

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

The U.S. Fish and Wildlife Service (USFWS) administers the Federal Endangered Species Act (FESA) (16 U.S. Code [USC] 153 et seq.), the Migratory Bird Treaty Act (MBTA) (16 USC 703–711), the Bald Eagle Protection Act (16 USC 668), and the Fish and Wildlife Coordination Act (16 USC 661-667e).

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.

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. I, 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 is “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.



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

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Figure 4.6-1
Regional Conservation Planning and Public Lands

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.

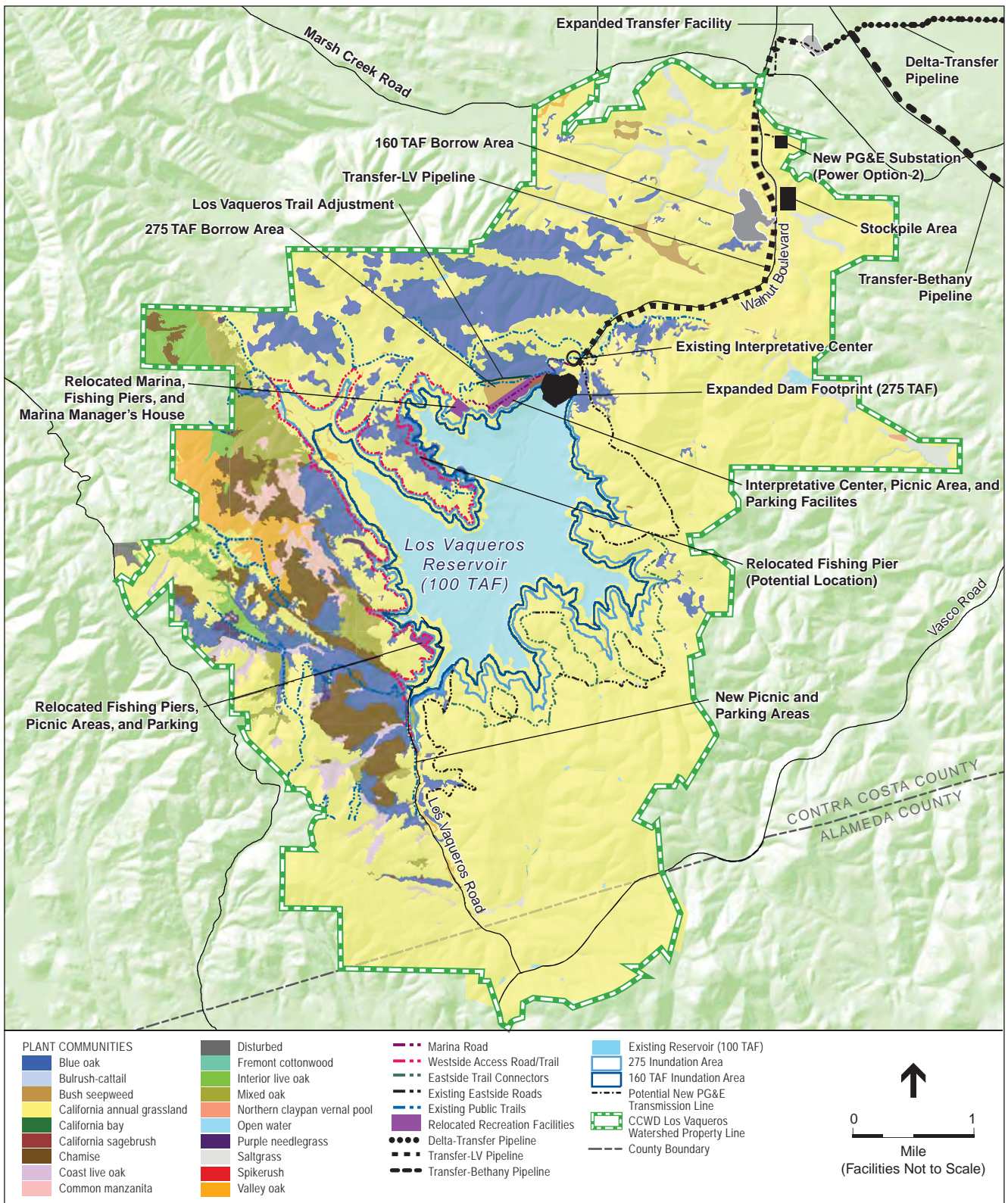
To establish a consistent approach to vegetation and habitat classification throughout the study area, and to be compatible with CALFED Bay-Delta Program guidelines for habitat mitigation, plant community and habitat descriptions are presented for in-watershed and out-of-watershed areas using CALFED 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*).



