (or their tadpoles or eggs) are found, the approved biologist shall contact USFWS to determine whether moving any of these life-stages is appropriate. If USFWS approves moving the animals, the approved biologist shall be allowed sufficient time to move frogs and/or salamanders from the work sites before work begins. If these species are not identified, construction can proceed at these sites. The approved biologist shall use professional judgment to determine whether (and if so, when) the California tiger salamanders and/or California red-legged frogs are to be moved. The USFWS-approved biologist shall immediately inform the construction manager that work should be halted, if necessary, to avert avoidable take of listed species.

- Areas will be monitored during construction to identify, capture, and relocate sensitive amphibians, if present.
A detailed California red-legged frog/California tiger salamander relocation plan will be prepared at least 3 weeks before the start of groundbreaking, and submitted to USFWS for review. The purpose of the plan is to standardize amphibian relocation methods and relocation sites.

A USFWS-approved biologist shall be present at the active work sites until California red-legged frogs and California tiger salamanders have been removed, and habitat disturbance has been completed. Thereafter, the contractor or CCWD shall designate a person to monitor onsite compliance with all minimization measures. A USFWS-approved biologist shall ensure that this individual receives training consistent with USFWS requirements.

CCWD and its contractors shall initiate all work within potential California red-legged frog aquatic breeding habitat between May 1 and November 1 (i.e., generally identified as the nonbreeding season). Project construction timing constraints are summarized in Section 4.6.3.

CCWD and its contractors shall install frog-exclusion fencing (i.e., silt fences) around all construction areas that are within 100 feet of potential California red-legged frog or California tiger salamander aquatic breeding habitat.

A USFWS-approved biologist shall conduct a training session for all construction personnel. At a minimum, the training shall include a description of the California red-legged frog and California tiger salamander and their habitat, the importance of these species and their habitat, the general measures that are being implemented to conserve the red-legged frog and tiger salamander as they relate to the project, and the boundaries within which the project construction shall occur.

During work activities, all trash that may attract predators shall be properly contained, removed from the work site, and disposed of regularly. After construction, the contractor shall remove all trash and construction debris from work areas on a daily basis.

All fueling and maintenance of vehicles and other equipment and staging areas will occur at least 20 meters (65.6 feet) from any riparian habitat or water body.

Before the onset of work, CCWD shall prepare a stormwater pollution prevention plan and water pollution control plan as described in Measures 4.5.1a and 4.5.1b to allow prompt and effective response to any accidental spills.

Before construction begins, CCWD shall prepare a plan describing pre-project conditions, restoration, and monitoring success criteria. CCWD or its contractors shall restore the contours and revegetate all areas disturbed by the project with an appropriate assemblage of native vegetation suitable to the area.

Where needed to maintain California red-legged frog and/or California tiger salamander breeding in existing mitigation wetlands that are presently supplemented with water, but are not directly disrupted by construction, CCWD shall continue to provide supplemental water to these ponds during and after construction according to the existing terms and conditions for these mitigation sites.
Measure 4.6.4b: CCWD shall provide compensation for permanent and temporary impacts on California tiger salamander and California red-legged frog aquatic habitat. In accordance with MSCS (CALFED, 2000) objectives, CCWD shall provide compensation for the permanent loss of California red-legged frog and California tiger salamander aquatic habitat at a minimum of a 3:1 ratio. The MSCS does not require compensation for loss of California red-legged frog and California tiger salamander aestivation habitat. To satisfy compensation guidelines, CCWD shall implement the following measures:

• CCWD shall mitigate for the loss of aquatic breeding sites that will be filled or otherwise directly affected by the project (estimated to be 16 sites at this time; number to be confirmed by pre-construction surveys) as well as mitigate for impacts on associated California red-legged frog upland habitat by providing compensatory habitat.

• CCWD shall develop and implement a mitigation, monitoring, and management plan, with input from regulatory agencies that shall outline long-term management strategies and performance standards to be attained to compensate for habitat losses resulting from the project. At a minimum, the plan shall include standards for mitigation site selection and construction specifications for mitigation sites, a description of site conditions including aerial maps, an analysis of local amphibian habitat (e.g., is another breeding habitat nearby?), and performance criteria by which site quality can be assessed over time (see below). A monitoring program shall be established to track the development of habitat conditions that are conducive to the establishment of the California red-legged frog and/or California tiger salamander breeding populations. Long-term monitoring (e.g., night surveys and aquatic dipnet surveys) shall be performed on an annual basis to determine if these species are present. The plan shall provide that monitoring be performed to ensure that mitigation ponds that are dependent upon artificial water function as designed.

• Performance criteria shall be used to assess the success of aquatic habitat created for California red-legged frogs and California tiger salamander aquatic habitat. These criteria shall be outlined in the mitigation, monitoring and management plan and shall include:
  - A description of the type of habitat to be created (e.g., permanent marsh consisting of open water and emergent vegetation; semipermanent marsh);
  - The total area, size and number of California red-legged frog and California tiger salamander mitigation ponds to be created based on a comparable loss of breeding sites (e.g., 1:1 replacement ratio) as a result of the project. These ponds shall concurrently satisfy wetland mitigation requirements identified in Measure 4.6.2b;6
  - Constructed permanent marsh ponds that are designed to support California red-legged frog breeding shall provide:
    ▪ at least 75% absolute vegetation cover of wetland plant species within shallow water emergent vegetation zones;

Note that final mitigation acreage requirements and compensation ratios may be adjusted by the USFWS or USACE based on actual wetland impacts, which will be identified during the permitting process.
- year-round inundation with depths of at least 1.5 feet in the vegetation zone and 4 feet in open water.

- Constructed semipermanent marsh ponds that are designed to support California tiger salamander or California red-legged frog breeding habitat shall provide:
  - water regimes similar to affected features, with semi-permanent water ranging from depths of 1.5 to 2.5 feet or greater during a typical rainfall year and an inundation period that exceeds 120 consecutive days;
  - a predominance of seasonal wetland plants (at least 75% absolute vegetation cover) during the winter/spring monitoring period (though may support upland species later in the year when pools dry).

- To the greatest practicable extent, CCWD or its contractors shall construct and manage compensation habitat (i.e., replacement ponds) for California red-legged frogs and California tiger salamanders prior to project implementation. A qualified biologist shall ensure that ponds are functioning before the removal and/or inundation of existing California tiger salamander and California red-legged frog aquatic breeding sites.

- Construction within the Kellogg Creek corridor (i.e., creek crossing sites) shall be designed to impact the smallest area required to provide for the installation of pipelines, particularly in the area below Los Vaqueros Dam.

- CCWD and its contractors shall restore and enhance Kellogg Creek and adjacent natural upland environs in the project area (about 4.0 linear miles) to restore suitable aquatic breeding habitat for California red-legged frogs and restore disturbed upland areas as close as possible to pre-project conditions. Methods of enhancement and restoration could include, but are not limited to, reducing erosion; installing breeding ponds; excluding cattle from sensitive areas; and managing, salvaging, and seeding with grasses, forbs, and other species that are native to the site, as well as other measures to increase water quality within the enhancement and restoration reach.

New mitigation ponds that are created for California red-legged frog and California tiger salamander shall be hydrologically self-sustaining and shall not require a supplemental water supply. Because few natural drainages in the Los Vaqueros Watershed could maintain self-sustaining mitigation ponds, a portion of the pond mitigation locations will likely be identified outside of the watershed.

**Impact Significance after Mitigation:** Less than Significant.
Impact 4.6.5: Project construction would result in direct and indirect impacts on existing populations of and habitat for the western pond turtle. (Less than Significant with Mitigation)

**Alternative 1**

**Los Vaqueros Reservoir Expansion, In-watershed Facilities, and Recreational Facilities**

Construction of the Expanded Los Vaqueros Reservoir, in-watershed facilities, and recreational facilities would directly affect known western pond turtle populations as well as both aquatic and upland habitat for the western pond turtle. Six stock ponds, ten created wetlands, and several drainages (including Kellogg Creek) would be affected by reservoir inundation and in-watershed activities; of these areas, at least three ponds known to support western pond turtles would be directly affected by inundation. Eight ponds that support western pond turtles would be directly affected by construction of Los Vaqueros Dam, associated Inlet/Outlet Pipelines, and relocation of the westside access road.

Western pond turtles are documented in the Inlet/Outlet Pipelines construction area, and this species may opportunistically be encountered in ponds, within Kellogg Creek, or in uplands in this area. Where possible, siting of the pipeline and construction activity would avoid aquatic features that could support this species. Turtles would be relocated if encountered in work areas, and turtle populations would be monitored to ensure successful relocation. Due to topographic constraints, such as steep slopes and narrowing canyons that arise at higher elevations in the watershed, it might not be feasible to replace all the directly affected wetland features near the point of impact, or even in nearby portions of the watershed. Thus, adult western pond turtles might need to be relocated to nearby offsite mitigation sites. While it could be possible to identify and relocate individual turtles, nest sites can be difficult to find because they are often away from aquatic areas and do not stand out from adjacent habitat. Nesting generally extends from late April through August, depending on the latitude, with a peak from late May to early July (Lovich, undated). It is anticipated that reservoir inundation at any time of the year could cause the direct loss of an unknown number of active nests.

Direct long-term temporary (i.e., greater-than-1-year) impacts would include disturbance of potential western pond turtle habitat in the construction zone along Kellogg Creek associated with dam and Inlet/Outlet Pipelines construction. Outside the construction zone, flows to Kellogg Creek would be maintained with a bypass running from water sources in the upper creek as part of Alternative 1. Downstream from Los Vaqueros Dam, the creek would still receive water from other contributing portions of the watershed and some ponding would be maintained in this creek.

**New Delta Intake and Pump Station**

Western pond turtles are not known to occur in the new Delta Intake and Pump Station project study area, but turtle basking habitat, including rocks and floating logs and boards, are present in the project area on the banks of Old River. Potential nesting habitat is available in friable soils between Old River levee and adjacent agricultural lands. This area is within the described range of this species, thus, it is possible that pond turtles or turtle nests could be destroyed during
construction of the new intake structure, during dewatering activities in Old River, or when turtles are encountered by equipment in uplands areas.

**Delta-Transfer Pipeline**
Impacts resulting from construction of the Delta-Transfer Pipeline generally would include upland disturbances within the 200-foot-wide construction corridor. Impacts would not be permanent, and disturbed habitat would be restored with native vegetation or returned to agricultural uses. Western pond turtles are not known to occur within 500 feet of the pipeline alignment, and aquatic sites that would support this species are generally limited in and near the construction corridor. Wetlands would be avoided where possible and restored where avoidance is not feasible. Therefore, direct impacts on western pond turtles or their associated habitat are not expected.

**Expanded Transfer Facility**
Western pond turtles are not reported near the Expanded Transfer Facility study area, and no aquatic habitat in the near-project area would support this species. Therefore, no direct or indirect impacts on western pond turtles are expected.

**Transfer-LV Pipeline**
Three western pond turtle occurrences are reported near the Transfer-LV Pipeline alignment (CDFG, 2008). These occurrences include areas along lower Kellogg Creek, where several stock ponds and created wetlands support this species. All aquatic features, including Kellogg Creek, stock ponds, and adjacent upland habitat, provide suitable habitat for western pond turtles. This species is expected at aquatic sites and may occur sporadically in upland areas.

**Transfer-Bethany Pipeline**
Impacts resulting from construction of the Transfer-Bethany Pipeline would include disturbance of habitat within the 300-foot-wide construction corridor. Western pond turtles could be destroyed within construction corridors during their ordinary upland movement activities. Habitat impacts would be temporary because disturbed upland habitat would be restored with native vegetation after pipeline construction is completed. Western pond turtles are not reported within 500 feet of the pipeline alignment. The likelihood is low that this species would be encountered in annual grasslands during construction.

**Power Supply Infrastructure**

**Power Option 1: Western Only.** Western pond turtles are documented from aquatic habitat in Italian Slough, and may be present in irrigation canals that traverse the Western powerline study area or adjacent upland habitat. This species may be encountered at any location on the Western powerline alignment. Impacts would be limited to disturbance and potential encounters during construction, with no permanent habitat impacts.

**Power Option 2: Western and PG&E.** Western pond turtles may be present in irrigation canals that traverse the Option 2 Western powerline study area or adjacent upland habitat. Impacts include potential encounters with adult turtles during construction, but no permanent habitat impacts.
Near the PG&E substation, western pond turtles are known from Kellogg Creek and may be infrequently encountered in upland areas and subject to vehicle mortality during construction.

**Summary for Alternative 1**

Under Alternative 1, the project would directly impact western pond turtle individuals and aquatic and upland nesting habitat through inundation, road relocation, and upland construction. Impacts related to Alternative 1 would be significant prior to mitigation but would be reduced to a less-than-significant level through implementation of Mitigation Measure 4.6.5, which calls for surveys to identify individuals and nests in the construction area and relocate them.

**Alternative 2**

Potential impacts to western pond turtles and their habitat would be the same as those discussed for Alternative 1. Impacts would be reduced to a less-than-significant level through implementation of Mitigation Measure 4.6.5, which calls for surveys to identify individuals and nests in the construction area and relocate them.

**Alternative 3**

Impacts to western pond turtles and their habitat at the reservoir and within the watershed would be the same as those described for Alternative 1. Outside the watershed, potential impacts would be lower under Alternative 3 than under Alternative 1 because this alternative would not include construction of either the new Delta Intake and Pump Station or the Transfer-Bethany Pipeline. Thus, this alternative would avoid any potential impact associated with these two facilities. Expansion of the Old River Intake and Pump Station proposed under this alternative only would not involve any physical site modification or disturbance either on the land or in the water. Therefore there would be no impact to western pond turtle at this site.

Impacts under this alternative would be considered significant direct effects of the project. The implementation of Mitigation Measure 4.6.5 would ensure that impacts to western pond turtles are minimized and reduce project effects to a less-than-significant level.

**Alternative 4**

A 160-TAF reservoir expansion would inundate or destroy seven created wetlands and several drainages (including Kellogg Creek) that are known to support western pond turtle populations. The majority of these features, both upstream and downstream from the dam, would be available to turtles during construction, as would the lowered Los Vaqueros Reservoir.

Because the reservoir would not be fully drained under this alternative, turtles would likely stay within Los Vaqueros Reservoir and be less likely to wander into upland areas, including the Dam construction site, than under Alternative 1. This species could be disturbed or destroyed in upland habitat in the 160-TAF borrow area, which would not occur under Alternative 1; however, the overall construction footprint within the Los Vaqueros Watershed, and hence the likelihood of encountering moving turtles, would be lower under Alternative 4.
These would be considered significant direct effects of the project. The implementation of Mitigation Measure 4.6.5 would ensure that take is minimized and reduce project effects to a less-than-significant level.

**Mitigation Measures**

The implementation of Mitigation Measure 4.6.5, which includes biological monitoring and turtle relocation, would reduce project impacts on western pond turtle populations and habitat to a less-than-significant level:

**Measure 4.6.5:** Before construction activities begin, a qualified biologist shall conduct western pond turtle surveys within creeks and in other ponded areas affected by the project. Upland areas shall also be examined for evidence of nests as well as individual turtles. The project biologist shall be responsible for the survey and for the relocation of turtles. Construction shall not proceed until a reasonable effort has been made to capture and relocate as many western pond turtles as possible to minimize take. However, some individuals may be undetected or enter sites after surveys, and would be subject to mortality. If a nest is observed, a biologist with the appropriate permits and prior approval from CDFG shall move eggs to a suitable location or facility for incubation, and release hatchlings into the creek system the following autumn. In addition, western pond turtles shall be included in the fish rescue operation described in Mitigation Measure 4.3.3 (Alternatives 1 and 2 only).

**Impact Significance after Mitigation:** Less than Significant.

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**Impact 4.6.6:** Project construction under Alternatives 1, 2, and 3 would result in direct and indirect impacts on listed vernal pool fairy shrimp and their habitat, and on the non-listed midvalley fairy shrimp and curved-foot hygrotrus diving beetle (Less than Significant with Mitigation)

**Alternative 1**

**Los Vaqueros Reservoir Expansion, In-watershed Facilities, and Recreational Facilities**

Vernal pool fairy shrimp are presumed present in all potentially suitable habitat in the project area. Vernal pool fairy shrimp are known from a single rock outcrop in the watershed known as the Kellogg Creek vernal pool complex. The outcrop is about 0.20 mile (1,056 feet) east and upslope from the proposed 275-TAF waterline. This location would not be directly affected by the reservoir inundation or proposed in-watershed facilities (Figure 4.6-5) (ESA, 2004). The USFWS (1995) Conference Opinion used as a BO for the existing Los Vaqueros Reservoir recognized the high sensitivity of the Kellogg Creek vernal pool complex. It required that public use of the

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7 The term “qualified biologist” refers to an individual who has at least a minimum education and qualifications that may include a 4-year degree in a biological sciences or other specific field and training and/or experience in surveying, identifying, and handling the subject species. This individual differs from a “Service-approved biologist” in that the qualified biologist may only handle species that are not listed as threatened or endangered by the USFWS. The Service-approved biologist is authorized to relocate such species.
easternmost portion of the watershed be restricted, and that allowable activities at the complex include research and occasional educational activities to be conducted under the immediate supervision of CCWD staff or other responsible parties (USFWS, 1995).

The 1995 BO identified lands just east of the reservoir (i.e., shoreline areas) as suitable for low-intensity dispersed recreational use such as hiking and boat landing (USFWS, 1995). However, CCWD did not develop public access trails or open east-watershed lands to public access. This action negated the requirement to fence the Kellogg Creek vernal pool complex and provide patrols to ensure that no trespassing happens. The proposed eastside trail would provide public hiking access to shoreline areas. Trail construction and public access would not occur within 500 feet of the complex; therefore, direct impacts are not anticipated from trail construction or lawful use of trails. However, use of lands within 200 feet of the complex, which was the threshold established under the 1995 USFWS BO, provides the possibility for trespass and permanent damage to the Kellogg Creek vernal pool complex and vernal pool fairy shrimp populations.

Occupied vernal pool fairy shrimp habitat in the Los Vaqueros Watershed and the Kellogg Creek vernal pool complex would be avoided through planned trail routing, so direct impacts to vernal pool fairy shrimp populations would be avoided. The Kellogg Creek vernal pool complex could be subject to indirect disturbance as a result of recreational users on trails and in the vicinity accessing the area resulting in habitat degradation.

As previously stated, longhorn fairy shrimp and midvalley fairy shrimp are not expected to occur within the Los Vaqueros Watershed.

Suitable habitat for the curved-footed hygrotus diving beetle exists in six stock ponds and 10 created wetlands ponds, and this species is presumed present at these locations. Impacts would not occur to this diving beetle in Kellogg Creek or other flowing drainages. Any populations within the expanded reservoir footprint would be lost. Populations would remain unharmed in features that are drained but not physically altered.

**New Delta Intake and Pump Station**

Two vernal pool fairy shrimp populations are reported 2 and 4 miles from the new Delta Intake and Pump Station. Longhorn fairy shrimp and midvalley fairy shrimp are not known near this project component. No seasonally ponding habitat lies in or near this study area; therefore, no direct or indirect impacts would occur to vernal pool branchiopods or their habitat at this facility.

Curved-foot hygrotus diving beetles are not described from this area, and are not subject to project impacts.

**Delta-Transfer Pipeline**

Vernal pool fairy shrimp populations have been identified at distances of 1 to about 3 miles from the Delta-Transfer Pipeline alignment; longhorn fairy shrimp populations have been identified within 5 miles of the alignment. Potential habitat for vernal pool fairy shrimp and possibly midvalley fairy shrimp occurs in a single alkali swale within the project area. The 200-foot-wide pipeline
corridor would avoid any known occupied habitat but could affect potential habitat in the alkali swale. Therefore, direct or indirect impacts on potentially occupied vernal pool fairy shrimp and/or midvalley fairy shrimp habitat could occur as a result of Delta-Transfer Pipeline construction.

This alignment does not provide habitat for curved-foot hygrotus diving beetle, thus no impacts would occur to these species.

**Expanded Transfer Facility**

The Expanded Transfer Facility construction would avoid any known or potential habitat for special-status branchiopods; therefore, no direct or indirect impacts are expected from this project element. This site does not provide habitat for curved-foot hygrotus diving beetles, thus no impacts would occur to this species.

**Transfer-LV Pipeline**

Much of the Transfer-LV Pipeline alignment is within the watershed. Vernal pool fairy shrimp and longhorn fairy shrimp populations have been identified between 1 to 3 miles from the alignment. Suitable habitat is not present within the alignment or project study area. Therefore, no direct or indirect impacts on fairy shrimp populations or their habitat are expected from Transfer-LV Pipeline construction.

Potential curved-foot hygrotus diving beetle habitat near the pipeline alignment is described for *Los Vaqueros Reservoir Expansion, In-Watershed Facilities, and Recreational Facilities*, above, and includes five created wetland ponds downstream from the dam.

**Transfer-Bethany Pipeline**

The Transfer-Bethany Pipeline alignment traverses identified vernal pool fairy shrimp habitat and crosses the western portion of critical habitat (Unit 19B) near Byron Airport for a linear distance of 4 miles (CDFG, 2008). The portion of designated critical habitat traversed by the alignment supports at least five topographic depressions that could support vernal pool fairy shrimp, and four additional pools that are occupied by this species (ESA, 2008a). Potential vernal pool fairy shrimp habitat was identified in an additional 7 pools on the alignment that are outside of designated critical habitat for this species. Vernal pool fairy shrimp is presumed present in all potentially suitable habitat for which CCWD chooses not to perform protocol level surveys. The non-listed midvalley fairy shrimp could co-occur with vernal pool fairy shrimp at any of these locations. Therefore, construction of the Transfer-Bethany Pipeline could cause direct and indirect impacts on potential and occupied vernal pool branchiopod habitat.

Habitat for curved-foot hygrotus diving beetles may be present in up to 16 alkali pools that were identified as vernal pool branchiopod habitat.

**Indirect Effects to Vernal Pool Hydrology.** Direct impacts on vernal pool fairy shrimp habitat are discussed above with direct and indirect impacts to seasonal wetlands and critical habitat addressed in Impact 4.6-2 and 4.6-13, respectively. For the portion of the Transfer-Bethany Pipeline alignment in the vicinity of Byron Airport, this Draft EIS/EIR analyzes potential project
effects on surface and subsurface hydrology of vernal pools that occur within and outside the area of direct project effects. As identified in the U.S. Fish and Wildlife Service Vernal Pool Recovery Plan, part of the pipeline alignment falls within one of the Altamont Hills core areas within the Livermore vernal pool region (USFWS, 2005a) (see Impact 4.6-13 for further discussion of effects to designated critical habitat). The purpose of the recovery plan is to incorporate ecosystem considerations through the development and implementation of recovery plans for communities or ecosystems where multiple listed species and species of concern occur, in a manner that restores, reconstructs, or rehabilitates the structure, distribution, connectivity, and function upon which those listed species depend (USFWS, 2005a).