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

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Figure 4.6-2
Distribution of Plant Communities and Habitats in the Los Vaqueros Watershed

**TABLE 4.6-1
PLANT COMMUNITIES AND HABITATS IN THE LOS VAQUEROS WATERSHED**

NCCP Habitat Types	Acres	Sawyer and Keeler-Wolf Vegetation Series	Acres
Lacustrine	1,489.05	Open water	1,489.05
Nontidal Freshwater Permanent Emergent	54.66	Bulrush-cattail series ^a	50.54
		Spikerush	4.13
Natural Seasonal Wetland	299.95	Northern claypan vernal pool ^a	4.36
		Bush seepweed series ^a	50.27
		Saltgrass series ^{a, b}	245.31
Valley/Foothill Riparian	68.97	Fremont cottonwood series ^a	7.10
		Valley oak series ^a	67.93
Grassland	12,819.17	California annual grassland series	12,790.20
		Purple needlegrass series ^a	28.97
Upland Scrub	775.33	Common manzanita	161.08
		California sagebrush series	17.38
		Chamise series	596.88
Valley/Foothill Woodland Forest	3,008.77	Blue oak series ^a	1,941.10
		Mixed oak series	756.47
		Interior live oak series	122.69
		Coast live oak series	181.64
		California bay series	0.81
Urban/Disturbed	19.12	Disturbed	19.12
Total	18,535.02		18,535.02

^a Classified as "Sensitive" by CDFG and/or CALFED.

^b Includes alkali wetlands and meadow habitats.

SOURCE: ESA unpublished data, 2006-2008

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 (*Artemisia 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 minimus*), 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. platyrhynchos*), 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 blennosperma (*Blennosperma 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 barley (*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.

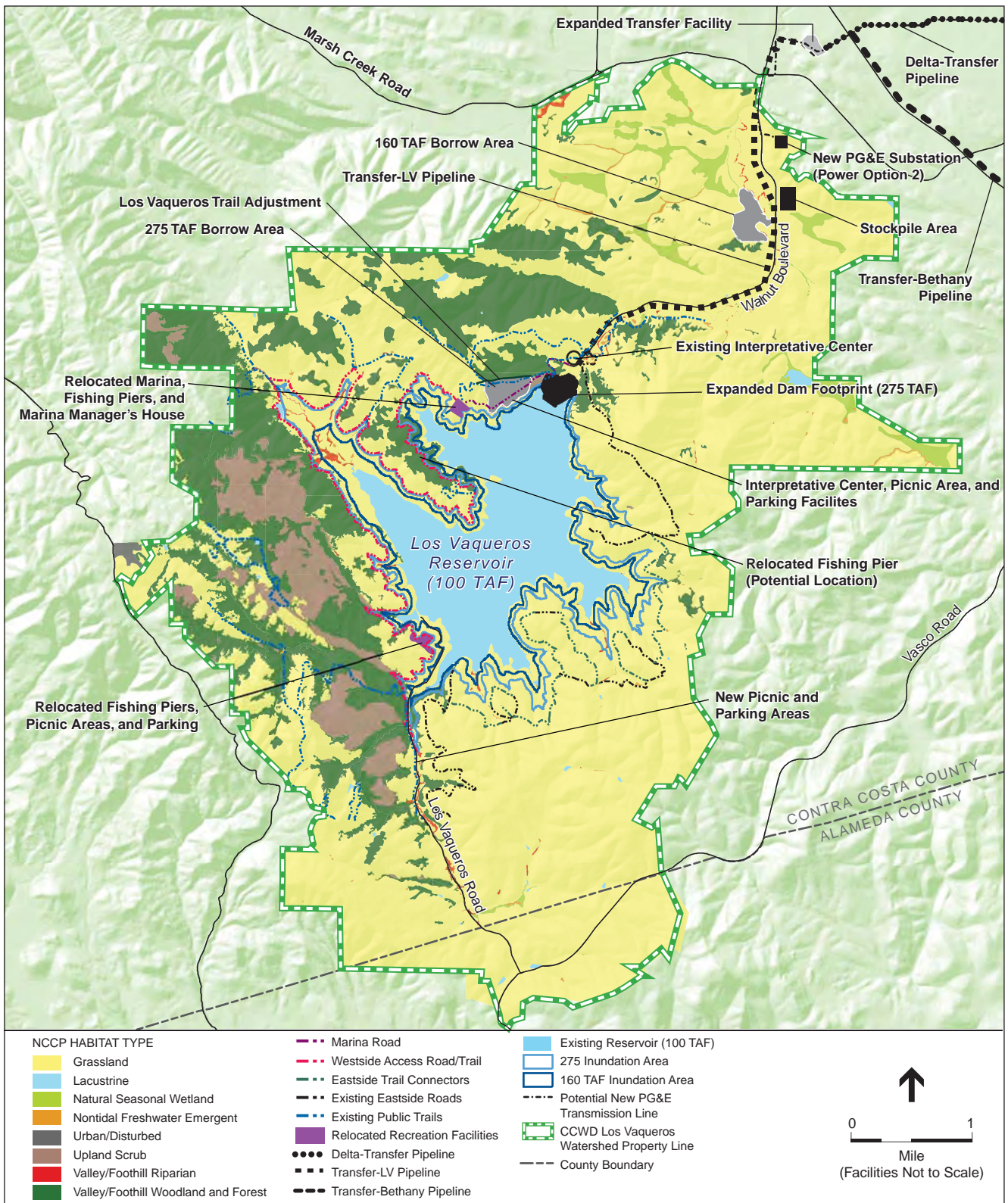
Alkali meadows support wildlife species that are adapted to seasonal ponding and may include the California tiger salamander and vernal pool fairy shrimp.

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



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

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Figure 4.6-3
Distribution of NCCP Habitats in the Los Vaqueros Watershed

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

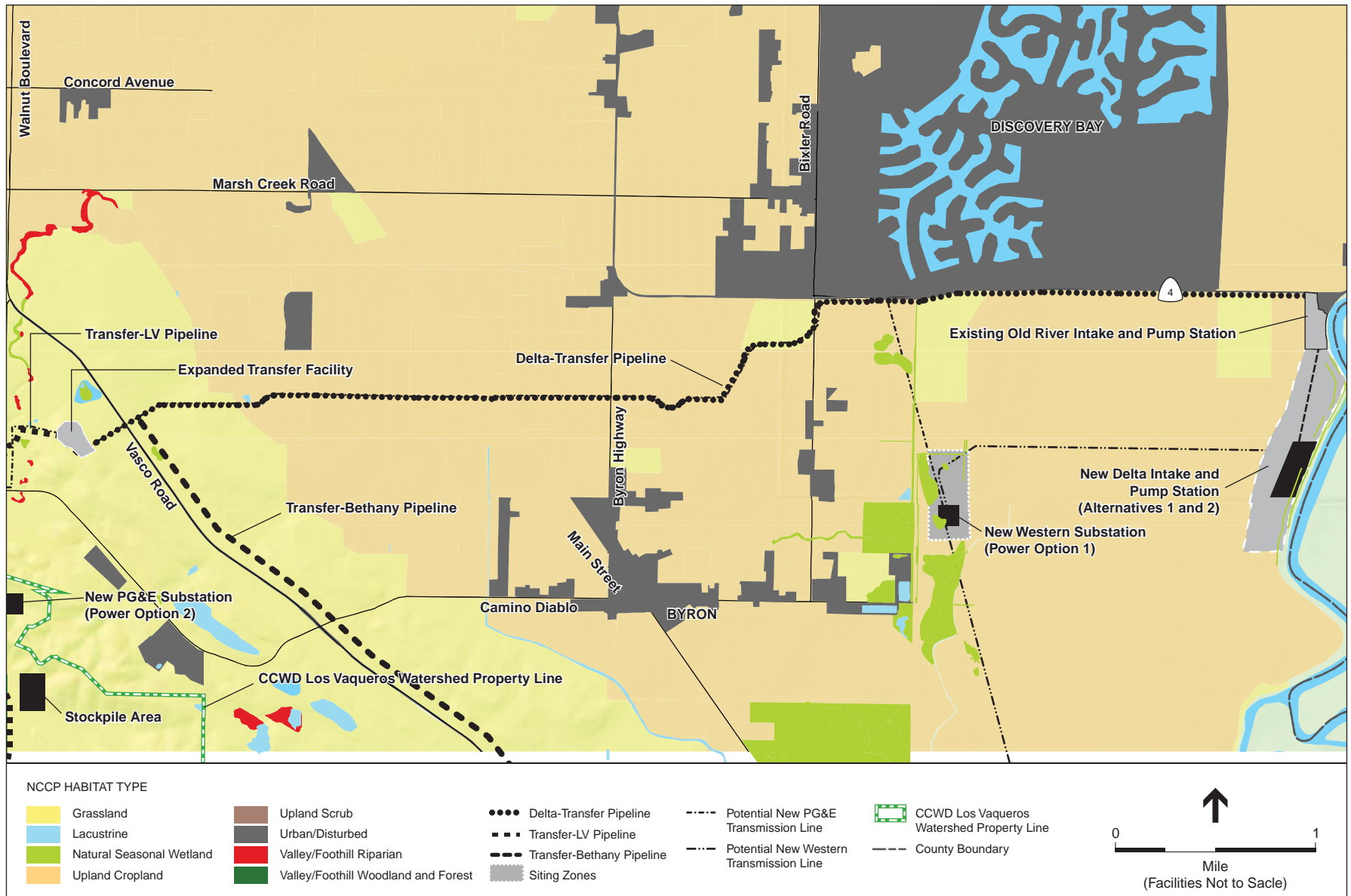
Delta Intake Facilities. The CALFED NCCP habitat types that occur in the new Delta Intake and Pump Station study area along Old River are upland cropland and tidal freshwater emergent (see **Figure 4.6-4** and **Table 4.6-2**).