The hydrologic analysis for this Draft EIS/EIR considered whether construction of the Transfer-Bethany Pipeline near Byron Airport could adversely affect local surface or groundwater hydrology, and therefore the functioning of larger vernal pool complexes in the Altamont Hills core area. The concern is whether the proposed buried pipeline and changes to surface topography after backfill would have the potential to impede the movement of water, either surface or groundwater, that supplies local vernal pools. The analysis of the changes to hydrology relied on a literature review of vernal pool hydrology, soil types, topography, and the local hydrology and geologic conditions.

The soil conditions in the area of the Transfer-Bethany Pipeline alignment include the Solano, San Ysidro, Linne, Rincon, and Altamont Series; these are fine-grained, clay-rich soils with slow to very slow permeability. Information obtained from an active groundwater remediation site located near Byron Hot Springs Road and near the proposed pipeline construction area indicate that depth to shallow groundwater (as reported since 1997) has ranged from 8.93 feet below ground surface (bgs) to 23.64 feet bgs. The water capacity, or the capacity of the soils to hold water, ranges from 3.5 to 10 inches of water per inch of soil. The slow permeability rates and water capacity, in conjunction with the relatively flat topography in this area, promote ponding and saturated, perched surface soils, especially after large rainfall events. These conditions result in the formation of vernal pools.

The soil conditions and topography at the site dictate the ability of surface and groundwater to be transmitted throughout this area and therefore determine the ideal conditions for vernal pool formation. Based on a generalized concept of vernal pool hydrology, geologic attributes of vernal pools include a surface soil underlain by a claypan, which severely restricts the downward rate of water movement, and surface drainage patterns conducive to pool formation (USFWS, 2005a). The soils underlying the site contain a claypan unit. The water-restricting horizon in the subsurface lithology contributes to the formation of a seasonal water table, or perched aquifer, and when the surface soils are fully saturated, vernal pool inundation begins (Hanes and Stromberg, 1998). Perched aquifer hydraulic gradients during and following precipitation events may play an important role in regulating the period of time during which the vernal pool area is inundated with water (Rains et al., 2006).

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8 A claypan is a dense, compact, low permeability layer in the subsoil having a much higher clay content than the overlying material, from which it is separated by a sharply defined boundary. Claypans are usually hard when dry, and plastic when wet and they limit or reduce the downward movement of water through the soil.
Given the known soil types, topography, and local geology, and the presence of a shallow groundwater aquifer, shallow groundwater is not considered a contributor to vernal pool functioning because the shallow groundwater is separated from the surface by the hard, plastic, clay-rich soil horizons, and shallow groundwater near the project area occurs at depths of approximately 9 to 24 feet bgs. Although shallow groundwater flow could be locally impeded in certain areas by the buried pipeline, it would not affect the supply of water to the downgradient vernal pools. The placement of the Transfer-Bethany Pipeline would have a less than significant impact to vernal pool hydrology because shallow groundwater is not considered a contributor to vernal pool inundation and functioning in this area.

However, the surface and perched aquifer hydrology within and downgradient at distances away from the pipeline corridor construction area could be adversely affected by the pipeline construction through alteration of surface topography, and changes in soil infiltration rates in surface soils. If surface topography were not adequately restored following construction, the pipeline could affect hydrology within the construction corridor and downgradient at distances away from the pipeline corridor if the surface flow drainage patterns currently supporting vernal pool formation are altered in such a way that future surface water runoff was routed away from the depressional features where vernal pools are formed. Similarly, changes in soil infiltration rates in surface soils within the approximate 97-acre footprint of the pipeline construction area could alter the perched aquifer hydrology by removing the low permeability claypan soil horizon supporting perched aquifer conditions if downgradient vernal pool areas are hydrologically connected through a continuous claypan soil horizon. It is assumed that the potential impact from changes to perched aquifer hydrology diminish with distance to the depressional features where vernal pools are formed.

Therefore, if the hardpan layer were not appropriately restored following construction, the installation of the Transfer-Bethany Pipeline through this area could have a permanent, direct impact on vernal pools within the pipeline construction corridor and could have indirect effects on downgradient pools through alteration of topography and/or changes to soil infiltration rates in surface soils. If surface topography and groundwater infiltration were not appropriately addressed, these could be potentially significant project effects. The implementation of Measures 4.6.2a and 4.6.2b (wetlands) and Measures 4.6.6a and 4.6.6b (vernal pool fairy shrimp) would reduce the potential for indirect impacts on these areas to a less-than-significant level.

**Power Supply Infrastructure**

**Power Option 1: Western Only.** No direct or indirect impacts on vernal pool branchiopods or their habitat are anticipated at the Western substation site or powerlines. Curved-foot hygrotrus diving beetles are not described from this area, and are not subject to project impacts.

**Power Option 2: Western and PG&E.** Aquatic habitat that may support fairy shrimp occurs in association with Natural Seasonal Wetlands just north of the Skinner Delta Fish Protective Facility (see Impact 4.6.1 and Figure 4.6-23). This area would be avoided by siting poles away from seasonal wetlands and restricting vehicle access in sensitive areas. Aquatic habitat that may support fairy shrimp was not identified near the proposed PG&E substation and PG&E...
distribution line study areas. A handful of alkali pools north of the Skinner Delta Fish Protective Facility provide potential diving beetle habitat and would be spanned by powerlines.

**Summary for Alternative 1**

Vernal pool fairy shrimp and midvalley fairy shrimp are presumed present in all potentially suitable habitat in the project study area. Under Alternative 1, the project would directly and indirectly impact these species and their habitat during construction of the Delta-Transfer Pipeline, which could impact one potentially occupied pool, and the Transfer-Bethany Pipeline, which would impact 4 occupied pools and 12 potentially occupied pools. No direct impacts to vernal pool branchiopods would occur in the Los Vaqueros Watershed. Recreational use of the eastside trail and unintentional trespass to the Kellogg Creek vernal pool complex could degrade this sensitive vernal pool complex and cause a reduction in habitat quality at this site.

Construction of the Transfer-Bethany Pipeline in the Byron Airport/Armstrong Road area would directly affect vernal pools within the pipeline construction footprint; however, with surface restoration, the installation of the pipeline is not expected to indirectly affect local vernal pool hydrology in pools outside the alignment by altering surface flows, groundwater flow, or infiltration rates, or substantially reducing the quality or extent of the overall vernal pool complex outside the project alignment.

Impacts to curved-foot hygrotus diving beetles could occur in six stock ponds and ten created wetland ponds that would be lost, dewatered, or modified during construction or reservoir inundation. Impacts could also occur at the 16 alkali pools along the Transfer-Bethany Pipeline.

Impacts related to Alternative 1 are significant prior to mitigation, but can be mitigated to a less-than-significant level through implementation of Mitigation Measure 4.6.6a, which serves to avoid potential habitat and restrict post-project public access, and Mitigation Measure 4.6.6b, which provides for cyst salvage and the creation and restoration of vernal pools locally, or the acquisition of credits from local mitigation banks.

**Alternative 2**

Potential impacts to vernal pool fairy shrimp, midvalley fairy shrimp, and curved-foot hygrotus diving beetles due to project implementation under Alternative 2 would be the same as those discussed for Alternative 1. This would be a potentially significant direct project impact prior to mitigation. Impacts would be reduced to a less-than-significant level through implementation of Mitigation Measures 4.6.6a and 4.6.6b.

**Alternative 3**

Alternative 3 does not include the Transfer-Bethany Pipeline; therefore, impacts to vernal pool fairy shrimp, midvalley fairy shrimp, and curved-foot hygrotus diving beetles and their habitat would be reduced in comparison to Alternative 1. Impacts would be limited to potential fairy shrimp habitat described in the Alternative 1 for a single pool in the Delta-Transfer Pipeline alignment, and potential for trespass-related impacts in the Los Vaqueros Watershed. Habitat
for these species is not present in the area for the Expanded Old River Intake and Pump Station. These constitute a potentially significant direct project impact prior to mitigation. The application of Mitigation Measures 4.6.6a and 4.6.6b would reduce impacts to a less-than-significant level.

**Alternative 4**

Occupied and potential vernal pool branchiopod habitat would be avoided under this alternative. Thus, no direct or indirect impacts would occur to branchiopod populations. Because the Delta-Transfer and Transfer-Bethany Pipelines are not part of Alternative 4, no impacts are anticipated to vernal pool fairy shrimp, midvalley fairy shrimp, and curved-foot hygrotrus diving beetles under Alternative 4, and no mitigation would be required.

**Mitigation Measures**

The measures proposed below would mitigate impacts to both vernal pool fairy shrimp and midvalley fairy shrimp to a less-than-significant level. The implementation of Measure 4.6.4b, which provides compensation for temporary and permanent impacts to sensitive amphibian habitat in seasonal ponds, would reduce impacts to curved-foot hygrotrus diving beetles to a less-than-significant level.

**Measure 4.6.6a:** CCWD shall assume the presence of listed vernal pool branchiopods in all suitable habitat for which CCWD chooses not to perform protocol-level surveys. Preliminary branchiopod surveys (ESA, 2008a) have documented the general distribution of and habitat for vernal pool fairy shrimp in the project area. Longhorn fairy shrimp are not expected in the project areas based on this species’ narrow habitat requirements, restricted range, and available habitat.

CCWD shall minimize impacts on listed vernal pool branchiopods. To avoid and minimize direct and indirect impacts on listed vernal pool branchiopods, standard water quality protection measures shall be implemented as established in Mitigation Measure 4.5.1. Additional measures to minimize and avoid habitat for listed vernal pool branchiopods shall be implemented as required by USFWS and include:

- Avoidance of potential habitat by narrowing work corridors near potential vernal pool branchiopod habitat to the greatest extent practicable.

- Establishment of 250-foot buffers around potential branchiopod habitat, which is a typical avoidance distance that is recommended by the USFWS to minimize and avoid direct and indirect impacts.

For the Kellogg Creek vernal pool complex the following protection measures shall be implemented:

- Land uses in the easternmost portion of the Los Vaqueros Watershed shall remain restricted to activities associated with wind energy generation, dry-land farming, grazing, and administration by CCWD.

- East of Los Vaqueros Reservoir, public access shall be restricted from CDFG conservation easement lands at the Kellogg Creek vernal pool complex and lands within...
500 feet. Public access shall be restricted to research and occasional educational activities conducted under the supervision of CCWD staff or other designated land management agencies.

- The eastside trail and other public access trails located in proximity to the vernal pool complex shall be 500 feet or farther from the CDFG conservation easement and beyond direct line of sight to rock outcrop features.

- The eastern boundary of the public access area shall be fenced to prevent human access to the vernal pool complex and this fence and the Kellogg Creek vernal pools area shall be patrolled to ensure that no trespassing happens and that the fence remains intact.

- Before opening the eastside trail to public access, a biological evaluation shall be prepared by CCWD that establishes baseline environmental conditions at the vernal pool complex. Elements to be assessed include signs of trespass (e.g., trash, fires, site trampling, wear marks, rocks or other features in pools, or bicycle tire tracks), an evaluation of water quality during winter months to include at a minimum total dissolved solids, pH, and alkalinity, and documentation of any site damage. These conditions will be used as a basis for later site evaluations. An assessment of branchiopod populations shall also be provided as a component of the baseline evaluation.

- If excessive trespass, defined here as noticeable site deterioration relative to baseline conditions, is identified at the vernal pool complex CCWD shall immediately coordinate with USFWS. If site damage is identified, corrective remedies shall be implemented to prevent further harm to the complex. Such actions may include removing trash or debris from the complex, closing portions of the eastside trail to public access, enhancing site fencing, or other remedies to prevent trespass.

- While the eastside trail remains open to public access, annual reports shall be prepared to document site conditions relative to baseline conditions.

- Permanent signage shall be installed within 50 feet of the Kellogg Creek vernal pool complex (or on the surrounding fence) that specifies that, “This area is habitat of the vernal pool fairy shrimp, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.”

- A USFWS-approved construction monitor shall be present during construction within 0.5 mile of the Kellogg Creek vernal pool complex, as identified in the 1995 BO (USFWS, 1995).

**Measure 4.6.6b:** CCWD shall mitigate for impacts to vernal pool fairy shrimp habitat through one or more of the following steps to provide compensatory habitat: (a) salvage of cysts and creation of replacement pool habitat in the local area at a replacement ratio of at least 3:1, (b) restoration of affected pools onsite after construction completion, or (c) acquisition of credits from a local mitigation bank(s).

To mitigate for the loss of aquatic sites on the Delta-Transfer Pipeline and Transfer-Bethany Pipeline alignments where vernal pool branchiopods are presumed present, CCWD shall implement the following measures:
4.6 Biological Resources

- CCWD shall mitigate for the loss of branchiopod habitat that will be filled or otherwise directly affected by the project (estimated to be 17 pools) by providing compensatory habitat.

- For portions of the Transfer-Bethany Pipeline alignment near Byron Airport (e.g., adjacent to Wildlands' Byron Conservation Bank and Contra Costa County lands at Byron Airport) that support vernal pools, CCWD shall conduct a preconstruction land survey of the pipeline construction area to document current conditions of topography and existing drainage patterns, and to document shallow soil lithology within the construction area footprint as a baseline for restoring vernal pool hydrology following construction. In areas where claypan soils are encountered within critical habitat for vernal pool fairy shrimp (and Contra Costa goldfields) the upper clay soil layer shall be locally stockpiled and reestablished in place following pipeline installation. Upon completion of construction activities, final grading shall be completed to maintain surface flow conditions, local hydrology and similar compaction of surface soils to that of the documented current conditions prior to construction activities.

- CCWD shall develop and implement a mitigation, monitoring, and management plan, with input from regulatory agencies that shall outline long-term management strategies and performance standards to be attained to compensate for habitat losses resulting from the project. At a minimum, the plan shall include standards for mitigation site selection and construction specifications for mitigation sites, a description of site conditions including aerial maps, an analysis of local branchiopod habitat, and performance criteria by which site quality can be assessed over time (e.g., size, vegetation species present, date of initial ponding, ponding duration, and wildlife usage). A monitoring program will be established to track the development of habitat conditions that are conducive to the establishment of vernal pool branchiopods.

- To the greatest practicable extent, CCWD or its contractors shall construct compensation habitat (i.e., replacement pools) before habitat disturbances are incurred; or directly within the project footprint after construction. A qualified biologist shall ensure that ponds are functioning as designed.

- CCWD shall submit the name and credentials of a biologist qualified to act as construction monitor to USFWS for approval at least 15 days before construction work begins.

- With concurrence from the USFWS, a USFWS-approved biologist shall salvage soils from sites that are known to support vernal pool branchiopods at least 2 weeks before the onset of construction, or during the preceding dry season if pools are anticipated to hold water when construction begins. The salvaged soil samples will be stored and used to inoculate created pools once minimum performance standards are met at these locations.

- A USFWS-approved biologist shall be present at each active work site within 0.5 mile of potential fairy shrimp habitat until habitat disturbance has been completed. Thereafter, the contractor or CCWD shall designate a person to monitor onsite compliance with all minimization measures. A USFWS-approved biologist
shall ensure that this individual receives training consistent with USFWS requirements.

- A USFWS-approved biologist shall conduct a training session for all construction personnel. At a minimum, the training shall include a description of the vernal pool fairy shrimp and their habitat, the importance of these species and their habitat, the general measures that are being implemented to conserve fairy shrimp as they relate to the project, and the boundaries within which the project construction shall occur.

- All fueling and maintenance of vehicles and other equipment and staging areas will occur at least 100 feet from any fairy shrimp habitat.

**Impact Significance after Mitigation:** Less than Significant.

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**Impact 4.6.7:** Project construction would have temporary and permanent impacts on potential San Joaquin kit fox habitat (Less-Than-Significant with Mitigation) and permanently reduce potential regional movement opportunities in one location for this species. (Significant and Unavoidable)

**Alternative 1**

Grassland habitat in eastern Contra Costa County represents suitable habitat for the San Joaquin kit fox. The loss, fragmentation, and degradation of habitat are considered primary threats to the northern population of San Joaquin kit fox (Orloff et al., 1986). Fragmentation of populations by aqueducts, busy highways, and other obstructions increases isolation, limits dispersal, and reduces genetic flow between populations. Other general threats to kit fox include the application of rodenticides in some areas, either as a direct threat through poisoning or as an indirect threat through reducing the abundance of their prey. Invasion of fragmented habitats by coyotes, red foxes (*Vulpes vulpes*), and feral dogs can also increase kit fox mortality (Ralls and White, 1995). USFWS, CDFG, and resource experts consider all continuous annual grasslands in the watershed and major portions of the proposed pipeline alignment routes as suitable habitat for the San Joaquin kit fox.

**Los Vaqueros Reservoir Expansion, In-watershed Facilities, and Recreational Facilities**

**Direct Impacts to Habitat.** Grassland habitats would be the primary vegetation community affected by inundation from reservoir expansion. Grasslands are the principal habitat used by San Joaquin kit foxes for denning, foraging, and dispersal, while open oak woodland and coastal scrub provide lower quality foraging habitat but are good for dispersal and cover from predators such as coyotes. CCWD has implemented an intensive schedule of annual kit fox surveys in the watershed since 1998. The only sighting during this period was in September 2008 in close proximity to the Los Vaqueros Watershed Administrative Offices (Howard, pers. comm.).

Reservoir expansion and in-watershed facilities would permanently impact 976.2 acres of annual grasslands habitat and 149.5 acres of oak woodland habitat; both of these habitats are thought to
provide kit fox denning, foraging, or dispersal habitat. These acreage figures include land both within and outside of dedicated CDFG kit fox conservation easements. Temporary in-watershed impacts from construction on kit fox habitat would affect up to 45.8 acres of annual grasslands habitat and 28.6 acres of valley foothill woodlands.

Long-term temporary habitat disturbances in the Inlet/Outlet Pipelines construction area would last a period of at least 2 years during construction of Los Vaqueros Dam and other facilities. During this extended period these areas would be unavailable for kit fox habitation or movement. While these impacts are in essence temporary, during ongoing consultation, CDFG and USFWS have indicated that such long-term habitat disturbances require greater compensation than typically applied for short-term temporary impacts (i.e., greater than a 1.1:1 replacement ratio).

**Direct Impacts to Potential Movement Corridors.** In 1993, the USFWS acknowledged that construction of the existing Los Vaqueros Reservoir would partially obstruct kit fox dispersal between the Herdlyn watershed (south and east of the reservoir) and Round Valley (north of the reservoir) (USFWS, 1993a). A September 2008 kit fox sighting near the Los Vaqueros Watershed Administrative Offices suggests that the Los Vaqueros Watershed still provides potential dispersal opportunities for regional kit fox movement. Anecdotal observations made around 2006 suggest possible kit fox activity at Round Valley Regional Preserve (Larsen, pers. comm.) with access possibly gained through watershed lands.

Declines in regional San Joaquin kit fox populations have been evident since surveys were initially conducted in the 1960s and 1970s (Jones and Stokes, 1992). While recent distribution data from CDFG, USFWS (unpublished GIS data), and the CNDDB (CDFG, 2008) suggest possible fox populations in the Black Diamond Mines area, near Brushy Peak, and along the eastern fringe of the Altamont Hills, the number of breeding foxes is not known from year to year.

Within the watershed, large tracts of grassland surrounding the reservoir on the north, east, and south have been identified as some of the most important remaining routes for kit fox movement in the watershed. After reservoir expansion, these movement corridors would remain largely intact. The eastern, northeast and northern sides of the reservoir would continue to provide potential dispersal and cover habitat. This general movement corridor area would remain a link between Round Valley and important kit fox areas south and east of the watershed. The reservoir expansion would incrementally reduce the size of this corridor area north of the reservoir from about 5,222 to 5,135 feet (a distance about 87 feet at its narrowest point) (see Figure 4.6-24). This loss of grassland habitat would not restrict potential kit fox dispersal corridors; thus, this effect on potential regional kit fox movement would be less than significant.

The proposed eastside trail would make use of existing roads to the wind power facilities. The new trail segments needed to connect the existing roads for trail continuity would not contribute to the substantial loss of annual grassland habitat available to kit foxes. However, recreational usage of the eastside trail could make this area less attractive to this species. Currently, no public access is allowed on this eastern side of the reservoir. While use of this eastside trail would be expected to be relatively low, similar to the relatively low use of the other existing trails above the reservoir, opening this area to the public could have indirect adverse effects on kit foxes.
Impacts to the Kit Fox Movement Corridor
Located Northeast of Los Vaqueros Reservoir

Los Vaqueros Reservoir Expansion Project EIS/EIR . 201110

Figure 4.6-24

SOURCE: USGS, 1993 (base map); CCWD, 2006; CCC, 2007; and ESA, 2007
On the western side, reservoir expansion to 275 TAF would inundate the remaining grassland area, thereby eliminating a potential kit fox movement corridor. This area is currently a 1,000- to 2,000-foot-wide strand of annual grasslands, with a few areas of oak woodland intrusion. With reservoir expansion, the waterline would seasonally inundate annual grasslands along this corridor and advance into upslope oak woodland habitat (see Figure 4.6-25). Assuming kit foxes use this corridor, the oak woodland habitat would represent a movement barrier for kit foxes. The loss of this potential western movement corridor is considered a potentially significant and unavoidable impact on San Joaquin kit fox movement opportunities.

Mitigation through land acquisition and habitat protection is proposed to preserve and enhance other existing regional movement corridors, particularly those with documented use. However, while this mitigation may preserve effective regional movement corridors for kit fox in the eastern Contra Costa County region, information about kit fox movement in this area is insufficient to confirm that this mitigation would fully lessen the potential effects of reservoir expansion. As a result, this impact to this potential kit fox movement corridor is considered significant and unavoidable.

**Indirect Impacts.** Three potential indirect impacts on San Joaquin kit fox would result from the project: (1) isolation of annual grasslands on the western side of the reservoir due to inundation, (2) the potential for increased predation of kit fox by coyotes, and (3) habitat disturbances in the Inlet/Outlet Pipelines construction area during construction that, while temporary, could extend for 3 years and render this area unusable as a movement corridor during that period. Concurrent with dam construction, however, the reservoir would be fully drained and dried, opening additional movement opportunities for kit fox in the western portion of the reservoir. These impacts are discussed in the following paragraphs. Some reservoir facilities would require nighttime lighting for safety and security, both during and after construction. Limited nighttime lighting is not expected to have a substantial effect on kit fox populations.