**TABLE 4.6-2
NCCP PLANT COMMUNITIES/HABITATS TYPES
FOR FACILITIES OUTSIDE OF THE WATERSHED (ACRES)**

NCCP Plant Community/ Habitat Type	Pipelines				Facilities			
	Delta-Transfer	Transfer-LV	Transfer-Bethany	Expanded Old River Intake and Pump Station	New Delta Intake and Pump Station	Expanded Transfer Facility	Power Option 1	Power Option 2
Tidal Freshwater Emergent	0	0	0	0	<0.1	0	0	0
Natural Seasonal Wetland	0	0.01	19.84	0	0	0	0	0
Valley/Foothill Riparian	0	0.01	0	0	0	0	0	0
Grassland	39.38	19.61	154.93	0	0	11.55	2.0	2.0
Valley/Foothill Woodland and Forest	0.13	0	0	0	0	0	0	0
Upland Cropland	113.53	0	0	7.45	22.70	0	0	0

LV = Los Vaqueros]

SOURCE: ESA unpublished data, 2006-2008



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

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Figure 4.6-4
 Distribution of NCCP Habitats in the Vicinity of the
 Delta Intake Facilities, Delta-Transfer Pipeline, and the
 Expanded Transfer Facility

Pipelines. The Delta-Transfer Pipeline, Transfer-LV Pipeline, and Transfer-Bethany Pipeline study areas² 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.