**Grassland Isolation.** On the western side of Los Vaqueros Reservoir, inundation to the 275-TAF level would raise the waterline into oak woodland habitat along much of the shoreline. Two large grassland areas (118.5 acres and 96.1 acres) would not be inundated or directly affected by the project (see Figure 4.6-25); however, reservoir inundation would isolate these areas from surrounding grasslands and render them inaccessible to kit fox. As a result, the project would contribute to the indirect loss of 214.6 acres of grassland habitat for kit fox habitation and dispersal.

**Coyote Predation.** Focused surveys performed by CCWD from 1996 through 2007 (CCWD, 2006) and anecdotal evidence (Mueller, pers. comm.) suggest that coyote populations have increased within the watershed since reservoir filling in 1998. The increase in local coyote populations since the mid-1990s could be directly related to land use changes that occurred after creation of the Los Vaqueros Reservoir. Two factors in particular, the increase in anthropogenic food sources for coyotes and the removal of coyote control measures, may have increased competitive pressure on San Joaquin kit foxes within the watershed and in neighboring lands at the Round Valley Regional Preserve and Vasco Caves Regional Preserve. Red foxes and feral dogs have not been identified as a threat to kit foxes in the Los Vaqueros Watershed.
Figure 4.6-25
Impacts to the Kit Fox Movement Corridor West of Los Vaqueros Reservoir

SOURCE: USGS, 1993; CCWD, 2007; MWH, 2007; and ESA, 2008
Though coyotes are not documented to eat San Joaquin kit foxes, they have been cited as a main source of kit fox mortality where populations of these species overlap (Cypher and Spenser, 1998; Disney and Spiegel, 1992; Ralls and White et al., 1995) and possibly rank among the greatest threats to kit fox recovery in the watershed. It is suggested that coyotes kill kit foxes to reduce competition for food and other resources, as the two species rely on somewhat similar food items— principally rabbits for coyotes and small rodents for kit fox (White et al., 1994; Cypher and Scrivner, 1992). Thus, lower abundance of coyotes by means of predator control could initiate higher abundance of kit foxes. Without some means of control, it is anticipated that coyote populations would remain stable in the watershed after reservoir expansion. Because coyote populations are expected to remain essentially neutral with or without reservoir expansion, the project is not expected to negatively affect coyote/kit fox interactions.

Long-term Temporary Impacts. Construction of the Inlet/Outlet Pipelines would occur over a 2-year period, rendering this area temporarily unusable as a potential kit fox movement corridor. Concurrent with Los Vaqueros Dam construction, the reservoir would be fully drained and additional kit fox movement opportunities would be temporarily available in the western portion of the reservoir. Thus, the project would temporarily alter kit fox migration pathways in the watershed. It is expected that the reservoir would be completely dry within months after water drawdown and that kit foxes would have a direct overland route across the dry reservoir within 1 to 3 months of draining. This route would require traversing less than a mile of relatively barren mineral soil and dry clay, a significant reduction in travel distances from the Round Valley region to areas south of the Los Vaqueros Reservoir. Kit foxes have been known to travel up to 6 miles in a single day and virtually all their movements occur at night; thus, the lack of cover or refugia features is not expected to decrease the potential use of reservoir areas for overland migration. This route would be available during construction of the Inlet/Outlet Pipelines. As a result, construction of the reservoir Inlet/Outlet Facilities is not expected to contribute additional indirect impacts to kit fox.

New Delta Intake and Pump Station

The new Delta Intake and Pump Station site is on the eastern fringe of the San Joaquin kit fox range, and the area provides marginal habitat for kit foxes (USFWS, unpublished data; see Figure 4.6-10). Based on their known range and available habitat near the Delta Intake Facilities, kit foxes may be encountered in this area during construction.

Delta-Transfer, Transfer-LV, and Transfer-Bethany Pipelines

Each of the proposed pipeline alignments generally support annual grasslands and oak woodland habitat that provide potential moderate to high quality San Joaquin kit fox denning, foraging, and dispersal habitat. Virtually all grasslands and oak woodland habitat in these alignments are believed to provide habitat benefits and values for kit foxes. The alignments are generally described below and impacts to them are presented in Table 4.6-13:

- The Delta-Transfer Pipeline alignment west of SR 4 is thought to provide at least moderate quality dispersal and denning habitat for San Joaquin kit fox.
The Transfer-LV Pipeline alignment traverses moderate quality annual grasslands that are subject to ongoing disturbances from watershed management and recreational activities.

The Transfer-Bethany Pipeline alignment traverses the eastern kit fox dispersal corridor where kit foxes have been sighted in recent years (CDFG, 2008; USFWS file data). This area is assumed to provide high quality habitat for this species.

Permanent habitat impacts would be limited because the pipelines would be mostly below-grade and areas would be restored after construction. The extent of habitat that would be permanently affected by installation of the access vaults, blow-off valves, or vents along the pipeline alignments is minimal (less than 0.5 acre total based on existing pipelines). The pipeline facilities are not anticipated to affect long-term San Joaquin kit fox movements or population distribution. Other than these features, pipelines would not have permanent habitat impacts.

### Expanded Transfer Facility

Construction at the Expanded Transfer Facility site would permanently impact 1.2 acres of low quality annual grasslands habitat that could be used by San Joaquin kit fox. This area is presently surrounded with security fencing that inhibits kit fox access, and is ungrazed and supports tall, extremely dense herbaceous vegetation, principally mustards, that is considered sub-optimal as kit fox habitat.

### Existing Mitigation Commitments

At present, 4,150 acres of land in the watershed have been conveyed to CDFG as a kit fox conservation easement, and 1,856 acres have been proposed to be conveyed (see Figure 4.6-14). Under Alternative 1, reservoir expansion would permanently inundate 372.4 acres of annual grasslands, 40.7 acres of valley foothill woodland and riparian habitat, and 0.4 acre of upland scrub within existing conservation easements for San Joaquin kit foxes. Another 67.9 acres of

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### TABLE 4.6-13
SUMMARY OF IMPACTS ON SAN JOAQUIN KIT FOX HABITAT ALONG PIPELINE ALIGNMENTS

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Length (miles)</th>
<th>Habitat Usage</th>
<th>Temporary Impacts on Grassland Habitat (acres)</th>
<th>Permanent Impacts</th>
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<tbody>
<tr>
<td>Delta-Transfer</td>
<td>6.8</td>
<td>Potential denning, foraging, and dispersal habitat</td>
<td>39.4</td>
<td>Limited to vaults, manholes, blow-off valves, or vents along the pipeline alignment</td>
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<tr>
<td>Transfer-LV</td>
<td>4.3</td>
<td>Potential denning, foraging, and dispersal habitat</td>
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<tr>
<td>Transfer-Bethany</td>
<td>7.7 (excludes southern tunnel/pipeline segment)</td>
<td>Moderate to high quality dispersal and denning</td>
<td>150.9</td>
<td></td>
</tr>
</tbody>
</table>

grasslands habitat within kit fox conservation easements would be permanently impacted to accommodate the borrow area (37.8 acres), dam (4.6 acres), westside access road (23.3 acres), and other parking, picnic, and road facilities (2.1 acres). These facilities would also permanently affect 9.1 acres of woodland and riparian forest habitat and 6.2 acres of upland scrub habitat within conservation easements.

Owing to construction, temporary impacts within kit fox conservation easements would total an additional 35.8 acres and include 31 acres of annual grasslands (up to 20.0 acres in the Inlet/Outlet Pipelines construction area; 11.0 acres for the westside access road; and 1.0 acre for other parking, picnic, and road facilities), 3.8 acres of woodland habitats, and 0.3 acre of upland scrub habitat.

Indirect impacts on San Joaquin kit fox CDFG conservation easements are anticipated on the western side of Los Vaqueros Reservoir, where inundation to the 275-TAF level places the reservoir shoreline waterline directly against oak woodland habitat, thereby isolating annual grasslands that would not be inundated (see Figure 4.6-25). The overall conservation value of these isolated areas would be substantially reduced as dedicated conservation lands because reservoir inundation would isolate these features from surrounding grasslands, potentially making them inaccessible to kit foxes. As a result, the project would cause the indirect reduction in conservation value to 214.6 acres of grassland habitat.

**Power Supply Infrastructure**

**Power Option 1: Western Only.** The Western study area is on the eastern edge of the San Joaquin kit fox range, and provides moderate to good quality habitat for this species. Impacts from powerlines would be minimal, with temporary habitat impacts during construction.

The Western substation would permanently affect 2.0 acres of annual grasslands habitat within the active range of the kit fox. The permanent access road to the substation facility, most likely from Camino Diablo Road, would likely use existing road easements with minimal habitat impacts.

**Power Option 2: Western and PG&E.** The PG&E substation would affect an estimated 2 acres of moderate to good quality annual grasslands habitat that may be used by kit foxes. Impacts from powerlines would be minimal.

As identified for Option 1, impacts from powerlines would be minimal in the Western powerline alignment.

**Summary for Alternative 1**

Under Alternative 1, the project would directly and indirectly impact San Joaquin kit fox habitat in several locations and permanently reduce potential regional movement opportunities in one location. The greatest habitat impact in terms of vegetation occurs to the grassland vegetation community, which provides potential kit fox denning, foraging, and dispersal. To a lesser degree, dispersal and coverage habitat provided by oak woodlands and coastal scrub would also be impacted. A potential movement corridor would be eliminated on the west side of the reservoir after
inundation. Indirect effects include grassland isolation, risk for increased competition by coyotes, and sustained habitat disturbances related to project construction. Many of these impacts would occur on lands that currently are subject to kit fox mitigation easements.

Impacts related to Alternative 1 would be significant prior to mitigation, but most can be mitigated to a less-than-significant level through protection measures and incorporation of onsite and offsite compensatory mitigation. Loss of a potential movement corridor on the western side of the reservoir remains a significant project effect that cannot be mitigated. Alternative 1 impacts would be reduced through implementation of Mitigation Measure 4.6.7a, which serves to identify kit fox in the area and protect them during project construction; Mitigation Measure 4.6.7b, which provides for the acquisition and dedication of lands into conservation easements or the purchase of mitigation credits; and Mitigation Measures 4.6.7c, which requires acreage replacement within the watershed.

**Alternative 2**

Potential impacts to San Joaquin kit fox, their habitat, and migration opportunities under Alternative 2 would be the same as those discussed for Alternative 1. As a result, Alternative 2 would have significant direct and indirect impacts before mitigation. After the implementation of Mitigation Measures 4.6.7a, 4.6.7b, and 4.6.7c, most impacts to San Joaquin kit foxes would be mitigated to a less-than-significant level; however, the loss of the western movement corridor presents a significant unavoidable impact to potential San Joaquin kit fox migration pathways.

**Alternative 3**

Under Alternative 3, potential impacts to San Joaquin kit foxes within the watershed would be the same as those described for Alternative 1. The reservoir would be expanded to the same 275 TAF capacity and have the same in-watershed footprint as under Alternative 1.

Because Alternative 3 does not include the Transfer-Bethany Pipeline, potential temporary impacts to moderate to high quality kit fox dispersal and denning habitat would not occur in this area. In the absence of the 7.7-mile pipeline alignment (and 1.4-mile to 2.2 mile tunnel/pipeline) this alternative would impact at least 150.9 fewer acres of grasslands habitat suitable for kit fox compared to Alternative 1.

Expansion of the Old River Intake and Pump Station proposed under this alternative would not involve any physical site changes modification or disturbance either on the land or in the water. Therefore there would be no impact to kit fox at this site.

These impacts constitute significant direct and indirect impacts to San Joaquin kit fox and their habitat before mitigation. After the implementation of Mitigation Measures 4.6.7a through 4.6.7c, most impacts to the San Joaquin kit fox would be mitigated to a less-than-significant level. As with Alternatives 1 and 2, the loss of the western movement corridor would constitute a significant, unavoidable impact of Alternative 3.
### Alternative 4

**Direct Impacts to Habitat**

Direct habitat impacts to San Joaquin kit fox habitat under Alternative 4 would be less than under Alternative 1. The 160 TAF reservoir expansion would permanently impact 498.5 acres of annual grasslands habitat and 22.1 acres of oak woodland habitat; both of these habitats are thought to provide potential kit fox denning, foraging, or dispersal habitat. These acreage figures include land both within and outside of dedicated CDFG kit fox conservation easements.

Alternative 4 does not include the Delta-Transfer Pipeline, Transfer-Los Vaqueros Pipeline, or Transfer-Bethany Pipeline; therefore, potential temporary impacts to moderate to high quality kit fox dispersal and denning habitat would not occur in these areas. In the absence of these pipeline alignments, this alternative would impact roughly 266.8 fewer acres of annual grasslands habitat than Alternative 1 (Table 4.6-13).

The 160-TAF borrow area is in a relatively level area west of Kellogg Creek that provides a potential movement corridor for kit fox. Long-term temporary habitat impacts would occur in an area measuring about 16.5 acres (600 feet by 1,200 feet) where soils would be excavated to a depth of about 10 feet. After soil removal, the borrow area would be replanted to annual grasslands.

**Direct Impacts to Potential Movement Corridors**

Reservoir expansion to 160 TAF would not significantly affect the large tracts of grassland surrounding the reservoir on the north, east, and south that serve as potential routes for kit fox movement through the watershed. After reservoir expansion, these movement corridors would remain largely intact. The eastern and northern sides of the reservoir would continue to provide potential dispersal and cover habitat. This general movement corridor area would remain a link between Round Valley and important kit fox areas south of the watershed. The eastern-northern movement corridor would be reduced less than 50 feet in width under Alternative 4, from an estimated 5,222 feet at the narrowed point to 5,172 feet after reservoir expansion (Figure 4.6-24). If kit fox movement opportunities are currently presumed in this corridor, the incremental narrowing of suitable habitat is not expected to appreciably affect the continued use of this area.

On the western side of the reservoir, reservoir expansion to 160 TAF would inundate some of the remaining grassland area that represents a potential kit fox movement corridor. As shown on Figure 4.6-24, the 160-TAF reservoir would inundate less of this grassland area than the 275-TAF reservoir, such that more grasslands would remain. However, inundation would effectively eliminate this area as a kit fox movement corridor. After expansion to the 160-TAF level, the waterline would abut the edge of oak woodland habitat and, assuming kit fox can presently use this corridor, would present a movement barrier for kit fox.

Mitigation through land acquisition and habitat protection is proposed to preserve and enhance other existing regional movement corridors, particularly those with documented use. However, while this mitigation may preserve effective regional movement corridors for kit fox in the eastern
Contra Costa County region, information about kit fox movement in this area is insufficient to confirm that this mitigation would fully lessen the potential effects of reservoir expansion.

**Existing Mitigation Commitments**

Reservoir expansion under Alternative 4 would permanently inundate 150.3 acres of annual grasslands and 20.7 acres of valley foothill woodland and riparian habitat that are within existing conservation easements for San Joaquin kit fox (Figure 4.6-14). Similar to Alternative 1, additional grasslands habitat within kit fox conservation easements, totaling about 67 acres, would be permanently affected to accommodate the borrow area, dam, and other facilities.

Indirect impacts on a San Joaquin kit fox CDFG conservation easement are anticipated on the western side of Los Vaqueros Reservoir, where the 160-TAF waterline would be next to oak woodland habitat, and would consequently isolate annual grasslands that would not be inundated (see Figure 4.6-23). The overall conservation value of these dedicated kit fox conservation easement lands would be reduced because they would be essentially isolated from surrounding grasslands and inaccessible to some wildlife species, including San Joaquin kit fox. As a result, the project would cause the indirect reduction in conservation value to 301.4 acres of grassland habitat. Note that indirect impacts are higher under Alternative 4 than under Alternative 1 because, while total inundation of grasslands is less under Alternative 4, a greater amount of remaining grassland acreage would become isolated west of the reservoir.

**Summary**

Direct habitat impacts under Alternative 4 would be less than under Alternative 1 due to the exclusion of the Transfer-Bethany, Delta-Transfer, and Transfer-Los Vaqueros Pipelines. With the absence of these features the project would impact 266.8 fewer acres of annual grassland habitat. Under Alternative 4, the project would impact fewer acres of annual grasslands (498.5 acres, versus 976.2 acres under Alternative 1) and oak woodlands habitat (20.7 acres, versus 81.1 acres under Alternative 1) that may be used by kit foxes. Both Alternatives 1 and 4 effectively eliminate the western side of the reservoir as a kit fox movement corridor.

Alternative 4 has greater indirect impacts to kit fox conservation lands west of the reservoir because more non-inundated grasslands would become inaccessible to kit fox (301.4 acres) compared with Alternative 1 (214.6 acres). Fewer indirect impacts would occur to these conservation areas under Alternative 1 (i.e., less grasslands would be isolated); however, more conservation lands would be directly inundated, producing a similar overall effect on kit fox habitat availability. Prior to mitigation, Alternative 4 would have significant direct and indirect impacts on San Joaquin kit fox and their habitat. After Mitigation Measures 4.6.7a through 4.6.7c are implemented, most impacts to San Joaquin kit fox would be mitigated to a less-than-significant level. As with the other alternatives, Alternative 4 would cause the loss of the western movement corridor, which would constitute a significant, unavoidable impact to the potential San Joaquin kit fox movement corridor.
Mitigation Measures

**Measure 4.6.7a:** CCWD shall implement San Joaquin kit fox protection measures. The following measures, which are intended to reduce direct and indirect project impacts on San Joaquin kit foxes, are derived from the *San Joaquin Kit Fox Survey Protocol for the Northern Range* (USFWS, 1999a) and the *Standardized Recommendations for Protection of the San Joaquin Kit Fox* (USFWS, 1999b). These measures shall be implemented for construction areas along pipeline corridors, staging areas, and facilities within the watershed:

- Preconstruction surveys shall be conducted within 200 feet of work areas to identify potential San Joaquin kit fox dens or other refugia in and surrounding workstations. A qualified biologist shall conduct the survey for potential kit fox dens 14 to 30 days before construction begins. All identified potential dens shall be monitored for evidence of kit fox use by placing an inert tracking medium at den entrances and monitoring for at least 3 consecutive nights. If no activity is detected at these den sites, they shall be closed following guidance established in USFWS Standardized Recommendations document.

- If kit fox occupancy is determined at a given site, the construction manager should be immediately informed that work should be halted within 200 feet of the den and the USFWS contacted. Depending on the den type, reasonable and prudent measures to avoid effects to kit foxes could include seasonal limitations on project construction at the site (i.e., restricting the construction period to avoid spring-summer pupping season), and/or establishing a construction exclusion zone around the identified site, or resurveying the den a week later to determine species presence or absence.

- To minimize the possibility of inadvertent kit fox mortality, project-related vehicles shall observe a maximum 20 miles per hour speed limit on private roads in kit fox habitat. Nighttime vehicle traffic shall be kept to a minimum on nonmaintained roads. Off-road traffic outside the designated project area shall be prohibited in areas of kit fox habitat.

- To prevent accidental entrapment of kit fox or other animals during construction, all excavated holes or trenches greater than 2 feet deep shall be covered at the end of each work day by suitable materials, fenced, or escape routes constructed of earthen materials or wooden planks shall be provided. Before filling, such holes shall be thoroughly inspected for trapped animals.

- All food-related trash items (such as wrappers, cans, bottles, and food scraps) shall be disposed of in closed containers and removed daily from the project area.

- To prevent harassment and mortality of kit foxes or destruction of their dens, no pets shall be allowed in the project area.

**Measure 4.6.7b:** To compensate for impacts on San Joaquin kit fox habitat outside of dedicated CDFG conservation easements, CCWD shall provide mitigation either through acquiring and dedicating lands into conservation easements or purchasing mitigation credits at compensation ratios that have been approved by state and federal resource agencies.

Consistent with MSCS and USFWS guidance, mitigation ratios applied for impacts on San Joaquin kit fox habitat shall be 1:1 to 1.1:1 for temporary impacts; 1:1 to 2:1 for long-
term temporary impacts; and 1:1 to 3:1 for permanent impacts. CCWD shall acquire San Joaquin kit fox mitigation lands based on anticipated impacts to suitable habitat and mitigation ratios identified by the MSCS and USFWS (see Table 4.6-14).

San Joaquin kit fox mitigation obligations may concurrently satisfy burrowing owl mitigation obligations identified in Mitigation Measure 4.6.8, below, if suitable habitat is present for both species in mitigation lands. The availability of mitigation lands to satisfy mitigation requirements for these species is discussed in the Comprehensive Biological Resources Mitigation and Compensation Program (Section 4.6.3).

Measure 4.6.7c: CCWD shall replace any acreage of existing kit fox easement affected by the project with an equivalent amount of acreage within the watershed to maintain under conservation easement the full amount required for the original Los Vaqueros Reservoir Expansion Project. In addition, CCWD shall provide compensation for conservation easement acreage affected at a ratio of up to 3:1, including conservation easement lands that are isolated by the project (see Table 4.6-14). Compensation for temporary impacts to lands within conservation easements shall be provided at a ratio of 1:1 to 1.1:1.

Impact Significance after Mitigation: Less than significant for habitat impacts except loss of the potential movement corridor on the western side of the reservoir, which would remain a significant and unavoidable effect of the project under all project alternatives. Although the proposed mitigation program includes acquisition of habitat acres to compensate for the grassland acres affected by reservoir expansion, and the program also proposes acquisition of compensatory habitat in areas that preserve remaining movement corridors for the kit fox, these measures would not reduce or avoid the loss of the grassland along the western side of the reservoir. The loss of most of this grassland strip to inundation and therefore of this specific potential movement corridor is unavoidable.