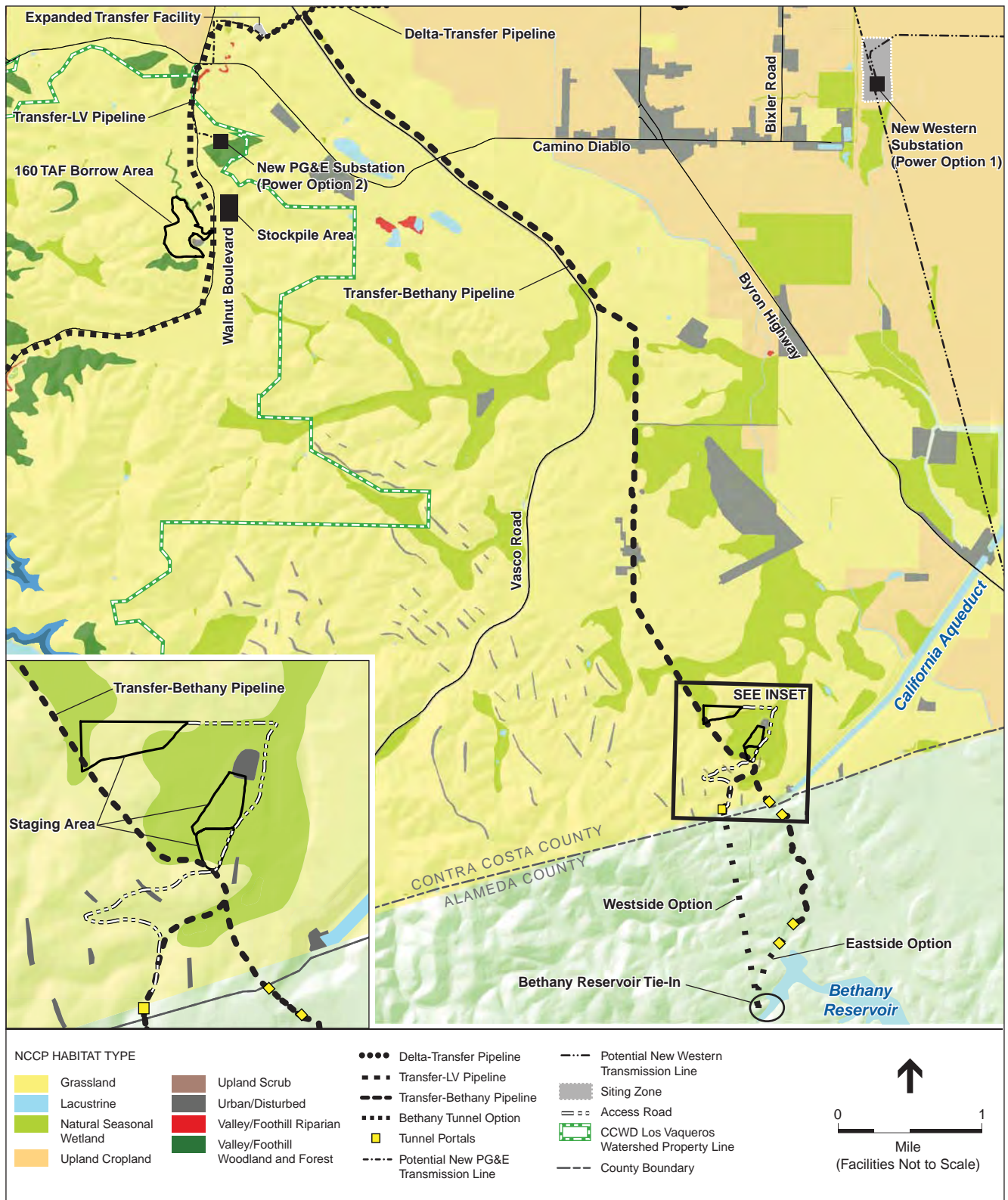
Special-Status Species

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 (CNDDDB) (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.

² The study area is defined as a 500-foot-wide corridor for pipelines and a 150-foot-wide area around the perimeter of facilities.



SOURCE: USGS, 1993; and ESA, 2008

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Figure 4.6-5
 Distribution of NCCP Habitats along the
 Transfer-LV and Transfer-Bethany Pipelines

**TABLE 4.6-3
SURVEY DATES FOR SPECIAL-STATUS PLANTS**

Project Component	Survey Dates	Findings	Pending Surveys
Reservoir Inundation Footprint and Dam and other In-Watershed Facilities ¹	June 3, 4, 10, 11, 14, and 15, 2004; 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	San Joaquin spearscale: 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	None
Delta Intakes and Transfer Station	May 22, 2007; April 23, 2008	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 lilaepsis: 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.	None
Delta-Transfer Pipeline	May 22, 2007	Negative for rare plants	None
Transfer-LV Pipeline	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	Negative for rare plants	None
Transfer-Bethany Pipeline	April 15, 17, and 18, 2008	San Joaquin spearscale: present in portions of alignment	Limited follow-up surveys for heartscale and brittlescale at a few distinct locations
Power Option 1	April 22 and 23, 2008	San Joaquin spearscale 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
Power Option 2	April 22 and 23, 2008	San Joaquin spearscale present in Western powerline alignment and would be spanned by powerlines	Limited follow-up surveys for heartscale and brittlescale at a few distinct locations
160-TAF Borrow Area (Alternative 4) ²	April 23, 2008; August 5, 2008	Negative for rare plants	None

¹ 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.

² 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**

<i>Scientific Name</i> Common Name	Listing Status USFWS/CDFG/ CNPS/ CALFED ³	General Habitat	Potential for Species Occurrence in the Project Area	Period of Identification or Blooming Period	NCCP Habitat Associations
Invertebrates					
FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES					
<i>Branchinecta longiantenna</i> Longhorn fairy shrimp	FE/--/--/m	Rock outcrop pools or other areas capable of ponding water seasonally	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.	Year-round (eggs in dry season, adult shrimp in winter)	NSW (Rock outcrop pools)
<i>Branchinecta lynchi</i> Vernal pool fairy shrimp	FT/--/--/m	Vernal pools or other areas capable of ponding water seasonally	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.	Year-round (eggs in dry season, adult shrimp in winter)	NSW
<i>Desmocerus californicus dimorphus</i> Valley elderberry longhorn beetle	FT/--/--/R	Riparian habitat, levee and riprap lined stream banks containing its host plant, elderberry shrubs (<i>Sambucus</i> spp.)	Present (in-watershed). Elderberry shrubs in the watershed show larval exit holes. Elderberry shrubs are not otherwise present in the project area.	Year round, emergence March-June	VFR, Gr, US, VFW, UC
FEDERAL OR STATE SPECIES OF SPECIAL CONCERN					
<i>Branchinecta mesovallensis</i> Midvalley fairy shrimp	--/--/--/m	Vernal pools or other areas capable of ponding water seasonally	Low-Moderate. Low likelihood of occurrence in created pools on the Transfer-Bethany Pipeline.	Year-round (eggs in dry season, adult shrimp in winter)	NSW
<i>Hygrotus curvipes</i> Curved-foot hygrotus diving beetle	FSC/--/--/--	Drainages, seeps, and wet areas; standing water in ponds or ephemeral pools	Present. Present in stock ponds and drainages in the watershed and likely in intermittent drainages and swales on pipeline routes.	Spring months	NSW
Amphibians					
FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES					
<i>Ambystoma californiense</i> California tiger salamander	FT/CSC/--/--/m	Wintering sites occur in grasslands occupied by burrowing mammals; breed in ponds and vernal pools	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.	Winter rains and March-April	NFE, NSW, VFR, Gr, VFW