Impact 4.6.8: Project construction would result in temporary and permanent loss of habitat for burrowing owl. (Less-Than-Significant with Mitigation)

Alternative 1

Los Vaqueros Reservoir Expansion, In-watershed Facilities, and Recreational Facilities

Construction activities related to the expansion of the Los Vaqueros Reservoir, access roads, and recreational facilities (e.g., trails and picnic areas) would require grading and excavation of 1,022.0 acres of California annual grasslands and purple needlegrass grasslands. Most temporary impacts (45.8 acres) would occur during project construction, whereas the permanent impact (976.2 acres) would occur when the reservoir is filled. The proposed reservoir footprint is in or next to potential burrowing owl breeding and nonbreeding habitat, and is considered to provide varying degrees of habitat quality for this species. Focused owl surveys have not been conducted to document the local distribution of this species near the reservoir, but nonbreeding owls are documented in the area and should be presumed present in all potentially suitable grassland habitats. Burrowing owls in this area would be exposed to direct and indirect project impacts.
### TABLE 4.6-14
SUMMARY OF SAN JOAQUIN KIT FOX HABITAT IMPACTS

<table>
<thead>
<tr>
<th>HABITAT IMPACTS (ACRES)</th>
<th>Impacted Nonconservation Lands</th>
<th></th>
<th></th>
<th>Impacted CDFG Kit Fox Conservation Lands</th>
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<th>Isolated SJKF Grasslands</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Temporary</td>
<td>Long-Term Temporary</td>
<td>Permanent</td>
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<td>Isolated SJKF</td>
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<td>Alternatives 1 and 2</td>
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<td>In-watershed</td>
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<td>20.0</td>
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<td>537.1</td>
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<td>In-watershed</td>
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<td>20.0</td>
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</table>

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a. "Long-term temporary" impacts are distinguished from temporary and permanent impacts to describe temporary habitat disturbances with a duration lasting longer than one growing season. Permanent impacts, as used in this section, are those that would permanently alter the landscape with no return to pre-project conditions. The USFWS generally considers "long-term temporary" effects (i.e., effects with a duration of greater than one growing season) as a permanent impact.
Burrowing owls are considered to have patchy, disjunctive distribution in the regional project vicinity. Where present, they often occur in large numbers. For example, sizeable groups of burrowing owl were noted in an approximately 100-acre area near Brushy Creek at Dyer Road (up to 14 pairs) as well as at a second site about 5 miles east of Dyer Reservoir, where J. Barclay (unpubl. data) recorded up to seven owl pairs around the perimeter of a 140-acre site. No records from CCWD or the CNDDB note burrowing owl colonies or aggregations in or near the reservoir expansion footprint.

Expansion of the reservoir would indirectly affect burrowing owls through the loss of habitat (foraging, roosting, and wintering habitat). Construction and earthmoving activities could affect burrowing owls through direct mortality of adults or nestlings if nest burrows are in areas where the soil is disturbed. Construction activities could also affect nesting burrowing owls by disrupting adult reproductive behavior if owl pairs were nesting within 500 feet of construction during the nesting season (March–June).

New Delta Intake and Pump Station
Although upland agricultural areas in the Delta Intake and Pump Station vicinity might theoretically be used by burrowing owls for foraging, and the levees could support burrows as nesting habitat, no known burrowing owl nesting habitat lies within 500 feet of the study area vicinity. Based on the known distribution of this species and preliminary reconnaissance survey findings, construction and operations of the Delta Intake and Pump Station are not expected to directly or indirectly affect burrowing owls.

Delta-Transfer, Transfer-LV, and Transfer-Bethany Pipelines
The Delta-Transfer Pipeline alignment traverses cropland and grassland habitat, and the Transfer-LV and Transfer-Bethany Pipelines would traverse grassland habitat that might be used by burrowing owl for foraging and breeding. During reconnaissance surveys in spring 2007, biologists identified high quality burrowing owl nesting and foraging habitat along the length of each of the pipeline alignments. Table 4.6-15 summarizes known occurrences and potential impacts that construction of each pipeline would have on burrowing owls and their habitat. Active burrowing owl nests and satellite burrows have not been detected along the various alignments.

Expanded Transfer Facility
The Expanded Transfer Facility site is near tall grasslands habitat that likely is not used by burrowing owls, although the tall grassland should be considered potentially occupied habitat. Burrowing owls are not known to occur near the Transfer Facility. Construction-related impacts on this species would include temporary disturbance of grassland habitat, which would be restored with native vegetation after construction is completed. Permanent impacts would include the loss of 1.22 acres of grassland habitat associated with the balancing reservoir. Permanent direct impacts on burrowing owls are not expected from this facility.
### TABLE 4.6-15

**SUMMARY OF BURROWING OWL OCCURRENCES AND POTENTIAL IMPACTS**

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Length (miles)</th>
<th>CNDDB Occurrences</th>
<th>Reconnaissance Survey</th>
<th>Potential Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta-Transfer</td>
<td>6.8</td>
<td>None documented within 500 feet</td>
<td>None observed</td>
<td>Likelihood of direct impacts is considered low to moderate due to agricultural activities. Habitat usage is considered minimal.</td>
</tr>
<tr>
<td>Transfer-LV</td>
<td>4.3</td>
<td>None documented within 500 feet</td>
<td>None observed</td>
<td>Likelihood of direct impacts is considered low to moderate due to high vehicle traffic and recreational usage. Habitat usage is considered minimal.</td>
</tr>
<tr>
<td>Transfer-Bethany</td>
<td>8.5</td>
<td>None documented within 500 feet, several documented in areas greater than 500 feet</td>
<td>None observed</td>
<td>Likelihood of direct impacts is moderate to high due to high quality annual grasslands habitat.</td>
</tr>
</tbody>
</table>

**SOURCE:** ESA 2008

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**Power Supply Infrastructure**

**Power Option 1: Western Only.** Impacts from powerlines would be minimal, with temporary habitat impacts during construction.

The Western substation would permanently impact 2 acres of annual grasslands habitat in an area that does not support owl breeding. Though not previously identified from the area, the permanent access road to the substation facility may support burrowing owl breeding; thus, road construction may cause temporary habitat impacts to this species.

**Power Option 2: Western and PG&E.** A pair of breeding burrowing owls was identified in the Power Option 2 Western powerline alignment during spring 2008 reconnaissance surveys, and the corridor provides patches of moderate quality burrowing owl nesting habitat (B. Pittman, pers. obs.). Impacts from powerlines would be minimal, with temporary habitat impacts during construction.

Burrowing owls have not been identified at the PG&E substation or within the powerline alignment, and based on reconnaissance surveys are not expected in the study area.

**Existing Mitigation Commitments**

No burrowing owl mitigation commitments have been established for the Los Vaqueros Reservoir Expansion Project.
Summary for Alternative 1

Under Alternative 1, the project would directly impact burrowing owls and their habitat through grading and excavation of grasslands and reservoir inundation. Grading and excavation constitute temporary impacts to 45.8 acres, and 976.2 acres would be permanently impacted when the reservoir is filled. This species could also be encountered at virtually any location on the Delta-Transfer Pipeline, Transfer-LV Pipeline, and Transfer-Bethany Pipeline. Impacts related to Alternative 1 would be significant prior to mitigation. Alternative 1-related impacts would be reduced to a less-than-significant level through implementation of Mitigation Measure 4.6.8a, which provides for surveys and protection measures during construction; and Mitigation Measure 4.6.8b, which provides compensation for impacts through land acquisition and dedication to a conservation easement and/or participation in a mitigation bank.

Alternative 2

Potential impacts to the burrowing owl and its habitat due to project implementation under Alternative 2 would be the same as those discussed for Alternative 1, and constitute a significant impact prior to mitigation. Alternative 2-related impacts would be reduced to a less-than-significant level through implementation of Mitigation Measures 4.6.8a and 4.6.8b.

Alternative 3

Potential impacts to the burrowing owl and its habitat due to project implementation under Alternative 3 would be similar to those discussed for Alternative 1 within the reservoir and along the Delta-Transfer pipeline, the Transfer-LV pipeline, and the electrical transmission facilities. However, overall impact to this species would be less because this alternative does not include construction of the Transfer-Bethany Pipeline, which would affect moderate to high quality burrowing owl habitat. Alternative 3 would therefore impact at least 150.9 fewer acres of grasslands habitat compared to Alternative 1, and the likelihood of encountering burrowing owls on the project would be reduced.

The Expanded Old River Intake and Pump Station would be constructed within the existing facilities footprint; therefore, no permanent impacts would occur on any upland burrowing owl foraging habitat. Based on the known distribution of this species and preliminary reconnaissance survey findings, construction and operations of the Expanded Old River Intake and Pump Station are not expected to directly or indirectly affect burrowing owls. No impacts are anticipated at this site.

Potential direct and indirect impacts to burrowing owls within the Los Vaqueros Watershed and on the Delta-Transfer Transfer-LV pipeline alignments are considered significant before mitigation. The implementation of Mitigation Measures 4.6.8a and 4.6.8b would reduce these potential impacts to a less-than-significant level.
**Alternative 4**

Grasslands in the reservoir footprint are considered to provide potential foraging, roosting, and wintering habitat for burrowing owl. These areas provide varying degrees of habitat quality for this species and many areas are not considered suitable for owl breeding. Construction activities related to 160-TAF reservoir expansion would permanently impact 498.5 acres of annual grasslands habitat, compared with 976.2 acres under Alternative 1. Focused owl surveys have not been conducted to document the local distribution of this species near the reservoir, but this species is routinely documented in the area and should be presumed present in all potentially suitable grassland habitats. Burrowing owls in this area would be exposed to direct or indirect project impacts from construction and reservoir inundation.

The 16.5 acre 160-TAF borrow area, which is unique to Alternative 4, provides low quality burrowing owl nesting habitat due to its low density of ground squirrel activity; however, this area is excellent foraging habitat for burrowing owls.

Direct and indirect impacts to burrowing owl under Alternative 4 are considered significant before mitigation. The implementation of Mitigation Measures 4.6.8a and 4.6.8b would reduce these potential impacts to a less-than-significant level.

**Mitigation Measures**

The implementation of Mitigation Measure 4.6.8a, which requires preconstruction surveys and protection measures to avoid burrowing owls during the breeding season, and Measure 4.6.8b, which includes the establishment of mitigation lands for loss of habitat as required by regulatory permits, would reduce potential impacts on burrowing owls to a less-than-significant level.

**Measure 4.6.8a:** CCWD shall implement the measures listed below for grassland habitats to reduce potential impacts to a less-than-significant-level and to avoid incidental take of burrowing owls. In advance of construction, CCWD shall follow the current CDFG burrowing owl survey guidance, presently the Burrowing Owl Consortium multi-phase approach to evaluate burrowing owl use. Measures shall apply to all construction activities near active nests or within potential burrowing owl nesting habitat, to avoid, minimize, or mitigate impacts on burrowing owls:

- **Breeding season surveys** shall be performed to determine the presence of burrowing owls for the purposes of inventory, monitoring, avoidance of take, and determining appropriate mitigation. In California the breeding season begins as early as February 1 and continues through August 31. Under the Burrowing Owl Consortium’s multi-phase survey methodology, for areas within 500 feet of construction boundaries, CCWD shall:
  1) perform a habitat assessment to identify essential components of burrowing owl habitat, including artificial nest features;
  2) perform intensive burrow surveys in areas that are identified to provide suitable burrowing owl habitat, and;
  3) perform at least four appropriately-timed breeding season surveys (four survey visits spread evenly [roughly every 3 weeks] during the peak of the breeding season, from April 15 to July 15) to document habitat use.

- **Pre-construction surveys** shall be used to assess the owl presence before site modification is scheduled to begin. Initial pre-construction surveys should be conducted outside of the
owl breeding season (February 1–August 31), but as close as possible to the date that ground-disturbing activities will begin. Generally, initial pre-construction surveys should be conducted within 7 days, but no more than 30 days prior to ground-disturbing activities. Additional surveys may be required when the initial disturbance is followed by periods of inactivity or the development is phased spatially and/or temporally over the project area. Up to four or more survey visits performed on separate days may be required to assure with a high degree of certainty that site modification and grading will not take owls. The full extent of the pre-construction survey effort shall be described and mapped in detail (e.g., dates, time periods, area[s] covered, and methods employed) in a biological report that will provided for review to CDFG.

In addition to the above survey requirements, the following measures shall be implemented to reduce project impacts to burrowing owls:

- Construction exclusion areas (e.g., orange exclusion fence or signage) shall be established around occupied burrows, where no disturbance shall be allowed. During the nonbreeding season (September 1 through January 31), the exclusion zone shall extend at least 160 feet around occupied burrows. During the breeding season (February 1 through August 31), exclusion areas shall extend 250 feet around occupied burrows (or farther if warranted to avoid nest abandonment).

- If work or exclusion areas conflict with owl burrows, passive relocation of onsite owls could be implemented as an alternative, but only during the nonbreeding season and only with CDFG approval. The approach to owl relocation and burrow closure will vary depending on the number of occupied burrows. Passive relocation shall be accomplished by installing one-way doors on the entrances of burrows within 160 feet of the project area. The one-way doors shall be left in place for 48 hours to ensure the owls have left the burrow. The burrows shall then be excavated with a qualified biologist present. Construction shall not proceed until the project area is deemed free of owls.

- Unoccupied burrows within the immediate construction area shall be excavated using hand tools, and then filled to prevent reoccupation. If any burrowing owls are discovered during the excavation, the excavation shall cease and the owl shall be allowed to escape. Excavation could be completed when the biological monitor confirms the burrow is empty.

- Artificial nesting burrows will be provided as a temporary measure when natural burrows are lacking. To compensate for lost nest burrows, artificial burrows shall be provided outside the 160-foot buffer zone (CDFG, 1995). The alternate burrows shall be monitored daily for 7 days to confirm that the owls have moved in and acclimated to the new burrow.

**Measure 4.6.8b:** CCWD shall compensate for permanent habitat losses at a minimum 2:1 ratio (possibly concurrent with other mitigation commitments, such as those for San Joaquin kit fox, provided habitat is present for both species). Compensation could consist of purchasing and enhancing suitable habitat, converting it to a conservation easement, and conveying the easement to a managing agency or institution in perpetuity; participating in a resource agency-approved mitigation bank that provides offset mitigation credits for loss of burrowing owl habitat; or a combination of both. Burrowing owl mitigation areas shall support burrowing owl populations in similar or greater densities to those on impacted burrowing owl habitat.
Impact Significance after Mitigation: Less than Significant.

Impact 4.6.9: Project construction and operation activities would result in direct and indirect impacts on existing populations of and habitat for golden eagle, bald eagle, and Swainson’s hawk. (Less than Significant with Mitigation; Beneficial for bald eagle foraging habitat)

Alternative 1

Los Vaqueros Reservoir Expansion, In-watershed Facilities, and Recreational Facilities

Golden eagles are known to nest within the watershed and could be directly and indirectly affected by the project, though nest sites shift regularly. The nearest known golden eagle occurrence to the in-watershed facilities is about 0.5 mile west of the stockpile area. An existing recreational trail, which would be inundated, runs along the western side of the reservoir and comes within 0.1 mile of a golden eagle nest site. A golden eagle nest site is 16 feet from the shoulder of the proposed westside access road (see Figure 4.6-10). Aside from potential construction effects, this road would also be used for recreational purposes (and subject to seasonal closures if golden eagle nesting is identified nearby). Direct impacts on golden eagles would include potential disturbance to nests and the permanent loss of foraging habitat from the westside access road, marina, inundation area and dam footprint. Expansion of the Los Vaqueros Dam and other facilities would cause construction noise and related disturbances that could temporarily reduce available nesting and foraging habitat for golden eagles near the dam and along lower Kellogg Creek (below Los Vaqueros Dam).

Bald eagles may forage within the watershed, but currently do not nest in the watershed. The nearest record of nesting bald eagles is 15 to 20 miles away from the proposed reservoir expansion at Del Valle Reservoir; however, a few bald eagles have recently wintered within the watershed. Expansion of the reservoir could have both beneficial and short-term adverse effects on this species.

Beneficial effects include increased foraging opportunities due to a larger reservoir as well as increased shoreline. This increase could result in more bald eagles using the site for overwintering or initiating nesting in the watershed. Potential adverse impacts would include short-term loss of wintering and foraging habitat during construction, and loss of some roosting trees. The loss of roosting sites would be relatively minimal; however, the increased inundation area would result in the creation of more snags, thus creating new roosting habitat. Reservoir draining and refilling would directly impact habitat availability for bald eagles over a 3- to 4-year term.

Bald eagles do not nest or overwinter in the vicinity of any of the out-of-watershed facilities; therefore, construction of the new Delta Intake and Pump Station or pipelines are not expected to cause direct or indirect impacts to them. As such, the following sections do not include further detailed discussion on bald eagle impacts.
Swainson’s hawks are infrequently observed in the Los Vaqueros Watershed. Nesting has not been documented in the watershed, which is at or beyond the western fringe of this species’ nesting range. Because Swainson’s hawk preferentially forages in Central Valley agricultural lands, the Los Vaqueros Watershed is considered to provide ancillary, and not primary, foraging habitat for this species. The inundation of grasslands habitat under Alternative 1 would cause the loss of this ancillary Swainson’s hawk foraging habitat, but such loss is not expected to reduce the availability of resources for this species or affect their distribution. As a result, in-watershed activities are not expected to impact Swainson’s hawk populations.

**New Delta Intake and Pump Station**

Due to a lack of nesting and foraging habitat, golden eagles are not expected to occur near the new Delta Intake and Pump Station.

Swainson’s hawks are not known to breed near the new Delta Intake and Pump Station site. Due to ongoing agricultural disturbances and a lack of breeding sites, this species is not expected to forage or breed near the proposed new facilities.

**Delta-Transfer Pipeline**

Golden eagles are unlikely to occur near the Delta-Transfer Pipeline alignment because of the lack of breeding and foraging habitat along the alignment. The nearest record of breeding golden eagles is in the watershed, about 1.8 miles west of this alignment. No direct or indirect impacts on golden eagle are expected as a result of Delta-Transfer Pipeline construction (see Figure 4.6-10).

Swainson’s hawks are known to breed in the pipeline alignment vicinity and could forage and breed within the study area. One nest is documented within 500 feet of the pipeline alignment (see Figure 4.6-9). No other nests are reported within 0.5 mile of the alignment (CDFG, 2008). Permanent upland disturbances associated with the Delta-Transfer Pipeline would be limited to small access vaults (about 100 square feet or 0.002 acre) about every 1,000 feet along the pipeline. Potential temporary impacts would include upland habitat disturbance within the 200-foot-wide construction corridor, and construction disturbance to nests within 0.5 mile of construction. Construction of this pipeline could affect potential Swainson’s hawk foraging habitat and active breeding sites if any hawks are present within 500 feet.

**Transfer-LV Pipeline**

Golden eagles are known to breed near the Transfer-LV Pipeline alignment, which is mostly within the watershed. Three records of breeding golden eagles are within 1 mile of the pipeline alignment; the nearest record is 0.2 mile away. Potential direct impacts on golden eagles include the temporary disturbance of foraging habitat during construction. Indirect impacts would include temporary disturbance to nesting or foraging golden eagles.

Swainson’s hawk nests have been recorded within 0.5 mile of the alignment and no active farmlands fall within the alignment. If hawks or their nests are present, temporary impacts could include disturbance of upland habitat within the 200-foot-wide construction corridor and construction disturbances within 0.5 mile of nests. As these project facilities are generally in the
Diablo Range foothills, in an area that is not cultivated, with few Swainson’s hawks noted from this area, a low likelihood exists that pipeline construction would affect nesting and foraging habitat.

Transfer-Bethany Pipeline
Golden eagles are not known to breed within the immediate vicinity of the Transfer-Bethany Pipeline alignment, with few available nesting sites in the alignment. The nearest record of breeding golden eagles is 1.7 miles from the proposed alignment. Potential direct impacts on golden eagles associated with the Transfer-Bethany Pipeline would be limited to temporary disturbances to foraging habitat during construction.

Swainson’s hawks are not known to breed near this pipeline alignment. No nests have been recorded within 0.5 mile of the alignment, and potential nesting habitat is considered minimal. Temporary impacts would include disturbance of upland habitat and potential disturbance to nests, if present. Because pipeline facilities are generally in the Diablo Range foothills, in an area that is not cultivated, with few Swainson’s hawks noted from this area, a low likelihood exists that pipeline construction would affect nesting and foraging habitat.

Expanded Transfer Facility
Golden eagles are not known to breed near the Expanded Transfer Facility site, which supports annual grassland habitat and ruderal9 habitat. The nearest golden eagle record is 1.6 miles away, within the watershed. Golden eagles in the watershed are unlikely to forage in the tall non-native forbs that dominate the Expanded Transfer Facility site.

Swainson’s hawks are not known to nest near the Expanded Transfer Facility site and the fenced site supports tall herbaceous vegetation that is considered poor Swainson’s hawk foraging habitat. Nests have not been recorded within 0.5 mile of the facility, and the site and adjacent areas lack nesting sites.

Power Supply Infrastructure (Power Options 1 and 2)
Swainson’s hawk nesting habitat does not occur on the Western powerline alignment. Swainson’s hawks have not been identified at the PG&E substation or within the powerline alignment, and foraging is not expected in this isolated non-agricultural area.

No impacts are anticipated to golden eagles or bald eagles from these proposed power facilities.

Existing Mitigation Commitments
No existing mitigation commitments for the Swainson’s hawk, golden eagle, or bald eagle would be affected by the project. CCWD has monitoring commitments for golden eagles and bald eagles from the EIR/EIS for the Los Vaqueros Reservoir and USFWS BO.

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9 Ruderal habitat refers to disturbed areas that support low quality vegetation assemblages.
**Summary for Alternative 1**

The construction phase of Alternative 1 would disturb foraging areas for the golden eagle, bald eagle, and Swainson’s hawk, and could destroy or disrupt golden eagle and Swainson’s hawk nests. Loss of golden eagle foraging habitat in the footprint of the westside access road, reservoir inundation area, Marina Complex, and dam; and small foraging habitat losses to Swainson’s hawk along the Delta-Transfer Pipeline from permanent above-ground features would occur. Adverse impacts during operations include potential disturbance of a golden eagle nesting site from use of the new westside access road. The impact to nesting golden eagles and Swainson’s hawks is significant and would be reduced to a less-than-significant level through implementation of Mitigation Measure 4.6.9a. During project operations, bald eagle foraging could benefit from the increased inundation area of the expanded Los Vaqueros Reservoir; however, foraging impacts to golden eagle and Swainson’s hawk would be significant prior to mitigation. CALFED and CDFG compensation guidelines would apply to offset impacts to golden eagle and Swainson’s hawk foraging habitat, as described in Mitigation Measure 4.6.9b.

**Alternative 2**

Potential impacts to populations of golden eagle, bald eagle, and Swainson’s hawk, and their habitat under Alternative 2 would be the same as those discussed for Alternative 1. Alternative 2 would have significant direct and indirect impacts on golden eagle and Swainson’s hawk before mitigation. With implementation of Mitigation Measures 4.6.9a (for each species) and 4.6.9b (for golden eagle and Swainson’s hawk), impacts on these raptor species would be reduced to a less-than-significant level.

**Alternative 3**

Potential impacts to populations of golden eagle, bald eagle, and Swainson’s hawk and their habitat due to project implementation under Alternative 3 would be comparable to those discussed for Alternative 1. In the absence of the Transfer-Bethany Pipeline, this alternative would temporarily impact at least 150.9 fewer acres of grasslands habitat that could provide nesting and foraging opportunities for golden eagles and potentially Swainson’s hawks.

Expansion of the Old River Intake and Pump Station would not require site modification or physical earthworks within the existing facility site. Expansion of this facility would not affect nesting sites for the above species. No impacts to golden eagle, bald eagle, or Swainson’s hawk nests or foraging habitat are anticipated as a result of these activities.

Direct and indirect impacts to golden eagle, bald eagle and Swainson’s hawk under Alternative 3 are considered significant prior to mitigation. The implementation of Mitigation Measures 4.6.9a (for each species) and 4.6.9b (for golden eagle and Swainson’s hawk) would reduce impacts on these raptor species to a less-than-significant level.
Alternative 4

Golden eagles are known to nest throughout the watershed, and the potential exists that they would be directly and/or indirectly impacted by project activities. Direct impacts include the loss of active or potential nest sites due to construction activities or reservoir inundation, and indirect effects may occur due to construction noise and equipment causing nest abandonment and mortality of young. The westside access road would not be realigned under this alternative; thus, direct impacts would largely be confined to the marina and dam footprint areas, and the 160-TAF borrow area. None of these areas have shown recent golden eagle nesting activity. Because of this, and the absence of the Transfer-LV Pipeline and Transfer-Bethany Pipeline facilities, project activities would be less likely to encounter nesting golden eagles compared with Alternative 1.

Bald eagles do not nest in the watershed. Potential impacts to bald eagles include short-term construction disturbance and loss of some roosting trees. In contrast to Alternative 1, bald eagle foraging habitat and roosting habitat would be available in the Los Vaqueros Watershed during construction under Alternative 4. Though the reservoir would have less water, the suitability of the watershed for bald eagles would not be substantially altered during the 3- to 4-year term of dam construction. The increased reservoir size could result in more bald eagles using the area for overwintering or initiating nesting in the watershed. Potential impacts include the potential loss of some roosting trees when the reservoir is filled, though this will be offset by the creation of new snags.

As described for Alternative 1, in-watershed activities are not expected to impact Swainson’s hawk populations or the availability of foraging habitat.

Direct and indirect effects of Alternative 4 are considered significant prior to mitigation. Impacts under this alternative would be limited to the golden eagle, and would be reduced to a less-than-significant level with the implementation of Mitigation Measure 4.6.9a.

Mitigation Measures

Implementation of Mitigation Measures 4.6.9a (for all three species) and 4.6.9b (for golden eagle and Swainson’s hawk) would reduce potential impacts associated with project construction to a less-than-significant level.

Measure 4.6.9a: CCWD shall ensure that nesting golden eagles, bald eagles, and Swainson’s hawks are protected. The following measures address potential impacts on nesting golden eagles and Swainson’s hawks in the project vicinity. Measures that pertain to golden eagles and their nests would apply to nesting bald eagles, were they found in the Los Vaqueros Watershed prior to construction.

- Whenever feasible, construction near recently active nest sites shall start outside the active nesting season. The nesting period for golden eagles is between March 1 and August 15. Bald eagles and Swainson’s hawks nest between March 15 and August 15.
- If groundbreaking activities begin during the nesting period, a qualified biologist shall perform a preconstruction survey 14 to 30 days before the start of each new
construction phase to search for golden eagle and Swainson’s hawk nest sites within 0.5 mile of proposed activities. If active nests are not identified, no further action is required and construction may proceed. If active nests are identified, the avoidance guidelines identified below shall be implemented.

- For golden eagles, construction contractors shall observe CDFG avoidance guidelines, which stipulate a minimum 500-foot buffer zone around active golden eagle nests. Buffer zones shall remain until young have fledged. For activities conducted with agency approval within this buffer zone, a qualified biologist shall monitor construction activities and the eagle nest(s) to monitor eagle reactions to activities. If activities are deemed to have a negative effect on nesting eagles, the biologist shall immediately inform the construction manager that work should be halted, and CDFG will be consulted. The resource agencies do not issue take authorization for this species.

- If construction begins during the Swainson’s hawk nesting period, a qualified biologist shall conduct preconstruction surveys at least 2 weeks prior to construction following CDFG guidance (e.g., CDFG, 2000) in areas that potentially provide nesting opportunities to verify species presence or absence. If the survey indicates presence of nesting Swainson’s hawks within a 0.5-mile radius, the results shall be coordinated with CDFG to develop and implement suitable avoidance measures that include construction buffers and nest monitoring.

- Consistent with the Staff Report Regarding Mitigation for Impacts to Swainson’s Hawks in the Central Valley of California (CDFG, 1994), mitigation shall include the following approach:
  - No intensive new disturbances or other project-related activities that could cause nest abandonment or forced fledging shall be initiated within 0.25 mile (buffer zone) of an active nest between March 15 and September 15.
  - Nest trees shall not be removed unless no feasible avoidance exists. If a nest tree must be removed, CCWD shall obtain a management authorization (including conditions to offset the loss of the nest tree) from CDFG. The tree removal period specified in the management authorization is generally between October 1 and February 1.
  - Monitoring of the nest by a qualified biologist may be required if the project-related activity has the potential to adversely impact the nest.

- CDFG often allows construction activities that are initiated outside the nesting season to continue without cessation even if raptors such as golden eagles choose to nest within 500 feet of work activities. Thus, work at the dam construction site may continue without delay if surveys verify the local absence of nesting golden eagles, or if groundbreaking begins outside the nesting period (August 16 through February 28).

- After construction, CCWD shall survey for and monitor golden eagle and bald eagle nesting sites in the Los Vaqueros Watershed to ensure that recreational activity and other beneficial uses of the watershed do not disrupt eagle nest sites. Surveys will be performed at the beginning of the nesting season and continue through the nesting season. Consistent with present policy, recreational access and other disruptive activities will be suspended within 500 feet of active eagle nests until the young eagles have fledged.
Measure 4.6.9b: CCWD shall acquire and/or restore foraging habitat for Swainson’s hawks and golden eagles in accordance with CALFED and CDFG guidelines, set forth in Staff Report Regarding Mitigation for Impacts to Swainson’s Hawks in the Central Valley of California (CDFG, 1994), as follows:

- Compensate for permanent foraging habitat losses (e.g., agricultural lands and annual grasslands) within 1 mile of active Swainson’s hawk nests (acreage to be determined during preconstruction surveys) at a ratio of 1 acre of mitigation lands for each acre of permanent development (i.e., 1:1 replacement ratio). Foraging habitat impacts will be largely limited to valve structures (roughly 10-foot square) every few hundred feet along pipeline routes, with less than an acre of anticipated foraging habitat loss.

- Consistent with MSCS guidance, impacts to golden eagle foraging habitat will be provided by enhancing or restoring foraging habitat at ratio from ratio of 1:1 to 5:1.

Impact Significance after Mitigation: Less than Significant.

Impact 4.6.10: Project construction and increased reservoir water levels would result in temporary and permanent loss of potential and occupied habitat for the Alameda whipsnake. (Less than Significant with Mitigation)

Alternative 1

Los Vaqueros Reservoir Expansion, In-watershed Facilities, and Recreational Facilities

Upland scrub and nearby associated woodland and grassland habitats in the vicinity of the reservoir expansion area are assumed to support Alameda whipsnakes based on CNDDDB records and survey findings (Swaim, pers. comm., 2007).

Scrub Habitat. Direct project impacts on scrub habitat that is suitable for the Alameda whipsnake includes 6.9 acres of permanent impacts and about 0.5 acres of temporary impacts. Areas that would be affected include the borrow area (3.8 acres), marina road (0.6 acre), dam (1.9 acre), and reservoir inundation footprint (0.6 acre). Assuming that some affected areas could be revegetated, scrub habitat would be temporarily affected at the marina road (0.3 acre), inundation footprint (0.2 acre), and westside access road (0.01 acre).

Though scrub habitat at the borrow site is generally isolated from larger scrub habitat blocks, the borrow area provides sufficient cover and vegetation complexity to support the Alameda whipsnake (Swaim, pers. comm., 2007). Also, this area is within the movement capabilities of the Alameda whipsnake relative to other occupied scrub habitat. Construction and use of construction-related vehicles could also cause Alameda whipsnake injury or mortality in scrub and nonscrub habitat, which would be a direct impact.

Nonscrub Habitat. In addition to direct effects caused by the loss of scrub habitat, direct habitat and species effects are expected in adjacent grasslands and oak woodlands. Generally, nonscrub habitat next to more typical “core” scrub habitat provides several important benefits and values
for Alameda whipsnakes. Annual grasslands and oak woodlands within several miles of scrub habitat may be routinely used by Alameda whipsnakes during normal foraging and dispersal activities (Swaim, pers. comm., 2007).

Alameda whipsnake movement observations demonstrate that individual dispersing snakes may venture into areas substantially greater than 1,000 feet from scrub habitat, out to 4 miles in some instances (Swaim, pers. comm., 2007). However, the MSCS compensation guidelines do not require compensation for permanent and temporary impacts to nonscrub habitat that may support Alameda whipsnake (CALFED, 2000). Because mitigation is not required for Alameda whipsnake nonscrub habitat under MSCS guidelines, the following analysis of 1,000- and 2,500-foot study buffers around scrub habitat is intended for informational purposes to identify the magnitude of the potential impact to potentially occupied nonscrub habitat, and is not intended to inform Alameda whipsnake mitigation requirements (see Figure 4.6-26). Table 4.6-16 presents the direct impacts on nonscrub upland habitat within 1,000 and 2,500 feet of identified scrub habitat.

| TABLE 4.6-16 |
| DIRECT IMPACTS ON NONSCRUB HABITAT WITHIN 1,000/2,500 FEET OF ALAMEDA WHIPSNAKE “CORE” UPLAND SCRUB HABITAT |

<table>
<thead>
<tr>
<th>Habitat Type</th>
<th>Alternatives 1, 2, and 3 Within 1,000/2,500 feet of Upland Scrub</th>
<th>Alternative 4 Within 1,000/2,500 feet of Upland Scrub</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual grasslands</td>
<td>102.2 acres/404.4 Acres</td>
<td>23.6 acres/141.8 Acres</td>
</tr>
<tr>
<td>Oak woodlands</td>
<td>33.8 acres/36.8 Acres</td>
<td>2.0 acres/8.4 Acres</td>
</tr>
<tr>
<td>Riparian woodland</td>
<td>5.93 acres/16.2 Acres</td>
<td>3.2 acres/8.8 Acres</td>
</tr>
<tr>
<td>Total Impacts to Nonscrub Habitat</td>
<td>141.9 acres/457.4 Acres</td>
<td>28.8 acres/159.0 Acres</td>
</tr>
</tbody>
</table>

1. Does not include aquatic and emergent habitats, which presumably are not used by Alameda whipsnakes.


Indirect impacts from grading and other construction activities in scrub and nonscrub habitat could include whipsnake harassment due to noise or vibration.

Reservoir inundation and, in particular, the flooding of annual grasslands near Los Vaqueros Road on the southwestern edge of the reservoir, could indirectly affect the availability of nonscrub habitat for Alameda whipsnakes. Inundation would extend the waterline about 0.5 mile farther south along Los Vaqueros Road, thereby severing the connectivity between scrub habitats to the west of the road and annual grassland to the east. The grasslands areas east of Los Vaqueros Road that would be affected are more than 500 to 1,000 feet from scrub habitat. It is not known if Alameda whipsnakes regularly use annual grasslands habitats east of Los Vaqueros Road; however, such use is expected at least on an intermittent basis.

10 Note that the project does mitigate for grassland and woodlands that may support Alameda whipsnakes.
Figure 4.6.26
Potential Impacts to Alameda Whipsnake Habitat

SOURCE: USGS, 1993 (base map); ECCHCP/NCCP, 2006; and ESA, 2007
All Other Facilities (Outside the Watershed)

Alameda whipsnake habitat is not present within the study area of any other proposed facility on lands outside the watershed (i.e., new Delta Intake and Pump Station, Transfer Facility Expansion, Delta-Transfer Pipeline, Transfer-LV Pipeline [outside of the watershed], Transfer-Bethany Pipeline, and electrical transmission facilities). Therefore, no impacts would occur as a result of construction or operation of these facilities.

Existing Mitigation Commitments

CCWD has no mitigation commitments for Alameda whipsnakes.

Summary for Alternative 1

Under Alternative 1, the project would directly impact potential and occupied habitat for Alameda whipsnakes through the loss of scrub habitat at the borrow area, marina road, dam, and reservoir footprint; as well as habitat in adjacent oak and riparian woodlands and annual grasslands. Under this alternative, 6.9 acres of scrub would be impacted and 102.2 acres of grasslands would be affected within 1,000 feet of scrub habitat. Impacts related to Alternative 1 would be significant prior to mitigation. Alternative 1-related impacts would be reduced to a less-than-significant level through implementation of Mitigation Measure 4.6.10a, which provides for project-area Alameda whipsnake studies, protection measures during construction, an appropriate revegetation plan, and compensatory habitat creation/restoration within the project area; and Mitigation Measure 4.6.10b, which provides for compensation of permanent habitat losses through the acquisition, protection, and management of occupied scrub habitat.

Alternative 2

Potential impacts to populations of Alameda whipsnakes and their habitat due to project implementation under Alternative 2 would be the same as those discussed for Alternative 1. Impacts would be significant before mitigation. The implementation of Mitigation Measure 4.6.10a and 4.6.10b would reduce this impact to a less-than-significant level.

Alternative 3

Potential impacts to populations of Alameda whipsnakes and their habitat due to project implementation under Alternative 3 would be the same as those discussed for Alternative 1. Because all impacts to Alameda whipsnakes would occur in association with the dam raise, reservoir inundation, and Recreation Facilities (as detailed in Alternative 1), Alternative 3 would be identical to those discussed previously. Project impacts are considered significant prior to mitigation. The implementation of Mitigation Measure 4.6.10a and 4.6.10b would reduce this impact to a less-than-significant level.

Alternative 4

Under Alternative 4, permanent direct impacts on Alameda whipsnake upland scrub habitat are estimated at 6.4 acres (versus 6.9 acres under Alternative 1) and temporary impacts would be
about 0.4 acre (0.5 acre was identified for Alternative 1). Permanent impacts include habitat loss at the borrow area (3.8 acres), marina road (0.6 acre), dam (1.9 acre), and the 160-TAF inundation footprint (0.1 acre). Temporary impacts would arise from the marina road (0.3 acre) and westside access road (0.01 acre).

Impacts to nonscrub habitat that may be used by Alameda whipsnakes would be substantially less under Alternative 4 than under Alternative 1 (Figure 4.6-26; Table 4.6-16). Within 1,000 feet of scrub habitat, Alternative 4 would impact 23.6 acres of annual grasslands (versus 102.2 acres under Alternative 1), 2.0 acres of oak woodlands (versus 33.8 acres), and 3.2 acres of riparian habitat (versus 5.9 acres). Within 2,500 feet of scrub habitat, Alternative 4 would impact 141.8 acres of annual grasslands (versus 404.4 acres under Alternative 1), 8.4 acres of oak woodlands (versus 36.8 acres), and 8.8 acres of riparian woodland (versus 16.2 acres). Under Alternative 4, direct impacts to non-scrub habitat that may be used by Alameda whipsnakes are less than half of those anticipated under Alternative 1.

These impacts are considered significant before mitigation. The implementation of Mitigation Measure 4.6.10a, which provides a mitigation and monitoring strategy to avoid and minimize Alameda whipsnake impacts before and during construction, and provide habitat restoration after construction, and Mitigation Measure 4.6.10b, to compensate for habitat losses consistent with MSCS guidelines, would reduce impacts on this species to a less-than-significant level.

**Mitigation Measures**

**Measure 4.6.10a:** CCWD shall minimize and/or avoid construction-related impacts on Alameda whipsnakes through the development and implementation of an Alameda whipsnake protection and monitoring plan. USFWS shall approve this plan during formal consultation under FESA Section 7, and shall establish a program of preconstruction surveys and construction supervision to identify and prevent potential hazards to individual Alameda whipsnakes that could be present during construction. The plan shall prohibit or restrict activities that could harm or harass this species. Habitat restoration and compensation shall also be included in the plan. Measures in this plan shall include, but are not limited to, the following:

- A description of the species habitat requirements and movement patterns applicable to the project area.

- A procedure for conducting preconstruction surveys and/or trapping surveys before the onset of initial ground-disturbing activities in areas with high quality habitat, as well as monitoring to be conducted before construction and/or restoration begin each day that these activities shall occur.

- Direct monitoring by a qualified biologist of the clearing of occupied or potentially occupied coastal scrub in the project area that would be directly affected by project construction (not by inundation). Construction shall not proceed until areas have been surveyed to capture and relocate as many Alameda whipsnakes as reasonably possible to minimize take. However, some individuals may be undetected or move in following surveys and would be subject to take.
- A protocol for the selection of USFWS-approved biological monitors who have experience with Alameda whipsnakes to monitor construction activities (such as initial clearing and grading, excavation, and the installation of silt fencing) within and next to Alameda whipsnake habitat.

- Worker education materials and procedures for informing construction crews about the potential presence of Alameda whipsnakes, equipment operation procedures to minimize impacts to whipsnakes, responsibilities of project personnel (such as reporting observations of Alameda whipsnakes within or next to the construction area to the biological monitor), observing speed limits, avoiding use of the haul road until cleared by the biological monitor, and other measures to avoid mortality of whipsnakes during construction; and the role of the monitoring staff in advising construction crews of compliance with take-avoidance measures for Alameda whipsnakes, documenting compliance in monitoring reports, and notifying USFWS within 24 hours of observation of whipsnakes within or next to a construction area.

- Limit stockpiling and staging activities and vehicle and equipment refueling and maintenance to occur in nonsensitive areas.

- CCWD shall prepare and implement a revegetation plan that describes pre-project conditions and available habitats for Alameda whipsnakes, invasive species control measures, and restoration and monitoring success criteria for undeveloped areas disturbed during project construction. The plan will provide the basis for the reestablishment of scrub habitat in disturbed areas and mitigation sites, and will include at a minimum an identification of mitigation areas, site preparation requirements, specifications for planting and/or seeding (e.g., what species and how many plantings), seasonal considerations for planting and site maintenance, the proposed irrigation strategy, performance criteria (e.g., 70 percent survival of plantings 5 years following installation, and 70 percent of plants exhibiting fair or better condition), any contingency measures that may be anticipated, and a provision for semi-annual monitoring and reporting.

Measure 4.6.10b: Consistent with MSCS guidelines, CCWD shall provide compensation for permanent and temporary loss of upland scrub habitat that may support Alameda whipsnakes by either (1) compensating for permanent habitat losses by acquiring, protecting, and managing 2 to 5 acres of existing occupied habitat for every acre within the same area of occupied habitat that would be affected, and/or (2) enhancing or restoring 2 to 5 acres of suitable habitat near the affected areas for every acre of occupied habitat affected (CALFED, 2000).

Impact Significance after Mitigation: Less than Significant.

Impact 4.6.11: Project construction activities could result in direct and indirect impacts on the valley elderberry longhorn beetle and its habitat. (Less than Significant with Mitigation)

The impact assessment for the valley elderberry longhorn beetle relied on elderberry shrub surveys within the watershed (ESA, 2005) and facilities outside the watershed in 2007 and 2008.
Alternative 1

Los Vaqueros Reservoir Expansion, In-watershed Facilities, and Recreational Facilities

In the watershed, the valley elderberry longhorn beetle was documented to occur in several drainages within the proposed inundation area. A total of 85 elderberry shrubs were documented within the watershed during surveys in 2005 (ESA, 2005). USFWS considers that direct or indirect impacts could occur to elderberry shrubs (with stems greater than 1 inch in diameter) within 100 feet of project construction sites (USFWS, 1999c).

The reservoir inundation area supports 45 elderberry shrubs with 249 stems measuring larger than 1 inch in diameter (ESA, 2005). Of these, six shrubs exhibited valley elderberry longhorn beetle exit holes. The inundation of these shrubs could cause direct mortality to beetles and loss of potential and occupied habitat. USFWS guidance indicates that indirect impacts could occur to two elderberry shrubs between 20 and 100 feet from the inundation zone. Indirect impacts could include general habitat degradation and loss of community complexity due to the loss of associated non-elderberry vegetation, general disturbance near occupied habitat, and possibly the accumulation of construction-generated dust on leaves.

The Inlet/Outlet Pipelines study area supports 10 elderberry shrubs with 53 stems greater than 1 inch in diameter (ESA, 2005). Within the project area, no shrubs are within 20 feet of the pipeline footprint, and it is expected that no shrubs would be removed.

Transfer-LV Pipeline

As described for the in-watershed facilities, four elderberry shrubs are within 100 feet of the Transfer-LV Pipeline construction corridor. Of these shrubs, three are more than 75 feet from the near the Inlet/Outlet Pipelines project area. Another elderberry shrub is within 20 feet of the pipeline construction footprint on Kellogg Creek (CDFG, 2008), but not within the pipeline footprint. Therefore, direct impacts (i.e., loss) on valley elderberry longhorn beetles would be limited to one plant, and indirect effects, mainly the potential accumulation of dust on leaves, could occur to three plants.

New Delta Intake and Pump Station, Delta-Transfer Pipeline, Expanded Transfer Facility, Transfer-Bethany Pipeline

Habitat for valley elderberry longhorn beetle is not present in the study areas for the new Delta Intake and Pump Station, Delta-Transfer Pipeline, Expanded Transfer Facility, and Expanded Transfer Facility; therefore, no impacts are expected in these project areas.

Power Supply Infrastructure (Power Options 1 and 2)

Elderberry shrubs do not occur near any of the proposed power facilities under either option; thus, no impacts are anticipated to valley elderberry longhorn beetles.
Summary for Alternative 1

Under Alternative 1, potential impacts to valley elderberry longhorn beetles and their habitat are anticipated for in-watershed work and for the Transfer-LV Pipeline. Reservoir inundation to 275-TAF level would directly impact 45 shrubs, and the dam raise and appurtenant facilities in the Inlet/Outlet Pipelines construction area would affect an additional 10 shrubs. One shrub would be directly affected by the Transfer-LV Pipeline. An additional 41 shrubs may be indirectly impacted by accumulation of dust on leaves. This is considered a potentially significant impact prior to mitigation. The implementation of Mitigation Measure 4.6.11 would reduce impacts to a less-than-significant level.

Alternative 2

Potential impacts to valley elderberry longhorn beetle and their habitat due to project implementation under Alternative 2 would be the same as those discussed for Alternative 1, and would be significant before mitigation. The implementation of Mitigation Measure 4.6.11 would reduce impacts to a less-than-significant level.

Alternative 3

Potential impacts to valley elderberry longhorn beetle and their habitat under Alternative 3 are the same as those for Alternative 1, affecting the same individual elderberry plants by the same mechanisms. These impacts would be significant before mitigation. The implementation of Mitigation Measure 4.6.11 would reduce impacts to a less-than-significant level.