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

<i>Scientific Name</i> Common Name	Listing Status USFWS/CDFG/ CNPS/CALFED	General Habitat	Potential for Species Occurrence in the Project Area	Period of Identification or Blooming Period	NCCP Habitat Associations
Amphibians (cont.)					
FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES (cont.)					
<i>Rana draytonii</i> California red-legged frog	FT/CSC/--/m	Breed in stock ponds, pools, and slow-moving streams	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.	Year-round	NFE, VFR, Gr, VFW
Reptiles					
FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES					
<i>Masticophis lateralis euryxanthus</i> Alameda whipsnake (= Alameda striped racer)	FT/ST/--/m	Coastal ranges, in chaparral and riparian habitat and adjacent grasslands.	Present. Occupied scrub habitat present in the watershed study area. Snakes are expected to use grasslands, woodlands, and other nonscrub habitat in the watershed.	March-November	VFR, Gr, US, VFW
FEDERAL OR STATE SPECIES OF SPECIAL CONCERN					
<i>Actinemys marmorata</i> Western pond turtle	--/CSC/--/m	Lakes, ponds, reservoirs, and slow-moving streams and rivers, primarily in foothills and lowlands	Present. Present in stock ponds and drainages in the watershed and likely in intermittent drainages and swales on pipeline routes.	Year-round	La, NFE, VFR, Gr, US, VFW
<i>Masticophis flagellum ruddocki</i> San Joaquin whipsnake (= coachwhip)	--/CSC/--/m	Open grassland, pasture, and alkali scrub	Present. Presumed present in grasslands in the watershed, on pipeline routes, and at the Expanded Transfer Facility.	March-October	Gr, US, VFW
<i>Phrynosoma coronatum</i> Coast horned lizard	--/CSC/--/--	Valley woodland, coniferous forest, riparian, and grassland habitats; most commonly in sandy washes with scattered shrubs	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.	Year-round	VFR, US, VFW
Birds					
FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES					
<i>Buteo swainsoni</i> Swainson's hawk	--/ST/--	Nests in large trees, often near water, open grasslands, or agricultural lands	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	March-July	VFR, Gr, UC, VFW, NSW, US
<i>Haliaeetus leucocephalus</i> Bald eagle	BEPA-FD/SE-CFP/--/m	Winter foraging at lakes and along major rivers	Low (nesting). The watershed supports active wintering and foraging habitat, but no active nesting	Year-round	La, NFE, VFR, VFW

TABLE 4.6-4 (Continued)
SPECIAL-STATUS SPECIES KNOWN TO OCCUR OR WITH POTENTIAL TO BE AFFECTED BY THE PROJECT

<i>Scientific Name</i> Common Name	Listing Status USFWS/CDFG/ CNPS/CALFED	General Habitat	Potential for Species Occurrence in the Project Area	Period of Identification or Blooming Period	NCCP Habitat Associations
Birds (cont.)					
FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES (cont.)					
<i>Accipiter cooperi</i> Cooper's hawk	--/CSC/--/m	Nests in dense oak and riparian woodland	High. Expected to nest in wooded portions of the watershed and on the Transfer-LV Pipeline and Transfer-Bethany Pipeline.	Year-round	VFR, VFW
<i>Accipiter striatus</i> Sharp-shinned hawk	--/CSC/--/--	Nests in dense stands of conifers and riparian habitats	High. Expected to nest in wooded portions of the watershed and on the Transfer-LV Pipeline and Transfer-Bethany Pipeline.	Year-round	VFR, VFW
<i>Agelaius tricolor</i> Tricolored blackbird	--/CSC/--/m	Nests in freshwater marshes with dense stands of cattails or bulrushes, occasionally in willows, thistles, mustard, blackberry brambles, and dense shrubs and grains	Moderate. Nesting sites available at disjunctive locations in the watershed and on pipeline routes.	Year-round; spring (nesting)	NFE, VFR, Gr, UC
<i>Aquila chrysaetos</i> Golden eagle	BEP/CSC- CFP/--/m	Nests in canyons and large trees in open habitats	Present. Six nesting occurrences reported from the watershed; one in the study area. Potential to occur on Transfer-LV Pipeline	Year-round	Gr, US, VFW
<i>Athene cunicularia hypugea</i> Western burrowing owl	--/CSC/--/m	Nests and forages in low-growing grasslands with burrowing mammals	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.	Year-round	Gr, UC
<i>Asio flammeus</i> Short-eared owl	--/CSC/--/--	Inhabits open fields, meadows, and marshes	High. Nesting habitat present in grasslands in the watershed and on the Delta-Transfer Pipeline, Transfer-LV Pipeline, and Transfer-Bethany Pipeline.	Year-round	Gr, UC
<i>Circus cyaneus</i> Northern harrier	--/CSC/--/m	Ground nester found in grasslands and in adjacent wetlands or upland/wetland areas	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.	Year-round	NFE, NSW, Gr, UC
<i>Elanus leucurus</i> White-tailed (= black shouldered) kite	--/CFP/--/m	Nests in shrubs and trees next to grasslands, forages over grasslands and agricultural lands	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.	Year-round	VFR, Gr, UC
<i>Eremophila alpestris actica</i> California horned lark	--/CSC/--/--	Nests and forages in short-grass prairie, mountain meadow, coastal plain, fallow fields, and alkali flats	High. May nest in short annual grasslands in the watershed and on all pipeline segments.	Year-round	Gr, UC