Alternative 4

The 160-TAF inundation zone supports 16 elderberry shrubs, with 74 stems measuring larger than 1 inch in diameter. Of these, two shrubs exhibited valley elderberry longhorn beetle exit holes (ESA, 2005). The inundation of these shrubs could cause direct mortality to beetles and loss of potential and occupied habitat. Elderberry shrubs are not present in the 160-TAF borrow area. Alternative 4 would affect 29 fewer elderberry shrubs than Alternative 1, with similar and indirect dust accumulation effects on vegetation. This would be a lesser, though significant impact prior to mitigation. The implementation of Mitigation Measure 4.6.11 would reduce impacts to a less-than-significant level.

Mitigation Measures

The following measure is based on the Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS, 1999c).

Measure 4.6.11: CCWD shall implement USFWS guidelines (1999 or more current) for avoiding, minimizing, and mitigating project impacts on valley elderberry longhorn beetles. If avoidance is not feasible, USFWS general compensation guidelines call for replacement of elderberry plants in designated mitigation areas at a ratio from 2:1 to 5:1 for each stem greater than 1 inch in diameter. Note that replacement ratios are by stem and not by elderberry shrub. Replacement stock shall be obtained from local sources. Plants are generally replaced at a 2:1 ratio for stems greater than 1 inch in diameter at ground level with no
adult emergence holes, 3:1 for stems where emergence holes are evident in less than 50 percent of the shrubs, and 5:1 for stems greater than 1 inch in diameter with emergence holes.

**Impact Significance after Mitigation:** Less than Significant.

**Impact 4.6.12:** Project construction activities could affect active breeding bird nest sites and new powerlines could affect migratory birds (Less than Significant with Mitigation)

**All Project Alternatives**

**Loss of Active Nests.** Each of the proposed alternatives would cause some degree of temporary habitat disturbance or permanent habitat loss within or near potential nesting habitat for birds that are protected under the federal MBTA. A subset of bird species that nest or could nest in the project vicinity includes the following: Cooper’s hawk, sharp-shinned hawk (*A. striatus*), red-tailed hawk, red-shouldered hawk (*B. lineatus*), white-tailed kite, osprey (*Pandion haliaetus*), northern harrier, golden eagle, prairie falcon (*Falco mexicanus*), and other raptors, as well as Bell’s sage sparrow (*Amphispiza belli ssp. belli*), oak titmouse (*Baeolophus inornatas*), yellow warbler (*Dendroica petechia*), Pacific-slope flycatcher (*Empidonax difficilis*), California horned lark (*Eremophila alpestris actia*), yellow-breasted chat (*Icteria virens*), loggerhead shrike, Allen’s hummingbird (*Selasphorus sasin*), Bewick’s wren (*Thryomanes bewickii*), California thrasher, and tricolored blackbird. These and other more common bird species may forage and nest in riparian, woodland, scrub, and/or grassland habitats throughout the project area. Nesting sites for shorebird and waterfowl species are similarly protected.

Construction activities associated with the project alternatives (including grading and removal of trees, shrubs, and other potential nesting habitat during the breeding season) could result in direct mortality of nesting birds. Indirect impacts from construction noise, vibrations, and increased human presence could spook adult birds, causing nest abandonment, death of young, or loss of reproductive potential at active nests near project sites. Such project impacts could occur at all facilities associated with the project alternatives.

**Impacts of Lighting on Birds.** Project alternatives would incorporate relatively low-height, high-intensity lighting during construction, and low-height, low intensity lighting at onsite buildings and facilities after construction. After construction, project lighting would be consistent with existing lighting at the dam and other facilities, which have not been demonstrated to pose a significant impact to flying birds, including shorebirds, waterfowl, passerines, and raptors that occur locally. Consistent with existing lighting in the watershed, light sources would be shielded and directed downward to reduce the amount of light and ambient glare. As a result, outdoor lighting for the project alternatives is not expected to result in a significant impact to wildlife or pose an increased strike hazard to migratory or other flying birds. After construction, shorebirds, waterfowl, passerines, and raptors are expected to use habitats in the project area to the same degree as before the project.
**Impacts of Noise and Vibration Effects on Nesting Birds.** Generally, more intensive construction activities can impact breeding birds within a larger sphere of influence. This is particularly true for pile driving, jack-hammering, and blasting activities, which may have a short duration, but can be loud and potentially disruptive to local nesting birds. Noise or vibration impacts on nesting golden eagles and other raptors could occur during blasting or jack-hammering activities in the 275-TAF borrow area and at the dam construction site.

**Loss of Habitat.** Construction disturbances to native habitats that may support nesting birds along pipeline and power alignments would be temporary with no permanent habitat losses. Project construction and reservoir inundation would result in the permanent removal of grassland, scrub, woodland, and riparian habitats that could support breeding birds. However, this impact area represents a small portion of the available nesting, foraging, and wintering habitat for special-status birds in the regional project vicinity.

**Conflicts with Powerlines.** Alternatives 1, 2, and 3 include the construction of new powerlines by either PG&E or Western that will connect new or upgraded facilities to existing power supplies. Poles and powerlines also pose a danger to raptors as a result of electrocution and collision hazards, and are a recognized source of raptor mortality. Powerline electrocution is the result of two interacting factors: raptor behavior and pole design. Raptors are opportunistically attracted to powerlines because they provide perch sites for hunting, resting, feeding, for territorial defense, or as nesting structures. Many standard designs of electrical industry hardware place conductors and groundwires close enough together that raptors can touch them simultaneously with their wings or other body parts, causing electrocution. Raptors and other birds may also collide with powerlines, which can be difficult for birds to detect for various reasons such as inclement weather conditions. Western typically uses standard hardware that minimizes the potential for bird electrocutions and collisions.

**Summary**
Temporary habitat disturbance or permanent habitat loss within or near potential nesting habitat for birds that are protected under the federal MBTA is possible under all project alternatives, with no single alternative markedly different from the others when considering these individual avian species as a collective group. This impact is significant before mitigation.

For all project alternatives, the implementation of Measure 4.6.12a and 4.6.12c will ensure that during the nesting season pre-construction surveys will be conducted and any active nests will be adequately buffered. For Alternatives 1, 2, and 3, Mitigation Measure 4.6.12b will reduce the potential for bird electrocution at new powerlines. Implementation of these mitigation measures would reduce impacts to a less-than-significant level.

**Mitigation Measures**

**Measure 4.6.12a:** CCWD shall ensure that active nests of raptors and other special-status nesting birds are not disturbed during construction.
If active construction work (i.e., ground clearing and grading, including removal of trees or shrubs) is scheduled to take place during the nonbreeding season (September 1 through January 31), no mitigation is required. If such construction activities are scheduled during the breeding season (February 1 through August 31), the following measures shall be implemented to avoid impacts on nesting raptors and other protected birds:

- Within 30 days of construction, a qualified wildlife biologist shall conduct preconstruction surveys of all potential nesting habitat within 500 feet of construction sites where access is available.

- If active nests are found during preconstruction surveys, a no-disturbance buffer (acceptable in size to CDFG) shall be created around active raptor nests and nests of other special-status birds during the breeding season, or until it is determined that all young have fledged. Typical buffers include 500 feet for raptors and 250 feet for other nesting birds (e.g., shorebirds, waterfowl, and passerine birds). The size of these buffer zones and types of construction activities restricted in these areas could be further modified during construction in coordination with CDFG and shall be based on existing noise and human disturbance levels in the project area.

- If preconstruction surveys indicate that nests are inactive or potential habitat is unoccupied during the construction period, no further mitigation shall be required. Trees and shrubs within the construction footprint determined to be unoccupied by special-status birds, or that are outside the no-disturbance buffer for active nests, could be removed.

- If construction commences during the nonbreeding season and continues into the breeding season, most songbirds that choose to nest next to active construction sites are generally considered to acclimate to construction activities, though nest abandonment may occur in some instances. However, nesting site monitoring shall be conducted by CCWD and no-disturbance buffer zones established in coordination with CDFG around active nests to prevent impacts on nesting birds and their young.

**Measure 4.6.12b:** CCWD shall follow Avian Protection Plan guidelines for powerlines.

CCWD shall use state-of-the-art guidelines to reduce raptor mortality from interactions with powerlines. The Avian Power Line Interaction Committee (1994) and USFWS recommend the following:

- Provide 60-inch minimum horizontal separation between energized conductors or energized conductors and grounded hardware,

- Insulate hardware or conductors against simultaneous contact if adequate spacing is not possible,

- Use Western-approved poles that minimize impacts to birds, and,

- Increase the visibility of conductors or shield wires to prevent and minimize bird collisions.

**Measure 4.6.12c:** Measures to reduce noise and vibration impact on nesting raptors near the dam and 275-TAF borrow area.
As identified in Measure 4.6.12a, a qualified biologist will conduct preconstruction surveys and establish suitable avoidance buffers around active bird nests. Construction at the 275-TAF borrow area will begin either outside the active nesting season or after verification that breeding birds are absent within 500 feet of work areas. If it appears that noise or vibration from ongoing blasting or jack-hammering at the dam or 275-TAF borrow area could affect nesting raptors that arrive after the start of construction, specific measures shall be implemented to reduce noise levels.

During blasting or jack-hammering, a noise level of no greater than 85 decibels (measured at the nest) will be used as general guidance for raptor nests that are established after construction. This parameter may be met through a variety of standard noise-reducing procedures for construction equipment, including the use of noise dissipaters and blasting mats. Contract specifications will include requirements for the use of blasting methods, including qualifications for the blasting contractor, the use of noise control methods and threshold noise levels, and other limitations. The specifications will also require the submittal of a blasting plan by the contractor that will cover the proposed noise control techniques, blasting charge size and limits, and hours of blasting.

**Impact Significance after Mitigation:** Less than Significant.

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**Impact 4.6.13:** Project construction activities under Alternatives 1 and 2 could affect designated critical habitat for listed species (vernal pool fairy shrimp and Contra Costa goldfields). (Less than Significant with Mitigation for Alternatives 1 and 2; No Impact for Alternatives 3 and 4)

**Alternative 1**

The Expanded Los Vaqueros Reservoir, Recreational Facilities, Expanded Transfer Facility, Delta-Transfer Pipeline, Transfer-LV Pipeline, Expanded Old River Intake and Pump Station, and new Delta Intake and Pump Station are not within designated critical habitat; therefore, no impacts would occur from these project components.

**Transfer-Bethany Pipeline**

As identified in the USFWS Vernal Pool Recovery Plan, a portion of the Transfer-Bethany Pipeline alignment is within the Altamont Hills core area of the Livermore vernal pool region (USFWS, 2005a). The purpose of the plan is to incorporate ecosystem considerations through the development and implementation of recovery measures for communities or ecosystems where federally listed species occur, in a manner that restores, reconstructs, or rehabilitates the structure, distribution, connectivity, and function upon which those listed species depend (USFWS, 2005a). This portion of the alignment has been designated by USFWS as critical habitat for Contra Costa goldfields and vernal pool fairy shrimp (USFWS, 2003; 2006) (see Figure 4.6-27).
Critical Habitat for Contra Costa Goldfields and Vernal Pool Fairy Shrimp

SOURCE: USGS, 1993 (base map); ESRI, 2006; CCWD, 2007; CCC, 2007; MWH, 2007; and ESA, 2007
Construction of the Transfer-Bethany Pipeline would directly affect designated critical habitat for Contra Costa goldfields and vernal pool fairy shrimp. About 4.0 miles (145.4 acres\(^{11}\)) of the proposed pipeline alignment passes through designated critical habitat for vernal pool fairy shrimp and 2.7 miles (98.1 acres) of the alignment passes through designated critical habitat for Contra Costa goldfields.

Contra Costa goldfields are not present in this pipeline project area and are not historically described from the Byron Hot Springs critical habitat unit (USFWS, 2005a; CDFG, 2008). Focused presence/absence surveys failed to identify Contra Costa goldfields in the study area.

Focused surveys in winter 2008 identified 16 vernal pools within or next to the Transfer-Bethany Pipeline alignment that could support vernal pool fairy shrimp. This species was identified from four of these pools, and non-listed fairy shrimp species (versatile fairy shrimp \([\text{Branchinecta lindahli}]\) and alkali fairy shrimp \([B. \text{Mackini}]\)) were collected from six others (ESA, 2008b). Vernal pool fairy shrimp are presumed present in all 16 pools based on the presence of suitable habitat.

The critical habitat designation for vernal pool fairy shrimp and Contra Costa goldfields was finalized in 2003 and revised in 2006. The PCEs for these species identified in the Regulatory Setting section of this chapter (i.e., the physical and biological functions that are considered essential to species conservation and require special management considerations or protection) include habitat in the form of vernal pools, swales, or other wetlands features, and the geographic, topographic, and edaphic features that comprise pool complexes. Such conditions are present in portions of the Transfer-Bethany Pipeline alignment. Any proposed activities within designated critical habitat that would alter the physical makeup of pools or reduce the functionality of the larger vernal pool complex would constitute a significant project effect.

Potential indirect effects to vernal pool hydrology in the local vicinity of the Transfer-Bethany Pipeline alignment in Altamont Hills core area of the Livermore vernal pool region are discussed above in Measure 4.6.6.

**Summary**

Specific impacts within designated critical habitat for vernal pool fairy shrimp and Contra Costa goldfields are characterized in Impact 4.6.6 as the loss of four occupied vernal pool fairy shrimp pools and 12 potentially occupied pools within critical habitat for vernal pool species. Beyond these losses, with the implementation of measures to stockpile claypan materials for use in later reestablishment of surface compaction and contours, the project is not expected to adversely modify designated critical habitat for vernal pool fairy shrimp and Contra Costa goldfields. Impacts related to Alternative 1 are significant prior to mitigation but can be mitigated to a less-than-significant level through the implementation of Mitigation Measures 4.6.2a and 4.6.2b (wetland protection and compensation measures), and Mitigation Measures 4.6.6a and 4.6.6b (vernal pool fairy shrimp protection and habitat compensation measures).

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\(^{11}\) Acreage assumes a 300-foot-wide construction corridor, which can be constricted within sensitive areas.
**Alternative 2**

Potential impacts to designated critical habitat under Alternative 2 would be the same as those discussed for Alternative 1, as they both include the Transfer-Bethany Pipeline. This constitutes a significant impact before mitigation. The impact on designated critical habitat from Transfer-Bethany Pipeline construction would be less than significant after the implementation of Mitigation Measures 4.6.2a and 4.6.2b and Mitigation Measures 4.6.6a and 4.6.6b.

**Alternative 3**

The proposed alternative would have no impact to designated critical habitat because it does not include the Transfer-Bethany Pipeline. No mitigation is required.

**Alternative 4**

The proposed alternative would have no impact to designated critical habitat because it does not include the Transfer-Bethany Pipeline. No mitigation is required.

**Mitigation:** None required. See Measures 4.6.2a, 4.6.2b, 4.6.6a and 4.6.6b.

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**Impact 4.6.14: Project construction activities could affect nonlisted special-status reptile species (San Joaquin coachwhip and coast horned lizard). (Less than Significant with Mitigation)**

**Alternative 1**

Based on large scale range maps, San Joaquin coachwhips and coast horned lizards (*Phrynosoma coronatum blainvillii*) are expected to occur sporadically throughout the regional project vicinity in open, dry areas with little or no tree cover. Documented occurrences of both are patchy, with one documented occurrence of San Joaquin coachwhip in the footprint of the Los Vaqueros Reservoir Dam. No other occurrences are reported in the Los Vaqueros Watershed or near any other project facilities. Coast horned lizard similarly has few reported local occurrences, but may be encountered in the project area. Both species are relatively uncommon and difficult to detect, even when present. All project alternatives would likely result in direct mortality of these species as well as temporary and permanent loss of their habitat.

Impacts to these species include the potential for their destruction by equipment or entrenchment in open trenches or other project facilities. This constitutes a significant impact before mitigation. The Implementation of Mitigation Measure 4.6.14, which minimizes the project footprint within suitable habitat and provides for preconstruction surveys, would reduce impacts on these species from project construction to a less-than-significant level.

**Alternative 2**

Potential impacts to populations of San Joaquin coachwhips and coast horned lizards and their habitat under Alternative 2 would be the same as those discussed for Alternative 1. This
constitutes a significant impact before mitigation. Implementation of Mitigation Measure 4.6.14 would reduce impacts on these species from project construction to a less-than-significant level.

**Alternative 3**

Potential impacts to populations of San Joaquin coachwhip and coast horned lizard and their habitat due to project implementation under Alternative 3 would be less than under Alternative 1 because Alternative 3 would not affect suitable annual grasslands on the Transfer-Bethany Pipeline that presumably support these species. In total, Alternative 3 would affect at least 150.9 fewer acres of grasslands habitat that could support the San Joaquin coachwhip and coast horned lizard. Project impacts under Alternative 3 would be considered significant before mitigation. Implementation of Mitigation Measure 4.6.14 would reduce impacts on these species from project construction to a less-than-significant level.

**Alternative 4**

Potential impacts to San Joaquin coachwhips and coast horned lizards would be considerably smaller under Alternative 4 compared with Alternative 1, because impacts would be limited to areas within the Los Vaqueros Watershed. This alternative would affect less habitat for these species within the watershed: 498.5 acres of annual grasslands within the watershed (versus 976.2 acres under Alternative 1) and would not incur the temporary impacts totaling 252.6 acres from the Delta-Transfer Pipeline (24.0 acres), Transfer-LV Pipeline (76.5 acres), Transfer-Bethany Pipeline (150.9 acres), and Expanded Transfer Facility (1.2 acres).

Even so, impacts to San Joaquin coachwhip and coast horned lizard would be significant prior to mitigation. Implementation of Mitigation Measure 4.6.14, which provides for preconstruction surveys and ongoing relocation of identified animals out of construction areas, would reduce impacts on these species to a less-than-significant level.

**Mitigation Measures**

**Measure 4.6.14:** CCWD shall ensure that habitat disturbances are minimized in areas that are known or suspected to support San Joaquin coachwhip and coast horned lizard. Within 30 days before surface-disturbing activities, concurrent with other preconstruction wildlife surveys, a qualified biologist shall survey for special-status reptile populations. If individuals of these species are found in the project area, they shall be relocated to suitable habitat 0.5 mile or farther from the project area. Some individuals may be undetected or enter sites after surveys and would be subject to harm.

**Impact Significance after Mitigation:** Less than Significant.
Impact 4.6.15: Project construction activities could affect nonlisted special-status mammal species (American badger, special-status bats, and the San Joaquin pocket mouse). (Less than Significant with Mitigation)

**Alternative 1**

American badgers are a non-listed species that are found throughout the regional project vicinity and are known to occur in low densities within the watershed (CDFG, 2008). American badgers could be directly affected by vehicle and construction-related mortality at any active construction sites, including those within the watershed and on pipeline routes, at the Expanded Transfer Facility, and near the Delta Intake Facilities. It is not anticipated that this species would be affected by project area noise, dust, or other construction disturbances, with the principal threat being vehicle mortality. The likelihood of encountering this species is considered directly proportional to the scale and duration of construction activities.

Breeding and nonbreeding bats could roost in many of the large sycamore or oak trees that occur in the watershed as well as in trees or structures near pipeline alignments. Crevices in Los Vaqueros Dam could also provide roosting habitat for special-status bats. Focused surveys have not been conducted to document the distribution or types of special-status bats that could be in the study area. Although the loss of individual bats in a nonbreeding roost would not be considered significant, the loss of an active maternity roost, even of relatively common species such as the California myotis (*Myotis californicus*), would be significant. Based on their known range and available habitat in the watershed and along pipeline alignments, bat species that could be affected by the project include the pallid bat, Townsend’s big-eared bat, greater western mastiff bat, small-footed myotis bat, long-eared myotis bat, fringed myotis bat, long-legged myotis bat, and Yuma myotis bat.

The San Joaquin pocket mouse is typically found in areas with fine-textured soils. This species was recorded in 2002 near Clifton Court Forebay, about 3.6 miles east of the watershed boundary and 7 miles from the existing Los Vaqueros Dam (CDFG, 2008). Open grasslands and upland scrub communities within the watershed are thought to provide poor quality habitat for the San Joaquin pocket mouse because this species is typically found in areas with friable soils in grasslands and blue oak savannahs (CDFG, 2005). Though not all grasslands habitat is occupied by this species, up to 976.2 acres of permanent impact may occur. Temporary impacts totaling 252.8 acres may occur as follows: other in-watershed facilities (45.8 acres), Delta-Transfer Pipeline (24.2 acres), Transfer-LV Pipeline (76.5 acres), Transfer-Bethany Pipeline (150.9 acres) and Expanded Transfer Facility (1.2 acres). Iodine bush scrub and short grasslands habitat that would generally be avoided within the Power Option 2 Western powerline alignment provide the best available habitat in the project area for this species. This area provides the only local occurrence of this species.

Prior to mitigation, project effects to American badgers, special status bats, and San Joaquin pocket mice would be potentially significant. The implementation of Mitigation Measures 4.6.15a and 4.6.15b would reduce this impact to less-than-significant.
Alternative 2

Potential impacts to nonlisted special-status mammal species due to project implementation under Alternative 2 would be the same as those discussed for Alternative 1. This would constitute a significant impact before mitigation. The implementation of Mitigation Measures 4.6.15a and 4.6.15b would reduce the magnitude of this impact to less-than-significant.

Alternative 3

All facilities proposed under Alternative 3 are discussed under Alternative 1, above. Because a fair likelihood exists that badgers could be encountered on the Transfer-Bethany Pipeline, which would affect about 150.9 acres of annual grassland habitat and is not included in this alternative, the likelihood for incidental badger mortality would be somewhat less under this alternative than for Alternative 1. Project impacts to San Joaquin pocket mice are also expected to be lower in the absence of this pipeline. Impacts to special status bats would be identical under both alternatives.

Prior to mitigation, project effects to American badgers, special status bats, and San Joaquin pocket mice would be potentially significant. The implementation of Mitigation Measures 4.6.15a and 4.6.15b would reduce the magnitude of this impact to less-than-significant.

Alternative 4

Potential impacts to nonlisted special-status mammal species due to project implementation under Alternative 4 would be similar to, but less than those discussed for Alternative 1, with impacts limited to areas within the watershed. As seen for Alternative 3, the absence of pipeline alignments and other project facilities would reduce habitat impacts within grasslands that provide suitable habitat for American badgers and San Joaquin pocket mice, and reduce the likelihood for mortality. Alternative 4 would affect less habitat for these species within the watershed: 498.5 acres of annual grasslands within the watershed (versus 976.2 acres under Alternative 1) and would not incur the temporary impacts totaling 252.8 acres from the Delta-Transfer Pipeline (24.2 acres), Transfer-LV Pipeline (76.5 acres), Transfer-Bethany Pipeline (150.9 acres), and Expanded Transfer Facility (1.2 acres).