TABLE 4.6-4 (Continued)
SPECIAL-STATUS SPECIES KNOWN TO OCCUR OR WITH POTENTIAL TO BE AFFECTED BY THE PROJECT

<i>Scientific Name</i> Common Name	Listing Status USFWS/CDFG/ CNPS/CALFED	General Habitat	Potential for Species Occurrence in the Project Area	Period of Identification or Blooming Period	NCCP Habitat Associations
Birds (cont.)					
FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES (cont.)					
<i>Falco mexicanus</i> Prairie falcon	--/CSC/--/--	Inhabits hills, canyons, and mountainous areas with grasslands; nests on cliffs or abandoned raptor nests	Low. Nesting not expected in study area	March-August	Gr, US
<i>Lanius ludovicianus</i> Loggerhead shrike	--/CSC/--/--	Scrub, open woodlands, and grasslands	Moderate. May nest in brush and scrub in the watershed and on all pipeline segments.	Year-round	VFR, Gr, US, VFW
<i>Pandion haliaetus</i> Osprey	--/CSC/--/--	Large bodies of water that produce fish and are surrounded by forested habitats	High. Nesting may occur in watershed. Less likely elsewhere in project area.	Year-round	VFR, Gr, UC
Mammals					
FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES					
<i>Vulpes macrotis mutica</i> San Joaquin kit fox	FE/ST/--/m	Annual grasslands or grassy open areas with shrubs, loose-textured soils for burrows and prey base	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.	Year-round	Gr, US, VFW
FEDERAL OR STATE SPECIES OF SPECIAL CONCERN					
<i>Antrozous pallidus</i> Pallid Bat	--/CSC/--/--	Roosts in buildings, caves, or cracks in rocks	Low-Moderate. Habitat may be available in large trees in the watershed study area, but large rock crevices are generally lacking.	February-August	La, VFR, Gr, US, VFW
<i>Corynorhinus townsendii</i> Townsend's big-eared bat	--/CSC/--/--	Oak and coniferous woodland and arid grasslands. Roosts in caves, buildings, etc.	Low. Habitat may be available in large trees in the watershed study area, but large rock crevices are generally lacking.	April-October	La, VFR, Gr, US, VFW
<i>Eumops perotis californicus</i> Greater western mastiff bat	FSC/CSC/--/--	Breeds in rugged, rocky canyons and forages in a variety of habitats	Low. Habitat may be available in large trees in the watershed study area, but large rock crevices are generally lacking.	February-August	La, VFR, Gr, US, VFW
<i>Myotis ciliolabrum</i> Small-footed myotis bat	FSC/--/--/--	Forages over grasslands and roosts in caves and rock crevices	Low. Habitat may be available in large trees in the watershed study area, but large rock crevices are generally lacking.	February-August	La, VFR, Gr, US, VFW
<i>Myotis evotis</i> Long-eared myotis bat	FSC/--/--/--	Inhabits woodlands and forests up to an approximately 8,200-foot elevation; generally not in Central Valley.	Low. Habitat may be available in large trees and rocks in the watershed study area, but large rock crevices are generally lacking.	February-August	La, VFR, Gr, US, VFW