Prior to mitigation, project effects to American badgers, special status bats, and San Joaquin pocket mice would be potentially significant. The implementation of Mitigation Measures 4.6.15a and 4.6.15b would reduce the magnitude of this impact to less-than-significant.

Mitigation Measures

Measure 4.6.15a: CCWD shall minimize impacts on badgers through a combination of worker training, preconstruction surveys, and passively or actively relocating animals. Impacts on the San Joaquin pocket mouse and American badger would be reduced by limiting the footprint of direct project effects within the Western powerline alignment.

- A qualified biologist shall conduct a training session for all construction personnel focused on the protection and conservation of protected, nonlisted special-status wildlife species, including American badgers. At a minimum, the training shall include a species and habitat description for the American badger (in addition to
other nonlisted special-status species). The training session shall identify the general measures that are being implemented to minimize impacts on these species as they relate to the project, and the boundaries within which the project could be accomplished.

- Concurrent with other required surveys (e.g., as required for Mitigation Measure 4.7), during winter/spring months before new project activities, and concurrent with other preconstruction surveys (e.g., kit fox and burrowing owl), a qualified biologist shall perform a pre-activity survey to identify the presence of American badgers. If this species is not found, no further mitigation shall be required. If badgers are identified, they shall be passively relocated using burrow exclusion (e.g., installing one-way doors on burrows) or similar CDFG-approved exclusion methods. In unique situations it might be necessary to actively relocate badgers (e.g., using live traps) to protect individuals from potentially harmful situations. Such relocation could be performed with advance CDFG coordination and concurrence. When unoccupied dens are encountered outside of work areas but within 100 feet of proposed activities, vacated dens shall be inspected to ensure they are empty and temporarily covered using plywood sheets or similar materials.

- If badger occupancy is determined at a given site within the work area, the construction manager should be informed that work should be halted. Depending on the den type, reasonable and prudent measures to avoid harming badgers will be implemented and may include seasonal limitations on project construction near the site (i.e., restricting the construction period to avoid spring-summer pupping season), and/or establishing a construction exclusion zone around the identified site, or resurveying the den a week later to determine species presence or absence.

- To minimize the possibility of inadvertent badger mortality, project-related vehicles shall observe a maximum 20 miles per hour speed limit on private roads.

- To prevent accidental entrapment of badgers or other animals during construction, all excavated holes or trenches greater than 2 feet deep shall be covered at the end of each work day by suitable materials, or escape routes constructed of earthen materials or wooden planks shall be provided. Before filling, such holes shall be thoroughly inspected for trapped animals.

- All food-related trash items (such as wrappers, cans, bottles, and food scraps) shall be disposed of in closed containers and removed daily from the project area.

- To prevent harassment and mortality of badgers or destruction of their dens, no pets shall be allowed in the project area.

Direct impacts to San Joaquin pocket mice would be minimized in the Western powerline alignment under Power Option 2 by limiting project activities within iodine bush scrub and short grasslands habitat to the smallest possible extent. The implementation of Measure 4.6.7b, which provides habitat compensation for temporary and permanent impacts to annual grasslands that are potentially occupied by San Joaquin kit fox, would additionally benefit American badgers and San Joaquin pocket mice.

**Measure 4.6.15b:** CCWD shall minimize impacts on special-status bats by performing preconstruction surveys and creating no-disturbance buffers around active bat roosting sites.
Before construction activities (i.e., ground clearing and grading, including trees or shrub removal) within 200 feet of trees that could support special-status bats, a qualified bat biologist shall survey for special-status bats. If no evidence of bats (i.e., direct observation, guano, staining, or strong odors) is observed, no further mitigation shall be required.

If evidence of bats is observed, CCWD and its contractors shall implement the following measures to avoid potential impacts on breeding populations:

- A no-disturbance buffer of 250-feet shall be created around active bat roosts during the breeding season (April 15 through August 15). Bat roosts initiated during construction are presumed to be unaffected by the indirect effects of noise and construction disturbances. However, the direct take of individuals will be prohibited.

- Removal of trees showing evidence of active bat activity shall occur during the period least likely to affect bats, as determined by a qualified bat biologist (generally between February 15 and October 15 for winter hibernacula, and between August 15 and April 15 for maternity roosts). If the exclusion of bats from potential roost sites is necessary to prevent indirect impacts due to construction noise and human activity adjacent, bat exclusion activities (e.g., installation of netting to block roost entrances) shall also be conducted during these periods. If special status bats are identified in the dam or special allowances must be made to relocate bats, CCWD will coordinate the effort in advance with CDFG.

**Impact Significance after Mitigation:** Less than Significant.

**Impact 4.6.16:** Draining the reservoir during project construction under Alternatives 1, 2, and 3 could affect Pacific Flyway species, including waterfowl and shorebirds. (Less than Significant)

**Alternative 1**

Since its completion in 1998, Los Vaqueros Reservoir is used extensively as a stopover for many water-dependent species of waterfowl and shorebirds on the Pacific Flyway. While the reservoir was not created to support migratory birds, the 1,456 acres of open-water and adjacent upland habitats support more than 165 different species of birds. The reservoir provides open-water and freshwater marsh habitats that support an abundance of migratory birds on the Pacific Flyway.

The watershed is noted for its variety of bird life. The Mt. Diablo Audubon Society documented 72,212 birds among 165 different species of birds in their 2006 Christmas bird count (Mueller, pers. comm.). Of these, 53 species are at least partially dependent upon freshwater marsh or open-water habitat provided by the reservoir. Waterfowl species that frequent the reservoir include the Canada goose, wood duck, gadwall, American wigeon, mallard, northern shoveler, northern pintail, green-winged teal, canvasback, redhead, ring-necked duck, greater scaup, lesser scaup, bufflehead, common goldeneye, hooded merganser, common merganser, and ruddy duck. Other birds noted in association with the reservoir include grebes, sandpipers, pelicans, cormorants, egrets, herons, and
gulls. Birds use the reservoir throughout the year, although the site is not used as a long-term stopover as are water bodies in Southern California.

The 3-year or longer absence of open-water and freshwater marsh habitat at the reservoir during dam construction would temporarily eliminate bird foraging and stopover habitat on the Pacific Flyway that has been available to migrating waterfowl since 1998. Elimination of open-water areas would temporarily eliminate foraging opportunities and force migrants to use other nearby aquatic locations. This elimination could be viewed as a potentially significant impact of the project because impacts on migratory birds are a potentially significant impact under CEQA and the MBTA.

However, due to the reservoir’s relatively recent creation and the relative abundance of other large, permanent water bodies in the regional project vicinity, the temporary loss of the reservoir is not expected to significantly disrupt birds using the Pacific Flyway. During dam construction, water-dependent migratory birds are expected to use other nearby reservoirs and water bodies as foraging and stopover locations. The closest such features are the Delta and Clifton Court Forebay, but foraging and stopover habitat is also available at Lake Del Valle, the Livermore Chain of Lakes, San Antonio Reservoir, San Leandro Reservoir, Suisun Bay, and San Francisco Bay, among other locations.

After the project is implemented, the expanded reservoir would increase open-water habitat and would not reduce upland habitat quality for migratory birds over the long-term. Thus, the temporary loss of foraging and stopover habitat on the Pacific Flyway would be considered a less-than-significant impact, and no mitigation is required.

**Alternative 2**
Potential impacts to Pacific Flyway bird species due to project implementation under Alternative 2 would be to the same as those discussed for Alternative 1. Impacts under this alternative would be less than significant with no mitigation required.

**Alternative 3**
Potential impacts to Pacific Flyway bird species due to project implementation under Alternative 3 would be the same as those discussed for Alternative 1. Impacts under this alternative would be less than significant with no mitigation required.

**Alternative 4**
Because some water would remain in the Los Vaqueros Reservoir during construction, no impacts to Pacific Flyway bird species would occur.

**Mitigation:** None required.
Impact 4.6.17: The project would not result in conflicts with local and regional conservation plans, or local plans or ordinances protecting biological resources. (No Impact)

All Project Alternatives

The Los Vaqueros Watershed lies within the biological inventory area of the East County HCP/NCCP, but outside of the action area and defined mitigation areas (see Figure 4.6-28). The HCP/NCCP designates two land “acquisition analysis zones” in the southeastern corner of the county, east of the Los Vaqueros Watershed. These zones were established to focus the HCP/NCCP conservation strategy into distinct geographic areas without specifically identifying individual parcels. The Zone 5 (Byron Hills) and Zone 6 (East County Cultivated Agriculture) zones (see Figure 4.6-28) are relevant to the current analysis because the Los Vaqueros Reservoir Expansion Project would also target mitigation lands in these areas. The project would also identify conservation areas in Alameda County that are outside of the East County HCP/NCCP acquisition analysis zones.

The Los Vaqueros Watershed is identified in the East County HCP/NCCP as public land for the purposes of protecting water supply, natural resources, and recreation, and is not identified as potential East County HCP/NCCP acquisition land. Therefore, proposed facilities sited within the watershed, and mitigation measures to replace and enhance habitat areas within the watershed, would not conflict with any lands targeted by the HCP/NCCP for acquisition. As quantified in this section, habitat impacts outside the Los Vaqueros Watershed are mostly temporary and associated with project pipelines.

Section 4.6.3 details a comprehensive biological resource mitigation and compensation program that would be implemented for the Los Vaqueros Reservoir Expansion Project and provides for substantial acquisition of mitigation and compensation lands in eastern Contra Costa and Alameda counties. Informal coordination with the East County HCP/NCCP team to date indicates that implementation of the mitigation program for the Los Vaqueros Reservoir Expansion Project could help support the goals and acquisition strategies of the HCP/NCCP without competing for land or conflicting with the conservation goals and objectives of that plan.

Studies completed to date for this project indicate that the region includes ample acreage of suitable habitat to allow implementation of the project mitigation program in concert with the HCP/NCCP. See Section 4.6.3 for further discussion of the framework and guiding principles for the project’s biological resource mitigation program.

No local ordinances protecting biological resources apply to the project.

Under all project alternatives, the project would not conflict with the conservation objectives or acquisition goals of the East County HCP/NCCP.

Mitigation: None required.
Los Vaqueros Reservoir Expansion Project EIS/EIR, 2011

Figure 4.6-28

East Contra Costa HCP/NCCP Acquisition Analysis Zones

SOURCE: USGS, 1993 (base map); ECCHCP, 2007; and ESA, 2008
Impact 4.6.18: Project construction would not make a cumulatively considerable contribution to cumulative effects on special-status species and habitats. (Less than Significant)

**Alternative 1**

As discussed throughout this section, expansion of the Los Vaqueros Reservoir under Alternative 1 would result in both temporary and permanent effects on biological resources in southeastern Contra Costa County. Most of the project impacts on biological resources would occur within CCWD’s Los Vaqueros Watershed. Reservoir expansion would inundate an additional 1,000 acres of habitat, mostly grasslands, and represents the majority of the permanent impact the project would have on biological resources. Other projects in the region would also contribute to the incremental loss of biological resources habitat. As identified in Section 4.1, Approach to the Environmental Analysis, these projects include the Cecchni Ranch development in Discovery Bay, Discovery Bay/Bryon Wastewater Treatment Plant Upgrade, Alternative Intake Project, Zone 7 Altamont Water Treatment plant and Pipeline, DWR South Bay Aqueduct Enlargement Project, and Mountain House Community in northwestern San Joaquin County. Environmental analysis is either underway or completed for most of these projects, and several are presently under construction.

Although the Los Vaqueros Reservoir Expansion Project would result in permanent loss of habitat, mitigation measures have been identified to reduce these effects to less than significant levels. As discussed in Section 4.6.3, CCWD proposes to implement a comprehensive biological resources mitigation program that integrates land acquisition, restoration, enhancement, and long-term preservation and management to compensate for project impacts on biological resources. The existing Los Vaqueros Watershed is an example of CCWD’s effective mitigation for the original reservoir project and the District’s resource management has provided a net benefit for some habitats and biological resources. The mitigation program for the Los Vaqueros Reservoir Expansion Project would be designed to complement the habitat and species conservation goals and principles established by the East County HCP/NCCP. Implementation of this mitigation program would significantly advance the goals of the East County HCP/NCCP by securing, enhancing, and protecting both a substantial amount of additional biological resources habitat in the region and habitat in strategic locations that can provide valuable linkages among other conservation areas in the region. Given the scope of the mitigation program to be implemented for this project to address effects on biological resources, the effects of the project are considered less than significant after mitigation and the project would not make a cumulatively considerable contribution to potential cumulative effects on biological resources and habitat in the region.

One impact of the project is considered to be significant and unavoidable—the loss of the potential kit fox movement corridor in the grassland area west of the existing reservoir (Impact 4.6.7). This grassland area would be inundated as a result of reservoir expansion. While use of this potential movement corridor has not been documented, because the grassland is suitable habitat for the kit fox, loss of this grassland is considered significant and unavoidable. No other project planned or proposed in the region would also affect this specific potential movement corridor, so no cumulative impact to the corridor would occur.
Elsewhere in the region, other projects within the Diablo Hills and eastern Contra Costa County area that may contribute to the permanent or temporary loss of grassland habitat and effects to San Joaquin kit fox habitat or movement corridors include the Zone 7 Altamont Water Treatment Plant and Pipeline, which would result in the permanent loss of fewer than 40 acres of annual grasslands habitat near the terminus of Dyer Road in Alameda County. This project is not expected to affect kit fox movement corridors and does not appreciably impact habitat for this species. The California Department of Water Resources South Bay Aqueduct Enlargement Project, presently under construction in northern Alameda County, will temporarily affect about 60 acres of annual grasslands habitat in the northern range of the kit fox, and will permanently impact about 25 acres of habitat to accommodate Dyer Reservoir. The SR 4 Highway Widening Project would have only a minor, temporary impact on kit fox habitat and movement.

The Mountain House Community in northwestern San Joaquin County is near the foot of the Diablo Range north of Interstate 205. This phased, 5,000-acre residential and commercial development project, which is identified in the San Joaquin County Multiple Species Habitat Conservation Plan, occupies annual grasslands and former agricultural lands that presumably provided moderate to high habitat values for San Joaquin kit foxes. This project could present a barrier to north-south kit fox movement through agricultural portions of the Valley floor. The environmental reviews conducted for the Mountain House Specific Plan considered direct project effects upon occupied kit fox denning and foraging habitat; however, effects to movement corridors were not identified (County of San Joaquin, 2008). Because the Los Vaqueros Reservoir Project is over 10 miles from the Mountain House Community, and would not affect the same area of potential kit fox movement, the two projects would not result in a significant cumulative impact to kit fox movement corridors.

The implementation of Alternative 1 would not conflict with a land use plan adopted for the purpose of avoiding or mitigating a significant environmental effect, or with an applicable HCP or NCCP.

**Alternative 2**

Cumulative effects for this alternative would be the same as those described for Alternative 1.

**Alternative 3**

Cumulative effects for this alternative would be the same as those described for Alternative 1, although fewer facilities would be developed under Alternative 3 compared to Alternative 1.

**Alternative 4**

Cumulative effects for this alternative would be similar to those described for Alternative 1, although fewer facilities would be developed under Alternative 4 compared to Alternative 1.

**Mitigation**

Implementation of measures identified throughout this section to address project effects on terrestrial biological resources would also reduce the project’s contribution to cumulative...
effects to a less-than significant level (4.6.1a, 4.6.1b, 4.6.2a, 4.6.2b, 4.6.3a, 4.6.3b, 4.6.4a, 4.6.4b, 4.6.5, 4.6.6a, 4.6.6b, 4.6.7a, 4.6.7b, 4.6.7c, 4.6.8a, 4.6.8b, 4.6.9a, 4.6.9b, 4.6.10a, 4.6.10b, 4.6.11, 4.6.12a, 4.6.12b, 4.6.14, 4.6.15a, and 4.6.15b). These measures would mitigate both direct and indirect impacts of the project alternatives.

**Impact Significance after Mitigation:** Less than Significant.

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### 4.6.3 Comprehensive Biological Resources Mitigation and Compensation Program

**Introduction**

This section summarizes the comprehensive biological resource mitigation and compensation program that is being developed in consultation with federal and state resource agencies to satisfy both the mitigation requirements identified in this EIS/EIR and the anticipated permit requirements. The following discussion summarizes project impacts on biological resources (plant communities, wetlands, and special-status species habitats) presented in Section 4.6.2, describes the habitat compensation requirements (acreage) to address these impacts, outlines the principles that will guide project mitigation, and summarizes the findings regarding the availability of suitable land for acquisition to meet the projected requirements for habitat compensation.

Previous and ongoing analyses indicate that suitable lands are available to meet project mitigation needs and show that project objectives are consistent with and complementary to the mitigation goals and strategies put forward under the East County HCP/NCCP approved in July 2007. Like the HCP/NCCP, this program provides a comprehensive framework for species and ecosystem conservation that addresses short- and long-term conservation needs. The proposed mitigation strategy for the project identifies the following:

- Key wildlife and habitat types affected by the project
- Individual species that are members of the plant or wildlife communities that depend on the impacted habitat types
- CALFED habitat compensation guidelines (CALFED, 2000)
- Habitat compensation and conservation opportunities that may be available outside of the watershed

Key factors in identifying suitable mitigation lands include the scarcity of the habitat type, ability to restore or enhance as habitat, and importance to regional conservation due to the strategic location or the particular importance of the lands as habitat for a sensitive status species (e.g., expanding contiguous habitat/corridors or protecting key habitat areas that are subject to isolation or substantial modification). Acquisitions of these types of lands would also comprehensively provide a net long-term benefit to biological resources in the project region beyond the current, pre-project conditions. These goals set by CCWD are also consistent with the MSCS (CALFED, 2000).
Summary of Potential Impacts and Mitigation Requirements

**Impacts**

Tables 4.6-17, 4.6-18, and 4.6-19 summarize project impacts to CALFED/NCCP habitat types and associated special-status species that require compensatory mitigation under the various project alternatives.

The general habitat types that would be affected by the project are:

- **Grassland habitat**, which includes upland vegetation communities dominated by introduced and native annual and perennial grasses and forbs, including nonirrigated and irrigated pasturelands. Under Alternatives 1 and 2, the project would impact 1,505.6 acres of grasslands habitat, which provide habitat for San Joaquin kit foxes, California tiger salamanders, and California red-legged frogs. Portions of the impacted in-watershed acreage also support Alameda whipsnakes. Lesser impacts were identified under Alternative 3 (1,354.7 acres) and Alternative 4 (819.1 acres) (see Tables 4.6-17, 4.6-18, and 4.6-19).

- **Valley Oak Woodland and Riparian habitat**, which includes all successional stages of woody vegetation commonly dominated by willow, Fremont cottonwood, valley oak, or western sycamore within the active and historical floodplains of low-gradient reaches of streams and rivers; also, non-riparian forest, woodland, and savanna of valleys and foothills commonly dominated by valley oak, blue oak, interior live oak, coast live oak, and foothill pine. Alternatives 1, 2, and 3 would impact 163.3 acres of Valley Oak Woodland and Riparian habitat, all within the watershed, which provides habitat for San Joaquin kit foxes, California tiger salamanders, and California red-legged frogs. Portions of the impacted acreage also support Alameda whipsnakes. Alternative 4 would impact 34.3 acres of Valley Oak Woodland and Riparian habitat (see Tables 4.6-17, 4.6-18, and 4.6-19).

- **Upland Scrub habitat**, which includes habitat dominated by shrubs characteristic of coastal scrub and chaparral scrub communities. The majority of the scrub habitat within the watershed is chaparral and may include California sagebrush, chamise, wedgeleaf ceanothus, and common manzanita. Under Alternatives 1, 2, and 3, the project would impact 7.0 acres of Upland Scrub habitat, which provides primary habitat for Alameda whipsnakes, and may also support dispersing California tiger salamanders and California red-legged frogs. Impacts under Alternative 4 are 6.7 acres (see Tables 4.6-17, 4.6-18, and 4.6-19).

Seasonal construction constraints presented by terrestrial biological resources (California red-legged frogs and breeding birds, including golden eagles and Swainson’s hawks) are summarized in Table 4.6-20.

**Mitigation Requirements**

The amount of habitat to be acquired for mitigation purposes outside of the watershed is guided by measures identified in the MSCS (CALFED, 2000) and input provided during ongoing strategic planning meetings with CDFG and USFWS staff. The mitigation requirements presented in Tables 4.6-17, 4.6-18, and 4.6-19 present both low and high compensation ratios, resulting in a range of potentially required mitigation lands for each habitat type. For example, the MSCS identifies that Upland Scrub habitat shall be replaced at a mitigation ratio between 2:1 (mitigation
### TABLE 4.6-17
HABITAT IMPACTS AND MITIGATION SUMMARY, ALTERNATIVES 1 AND 2

<table>
<thead>
<tr>
<th>HABITAT TYPE a</th>
<th>HABITAT IMPACTS (ACRES)</th>
<th>Impacted Nonconservation Lands</th>
<th>Impacted CDFG Kit Fox Conservation Lands</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Temporary</td>
<td>Long-Term Temporary</td>
</tr>
<tr>
<td>Grasslands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Watershed (supports SJKF, CTS, and CRLF; some AWS)</td>
<td>Temporary</td>
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<tr>
<td>Out-of-Watershed (supports SJKF, CTS, and CRLF)</td>
<td>Subtotal</td>
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<tr>
<td></td>
<td>Total Grassland Impact: 1,505.6 acres</td>
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<td></td>
</tr>
<tr>
<td>Valley Oak Woodland and Riparian</td>
<td>Supports SJKF, CTS, CRLF, and AWS</td>
<td>Temporary</td>
<td>28.6</td>
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<tr>
<td></td>
<td>Total Valley Oak Woodland and Riparian Impact: 163.3 acres</td>
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<td></td>
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<tr>
<td>Upland Scrub (In-Watershed)</td>
<td>Primarily AWS habitat, also CTS and CRLF</td>
<td>Temporary</td>
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</tr>
<tr>
<td></td>
<td>Total Upland Scrub Impact: 7.0 acres</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### MITIGATION AND COMPENSATION SUMMARY b

<table>
<thead>
<tr>
<th>HABITAT TYPE a</th>
<th>HABITAT IMPACTS (ACRES)</th>
<th>Impacted Nonconservation Lands</th>
<th>Impacted CDFG Kit Fox Conservation Lands</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Temporary</td>
<td>Long-Term Temporary</td>
</tr>
<tr>
<td>Annual Grasslands</td>
<td>Habitat Compensation Ratio Ranges for San Joaquin Fox. Mitigation also compensates for habitat losses for CRLF and CTS</td>
<td>1:1 to 1.1:1</td>
<td>1:1 to 2:1</td>
</tr>
<tr>
<td>Grasslands Compensation Acreage Required</td>
<td>282.6 to 310.9</td>
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<td>537.1 to 1,611.3</td>
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<td>Total Grassland Mitigation Requirement: 1,505.6 to 3,939.0 acres</td>
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<tr>
<td>Oak Woodlands and Riparian Habitat</td>
<td>Oak Woodland and Riparian Conservation Required, Low (2:1) to High (3:1)</td>
<td>57.2 to 85.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Total Oak Woodland and Riparian Mitigation Requirement: 326.6 to 489.9 acres</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upland Scrub</td>
<td>Upland Scrub Conservation Acreage Required: Low (2:1) to High (5:1)</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total Upland Scrub Mitigation Requirement: 14.0 to 34.8 acres</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

a SJKF = San Joaquin kit fox; CTS = California tiger salamander; CRLF = California red-legged frog; AWS = Alameda whipsnake

b Compensation ratios shown are from CALFED MSCS, 2000, Table D.
<table>
<thead>
<tr>
<th>HABITAT TYPE</th>
<th>HABITAT IMPACTS (ACRES)</th>
<th>HABITAT IMPACTS (ACRES)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Impacted Nonconservation Lands</td>
<td>Impacted CDFG Kit Fox Conservation Lands</td>
</tr>
<tr>
<td></td>
<td>Temporary</td>
<td>Long-Term</td>
</tr>
<tr>
<td>Grasslands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Watershed (supports SJKF, CTS, and CRLF; some AWS)</td>
<td>15.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Out-of-Watershed (supports SJKF, CTS, and CRLF)</td>
<td>115.9</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>131.7</strong></td>
<td><strong>0.0</strong></td>
</tr>
<tr>
<td><strong>Total Grassland Impact:</strong></td>
<td><strong>1,354.7 acres</strong></td>
<td></td>
</tr>
<tr>
<td>Valley Oak Woodland and Riparian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supports SJKF, CTS, CRLF, and AWS</td>
<td>28.6</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total Valley Oak Woodland and Riparian Impact:</strong></td>
<td><strong>163.3 acres</strong></td>
<td></td>
</tr>
<tr>
<td>Upland Scrub (In-Watershed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primarily AWS habitat, also CTS and CRLF</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total Upland Scrub Impact:</strong></td>
<td><strong>7.0 acres</strong></td>
<td></td>
</tr>
</tbody>
</table>

**MITIGATION AND COMPENSATION SUMMARY**

<table>
<thead>
<tr>
<th>Habitat Compensation Ratio Ranges for SJKF. Mitigation also compensates for upland habitat losses for CRLF and CTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low: 1:1; High: 3:1</td>
</tr>
<tr>
<td>Grasslands Compensation Acreage Required</td>
</tr>
<tr>
<td>131.7 to 144.9; 0; 537.1 to 1,611.3</td>
</tr>
<tr>
<td><strong>Total Grassland Mitigation Requirement:</strong> 1,354.7 to 3,773.0 acres</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oak Woodland and Riparian Conservation Required, Low (2:1) to High (3:1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oak Woodland and Riparian Habitat</td>
</tr>
<tr>
<td>57.2 to 85.8; 0.0; 162.2 to 243.3</td>
</tr>
<tr>
<td><strong>Total Oak Woodland and Riparian Mitigation Requirement:</strong> 326.6 to 489.9 acres</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Upland Scrub Conservation Acreage Required: Low (2:1) to High (5:1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0; 0.0; 0.0; 0.6 to 1.5; 0.0; 13.4 to 33.5</td>
</tr>
<tr>
<td><strong>Total Upland Scrub Mitigation Requirement:</strong> 14.0 to 34.8 acres</td>
</tr>
</tbody>
</table>

a SJKF = San Joaquin kit fox; CTS = California tiger salamander; CRLF = California red-legged frog; AWS = Alameda whipsnake
b Compensation ratios shown are from CALFED MSCS, 2000, Table D.
TABLE 4.6-19
HABITAT IMPACTS AND MITIGATION SUMMARY, ALTERNATIVE 4

<table>
<thead>
<tr>
<th>HABITAT TYPE(^a)</th>
<th>Impacted Nonconservation Lands</th>
<th>Impacted CDFG Kit Fox Conservation Lands</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Temporary</td>
<td>Long-Term</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Temporary</td>
</tr>
<tr>
<td>Grasslands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Watershed (supports SJKF, CTS, and CRLF; some AWS)</td>
<td>19.2</td>
<td>0.0</td>
</tr>
<tr>
<td>Out-of-Watershed (supports SJKF, CTS, and CRLF)</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Subtotal</td>
<td>19.2</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Total Grassland Impact: 819.1 acres

<table>
<thead>
<tr>
<th>Valley Oak Woodland and Riparian</th>
<th>Impacted Nonconservation Lands</th>
<th>Impacted CDFG Kit Fox Conservation Lands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supports SJKF, CTS, CRLF, and AWS</td>
<td>13.6</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Total Valley Oak Woodland and Riparian Impact: 34.3 acres

<table>
<thead>
<tr>
<th>Upland Scrub (In-Watershed)</th>
<th>Impacted Nonconservation Lands</th>
<th>Impacted CDFG Kit Fox Conservation Lands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primarily AWS habitat, also CTS and CRLF</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Total Upland Scrub Impact: 6.7 acres

MITIGATION AND COMPENSATION SUMMARY\(^b\)

<table>
<thead>
<tr>
<th>Annual Grasslands</th>
<th>Habitat Compensation Ratio Ranges for SJKF Mitigation also compensates for upland habitat losses for CRLF and CTS. Low 1:1:1 High 3:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grasslands Compensation Acreage Required</td>
<td>19.2 to 21.1 0.0 348.2 to 1,044.6</td>
</tr>
</tbody>
</table>

Total Grassland Mitigation Requirement: 819.1 to 2,420.8 acres

<table>
<thead>
<tr>
<th>Oak Woodlands and Riparian Habitat</th>
<th>Oak Woodland and Riparian Conservation Required, Low (2:1) to High (3:1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27.2 to 40.8 0.0 0.0 7.6 to 11.4 0.0 41.4 to 62.1 NA</td>
</tr>
</tbody>
</table>

Total Oak Woodland and Riparian Mitigation Requirement: 76.2 to 114.3 acres

<table>
<thead>
<tr>
<th>Upland Scrub</th>
<th>Upland Scrub Conservation Acreage Required: Low (2:1) to High (5:1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.0 0.0 0.3 to 1.5 0.0 12.8 to 32.0 NA</td>
</tr>
</tbody>
</table>

Total Upland Scrub Mitigation Requirement: 13.1 to 33.5 acres

\(^a\) SJKF = San Joaquin kit fox; CTS = California tiger salamander; CRLF = California red-legged frog; AWS = Alameda whipsnake

\(^b\) Compensation ratios shown are from CALFED MSCS, 2000, Table D.
### TABLE 4.6-20
SEASONAL CONSTRUCTION CONSTRAINTS FROM TERRESTRIAL BIOLOGICAL RESOURCES

<table>
<thead>
<tr>
<th>Species</th>
<th>Constraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>California red-legged frog (Impact 4.6.4)</td>
<td>Work within or next to aquatic breeding habitat will be conducted between May 1 and November 1. Activities below Los Vaqueros Dam and in the Inlet/Outlet Pipelines construction area that affected aquatic breeding habitat, including Kellogg Creek, shall be initiated during this period and may thereafter continue year-round.</td>
</tr>
<tr>
<td>Breeding birds (Impacts 4.6.8, 4.6.9, and 4.6.12)</td>
<td>For all breeding birds during the breeding season:</td>
</tr>
<tr>
<td></td>
<td>For work during the breeding season (February 1 through August 31), specific measures would be applied to avoid impacts to nesting raptors and MBTA birds species to include:</td>
</tr>
<tr>
<td></td>
<td>• Preconstruction surveys</td>
</tr>
<tr>
<td></td>
<td>• Establishment of buffer zones around active nests as follows</td>
</tr>
<tr>
<td></td>
<td>- 250 feet for passerine bird nests and 500 feet for raptor nests</td>
</tr>
<tr>
<td></td>
<td>- 250 feet for active burrowing owl nests</td>
</tr>
<tr>
<td></td>
<td>- 0.25-mile buffer zone around Swainson’s hawk nests between March 15 and September 15</td>
</tr>
<tr>
<td></td>
<td>- 500 foot buffer for golden eagles between March 1 and August 15 (or initiate work at specific sites outside the nesting period)</td>
</tr>
<tr>
<td></td>
<td>For burrowing owls only during the non-breeding season:</td>
</tr>
<tr>
<td></td>
<td>For work within suitable habitat during the nonbreeding season (September 1 through January 31) the following mitigation is required for burrowing owls:</td>
</tr>
<tr>
<td></td>
<td>• Preconstruction surveys</td>
</tr>
<tr>
<td></td>
<td>• Establishment of 160-foot buffer zones around occupied burrows</td>
</tr>
</tbody>
</table>

The approach used in this analysis to compensate for anticipated impacts to these habitat types is to acquire and manage large areas of comparable habitat outside of the watershed but within eastern Contra Costa County and Alameda County. However, for habitats such as valley/foothill riparian and wetlands, mitigation efforts would most likely consist primarily of restoration and enhancement of existing habitats within the watershed.

Note that the mitigation for San Joaquin kit fox (grasslands) habitat will likely extend beyond Contra Costa County into northeastern Alameda County because of the special habitat considerations for the species, as well as to provide a greater regional conservation benefit. The prioritization of mitigation lands for acquisition shall consider factors other than just acreage, such as the Recovery Plan for kit foxes, connectivity between habitats (i.e., linkage and movement), current species’ range, and other data to maximize benefits to the species. It is likely that land acquisition will concentrate on strategic locations within the region, generally north of Interstate 580, within or next to the Altamont Hills that advance the conservation and recovery objectives of this species. Lands just south of Interstate 580 that provide habitat benefits to maintain north-south habitat continuity are also eligible for consideration.
## TABLE 4.6-21
ACREAGE OF HABITATS IDENTIFIED FOR ACQUISITION

<table>
<thead>
<tr>
<th>Habitat Affected (Acres)a</th>
<th>Conservation Ratiosb</th>
<th>Acreage of Conservation Habitat Needed for Alts 1 and 2</th>
<th>Acreage of Conservation Habitat Needed for Alt 3</th>
<th>Acreage of Conservation Habitat Needed for Alt 4</th>
<th>Acresd of Habitat on Private Lands Identified within Eastern Contra Costa County</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Low Ratio</td>
<td>High Ratio</td>
<td>Low Estimate</td>
<td>High Estimate</td>
</tr>
<tr>
<td>Grassland</td>
<td>1,505.6</td>
<td>819.1</td>
<td>1:1 temp</td>
<td>1:1 temp</td>
<td>1,505.6</td>
</tr>
<tr>
<td>Valley/Foothill Riparian</td>
<td>2.8 temp/0.9 perm</td>
<td>Same as Alt. 1</td>
<td>2:1</td>
<td>3:1</td>
<td>7.4</td>
</tr>
<tr>
<td>Valley/Foothill</td>
<td>BLO: 114.3/9.0 at mit. sites</td>
<td>Same as Alt 1</td>
<td>2:1</td>
<td>3:1</td>
<td>BLO: 246.6</td>
</tr>
<tr>
<td>Woodland and Forest (BLO = blue oak, VO = valley oak)</td>
<td>VO: 31.6 perm/128.0 at mit. sites</td>
<td>2:1</td>
<td>3:1</td>
<td>BLO: 246.6</td>
<td>BLO: 369.3</td>
</tr>
<tr>
<td>Upland Scrub</td>
<td>7.0</td>
<td>6.7</td>
<td>2:1</td>
<td>5:1</td>
<td>14.0</td>
</tr>
<tr>
<td>Total</td>
<td>1,847.0</td>
<td>842.6</td>
<td>2:1</td>
<td>5:1</td>
<td>2,092.8</td>
</tr>
</tbody>
</table>

a Calculated from maximum potential impacts.
b Specifies a quantitative mitigation factor identified in the MSCS (CALFED, 2000) Table D.
c Acres on private lands identified in East Contra Cost County HCP/NCCP study area. Includes all riparian habitats, woodlands on parcels with 20 acres or more of habitat, upland scrub with 20 acres or more of habitat, and grasslands with 40 acres or more of habitat.
d Does not include lands identified in northeastern Alameda County that are presently under analysis.

mit. = mitigation
perm = permanent
temp = temporary
The East County HCP/NCCP identified suitable core habitat for kit foxes and potential primary movement routes within the watershed as well as areas surrounding the watershed that connect existing protected lands as part of the species’ conservation strategy (East County HCPA, 2006). USFWS has also identified “satellite” populations at the northern extent of the San Joaquin kit fox’s range in Contra Costa County that may include Herdlyn Watershed, south of Los Vaqueros Watershed, and Round Valley Regional Preserve, north of Los Vaqueros Watershed (Larsen, pers. comm.). The range of this species in the northern portion of its range is presented in Figure 4.6-11.

The Recovery Plan for Upland Species of the San Joaquin Valley has further identified as primary recovery actions the protection of existing habitat for federally and state-listed San Joaquin kit foxes in the northern portion of its range and protection of existing San Joaquin kit fox connections between habitat in Contra Costa County and habitat farther south (USFWS, 1998). Therefore, acquiring lands within Alameda County and the HCP/NCCP Planning area would provide additional opportunities to further maintain local and regional kit fox corridors and contribute toward the species’ recovery.

Mitigation Lands Opportunities

Private lands for potential acquisition for conservation and enhancement purposes were identified using a combination of existing plans and policies, aerial photography, field surveys, and GIS analyses. Private lands include those properties that are not under the ownership of any municipalities or public agencies. For example, all state and county parks, water district and flood control district lands, schools, and federal lands are considered public lands and are excluded from this designation.

To quantify potentially available lands by habitat type, East County HCP/NCCP electronic data were compared with CALFED NCCP habitat designations for consistency of habitat designations.

The East County HCP/NCCP identified and prioritized potential habitat acquisition areas that would meet the goals of its plan. These habitat areas were mapped as existing within public or private lands using the Contra Costa County parcel database information. Then, using satellite imagery taken from 2005 and 2006, ESA, Inc. updated the HCP information to exclude habitat on private lands that had been developed since the HCPs inception. Then, to determine the acreage of potentially available lands, the private lands data were queried to include parcels containing the following: habitat areas greater than or equal to 20 acres for valley/foothill woodland and forest and upland scrub habitats; and habitat areas greater than or equal to 40 acres for grassland habitat. Due to the relative scarcity and geography of riparian habitat on the landscape, no minimum acreage was set for this habitat type.

To develop a methodology to prioritize potentially available private lands, field reconnaissance surveys were conducted to corroborate qualitative habitat assessments made using aerial imagery. The goal was to develop a key of habitat characteristics that corresponded to suitable habitat (i.e., comparable to or better than those habitats potentially affected by the project) to prioritize potentially available public lands for acquisition. These surveys focused on valley/foothill woodland and forest, and upland scrub habitats. Grassland and riparian habitats were not surveyed because grasslands are considered to be fairly uniform throughout the region and riparian habitats would most likely
be restored and/or enhanced within the watershed. Examples employing this methodology are included below.

**Grassland**

Land acquisition efforts for grasslands would focus on acquiring comparable or higher quality grassland habitat than that impacted by the project. Grassland habitat, which is the most dominant habit in the watershed, includes upland vegetation communities dominated by introduced and native annual and perennial grasses and forbs, such as nonirrigated and irrigated pasturelands. Grassland covers 12,819 acres, or 77 percent of the watershed (ESA, 2004).

Alternatives 1 and 2 would affect 1,505.6 acres of grassland, Alternative 3 would affect 1,354.7 acres, and Alternative 4 would affect 819.1 acres. A breakdown of temporary versus permanent project effects is presented in Tables 4.6-17, 4.6-18, and 4.6-19. The maximum number of acres required for grassland mitigation under Alternatives 1 and 2 is estimated at 3939.0 acres (see Table 4.6-21). The amount of grassland habitat potentially available for acquisition in Contra Costa County is 26,994 acres—more than 6 times the amount of grassland mitigation lands required. Additional suitable lands are available in Alameda County.

**Valley/Foothill Riparian**

Mitigation efforts for valley/foothill riparian habitat focused on restoration and enhancement of riparian habitat within the watershed. Valley/foothill riparian habitat includes all successional stages of woody vegetation, commonly dominated by willow, Fremont cottonwood, valley oak, or sycamore, within the active and historical floodplains of low-gradient reaches of streams and rivers generally below a 300-foot elevation.

Alternatives 1 through 3 would impact 3.7 acres of valley/foothill riparian habitat (principally cottonwood habitat), and Alternative 4 would impact 0.09 acre of valley/foothill riparian habitat. The maximum number of acres estimated to be required for mitigation of woody riparian habitat would be 11.1 acres.

About 299 acres of valley/foothill riparian habitat have been identified as available for acquisition within eastern Contra Costa County, and 67 acres have been identified as available for restoration and enhancement within the watershed. Mitigation for riparian habitat would primarily involve restoration and enhancement of existing or disturbed habitat within the watershed, and acquisition of riparian habitats as needed to meet potential maximum mitigation requirements.

**Valley/Foothill Woodland and Forest**

Land acquisition efforts for valley/foothill woodland and forest would focus on acquiring comparable or higher quality oak woodland and oak savanna habitats than those impacted by the project. Oak habitat covers 3,010 acres, or 18 percent of the watershed, and is the second most common habitat type within the watershed (ESA, 2004). Oak woodland has relatively dense stands of oaks and may include more shrubs in the understory, while oak savanna characteristically contains fewer and widely spaced individual oak trees with an open canopy and grassland understory.
Alternatives 1, 2, and 3 would permanently impact 114.3 acres of blue oak woodland and forest and 9.0 acres of blue oak mitigation lands, 31.6 acres of valley oak woodland and forest, and 128.0 acres of valley oak mitigation lands. Alternative 4 would permanently impact 17.6 acres of blue oak woodland and forest plus 9.0 acres of blue oak mitigation lands, 31.6 acres of valley oak woodland and forest, and 128.0 acres of valley oak mitigation lands. The maximum number of acres estimated to be required for mitigation of Valley/Foothill Woodland and Forest would be 369.3 acres of blue oak habitat and 478.8 acres of valley oak habitat.

About 12,304 acres, significantly more than the required amount of valley/foothill woodland and forest habitat, have been identified as potentially available for acquisition within eastern Contra Costa County.

**Upland Scrub**

Land acquisition efforts for upland scrub habitat (i.e., chaparral), would focus on acquiring comparable or higher quality chaparral habitat than that impacted by the project. Chaparral habitat comprises about 775 acres, or about 4 percent, of the watershed (ESA, 2004). Within the watershed chaparral habitat generally occurs along ridges and upper slopes as homogeneous patches within oak woodland. Outside of the watershed, chaparral habitat occurs in a similar fashion, usually surrounded by or next to stands of oak woodland. Therefore, it is both logical and preferable to acquire areas of chaparral habitat that are also within suitable stands of oak woodland to preserve general habitat continuity.

Alternatives 1 through 3 would impact 7.0 acres of chaparral habitat, while Alternative 4 would impact up to 6.7 acres. The maximum number of acres required for mitigation of chaparral habitat is estimated at 35 acres. The amount of chaparral habitat potentially available for acquisition is 431 acres, more than 10 times the amount required, and does not include available lands in Alameda County.

**Mitigation Site Selection and Acquisition Priorities**

**Mitigation Land Acquisition Strategy**

For purposes of maximizing habitat value and wildlife benefits, the highest priority sites for acquisition and management would consist of:

- Large contiguous areas of habitat that are both near and distant from development and urban centers that provide key values for San Joaquin kit foxes, but also for California tiger salamanders, California red-legged frogs, and/or Alameda whipsnakes
- Lands next to or near the watershed or other existing land reserves

Large contiguous areas of land are considered to be ideal because they offer a smaller perimeter-to-area ratio and would be less likely to become fragmented. Areas near urban centers or rapidly growing suburbs may be threatened by encroaching development. Similarly, areas far from developed areas and near or next to existing reserves are less likely to be impacted by development and would provide large continuous areas of undisturbed habitat for wildlife.
Strategically located lands in agricultural development may also be considered higher priority for acquisition, either to ensure lands remain in continued agricultural use, or to abate the long-term habitat modification and degradation threats. While these lands may be smaller in size and closer to existing urban lands, they can be considered to be in greater jeopardy than more remote or distant properties.

The selection of acquisition lands would be an ongoing process performed in coordination with multiple parties, including regulatory agencies, land management agencies, and CCWD to develop an acceptable mitigation strategy and approach. Multiple factors would need to be considered when selecting the potential lands for acquisition. Such factors include the habitat suitability in terms of habitat size, continuity, and value to wildlife, particularly endangered species. In addition, the parcels’ proximity to existing preserves and other suitable parcels would be considered.

**Mitigation Site Selection Strategy**

**Habitat Suitability**

The use of aerial imagery and professional judgment would be key to identifying suitable mitigation habitat (i.e., comparable or higher quality than lands potentially impacted). The goal is to develop a methodology of desktop review that can be used to further refine lands potentially available for acquisition that would meet the project’s mitigation needs, not only on a quantitative basis, but on a qualitative basis as well.

Field reconnaissance of oak woodland and chaparral habitats confirms that habitat type, overall habitat quality, the degree of local development, and potential functional values relative to target species can be assessed from aerial photos. It is important to note, however, that this preliminary screening process is an initial tool to identify potentially suitable mitigation lands, and would be ground-truthed to verify site conditions before reaching a recommendation of site acquisition.

To further refine the habitat value of potential mitigation lands for wildlife species, subject parcels would be compared to the value of impacted habitats within the watershed. Baseline data collected within the watershed include an evaluation of habitats for wildlife value using USFWS’ HEP. The HEP is a method of assessing the functional value of a habitat for a representative species for that habitat using specific habitat criteria. Using the HEP would help further prioritize mitigation land acquisition in the next steps.

**Conclusions**

The mitigation program continues to be refined in consultation with the resource agencies to address project effects on biological resources. Evaluation of land within the eastern county region shows that the acreage of land identified in eastern Contra Costa County for potential acquisition greatly exceeds the compensatory needs of the Los Vaqueros Reservoir Expansion Project. Lands that are presently under analysis in Alameda County further bolster the available pool of mitigation lands.