TABLE 4.6-4 (Continued)
SPECIAL-STATUS SPECIES KNOWN TO OCCUR OR WITH POTENTIAL TO BE AFFECTED BY THE PROJECT

<i>Scientific Name</i> Common Name	Listing Status USFWS/CDFG/ CNPS/CALFED	General Habitat	Potential for Species Occurrence in the Project Area	Period of Identification or Blooming Period	NCCP Habitat Associations
Mammals (cont.)					
FEDERAL OR STATE SPECIES OF SPECIAL CONCERN (cont.)					
<i>Myotis thysanodes</i> Fringed myotis bat	FSC/--/--	Inhabits a variety of habitats including pinyon-juniper woodland, valley-foothill hardwood, hardwood-conifer forests, and desert scrub; generally not in Central Valley	Low. Rock crevice habitat is generally lacking in the watershed study area.	February-August	La, VFR, Gr, US, VFW
<i>Myotis volans</i> Long-legged myotis bat	FSC/--/--	Inhabits forests and woodland habitats, primarily oak and juniper woodlands	Low. Habitat may be available in large trees in the watershed study area, but large rock crevices are generally lacking.	February-August	La, VFR, Gr, US, VFW
<i>Myotis yumanensis</i> Yuma myotis bat	FSC/CSC/--	Open forests and woodlands below 8,000-foot elevation in close association with water bodies	Low. Rock crevice habitat is generally lacking in the watershed study area.	February-August	La, VFR, Gr, US, VFW
<i>Perognathus inornatus inornatus</i> San Joaquin pocket mouse	--/CSC/--	Annual grasslands, saltbush scrub, and oak savannah habitats; usually found in areas with friable soils	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.	Year-round	Gr
<i>Taxidea taxus</i> American badger	--/CSC/--	Dry, open grasslands	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.	Year-round	Gr
Plants					
FEDERAL OR STATE THREATENED AND ENDANGERED SPECIES					
<i>Lasthenia conjugens</i> Contra Costa goldfields	FE/--/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					
<i>Atriplex cordulata</i> 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)
SPECIAL-STATUS SPECIES KNOWN TO OCCUR OR WITH POTENTIAL TO BE AFFECTED BY THE PROJECT

<i>Scientific Name</i> Common Name	Listing Status USFWS/CDFG/ CNPS/CALFED	General Habitat	Potential for Species Occurrence in the Project Area	Period of Identification or Blooming Period	NCCP Habitat Associations
Plants (cont.)					
FEDERAL OR STATE SPECIES OF SPECIAL CONCERN (cont.)					
<i>Atriplex depressa</i> Brittlescale	--/--/1B/m	Alkaline or clay grasslands, chenopod scrub, and playas; occasionally in riparian areas, marshes, or vernal pools	Present in LV watershed. Moderate potential at a few distinct sites on the Transfer-Bethany Pipeline alignment; final survey delayed by site access.	May-October	NSW, Gr
<i>Atriplex joaquiniana</i> San Joaquin spearscale	--/--/1B/m	Alkaline seasonal wetlands and sinks in grasslands, chenopod scrub, and alkali meadows	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.	April-October	NSW, Gr
<i>Hesperolinon breweri</i> Brewer's dwarf-flax (=western flax)	--/--/1B/m	Transition between annual grassland and mixed chaparral; also near woodlands	Present. Portions of one population occur in the watershed study area; absent from other project facilities.	May-July	Gr, US, VFW
<i>Hibiscus lasiocarpus</i> Rose-mallow	--/--/2/m	Tidally influenced coastal and freshwater marsh	Present (New Intake). A population occurs at the site for the new Delta Intake and Pump Station	June-September	NFE
<i>Lilaeopsis masonii</i> Mason's lilaeopsis	--/SR/1B	Tidally influenced coastal and freshwater marsh	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	April-November	TFE

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

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

The following data sources advised the analysis:

- The CNDDDB 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 CNDDDB files associated with discussion with CNDDDB 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
(*Arctostaphylos auriculata*)
- Contra Costa manzanita
(*Arctostaphylos manzanita* ssp. *laevigata*)
- Alkali milk-vetch
(*Astragalus tener* var. *tener*)
- Big tarplant (*Blepharizonia plumosa*)
- Congdon's tarplant
(*Centromadia parryi* ssp. *congdonii*)
- Recurved larkspur
(*Delphinium recurvatum*)
- Round-leaved filaree
(*Erodium macrophyllum*)
- Diamond-petaled California poppy
(*Eschscholzia rhombipetala*)
- Diablo helianthella
(*Helianthella castanea*)
- Rayless ragwort (*Senecio aphanactis*)
- Caper-fruit tropidocarpum
(*Tropidocarpum capparideum*)
- Mt. Diablo fairy lantern
(*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.

Invertebrates

Federal or State Threatened and Endangered Species

Longhorn fairy shrimp (*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 (*Branchinecta lynchi*), 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).

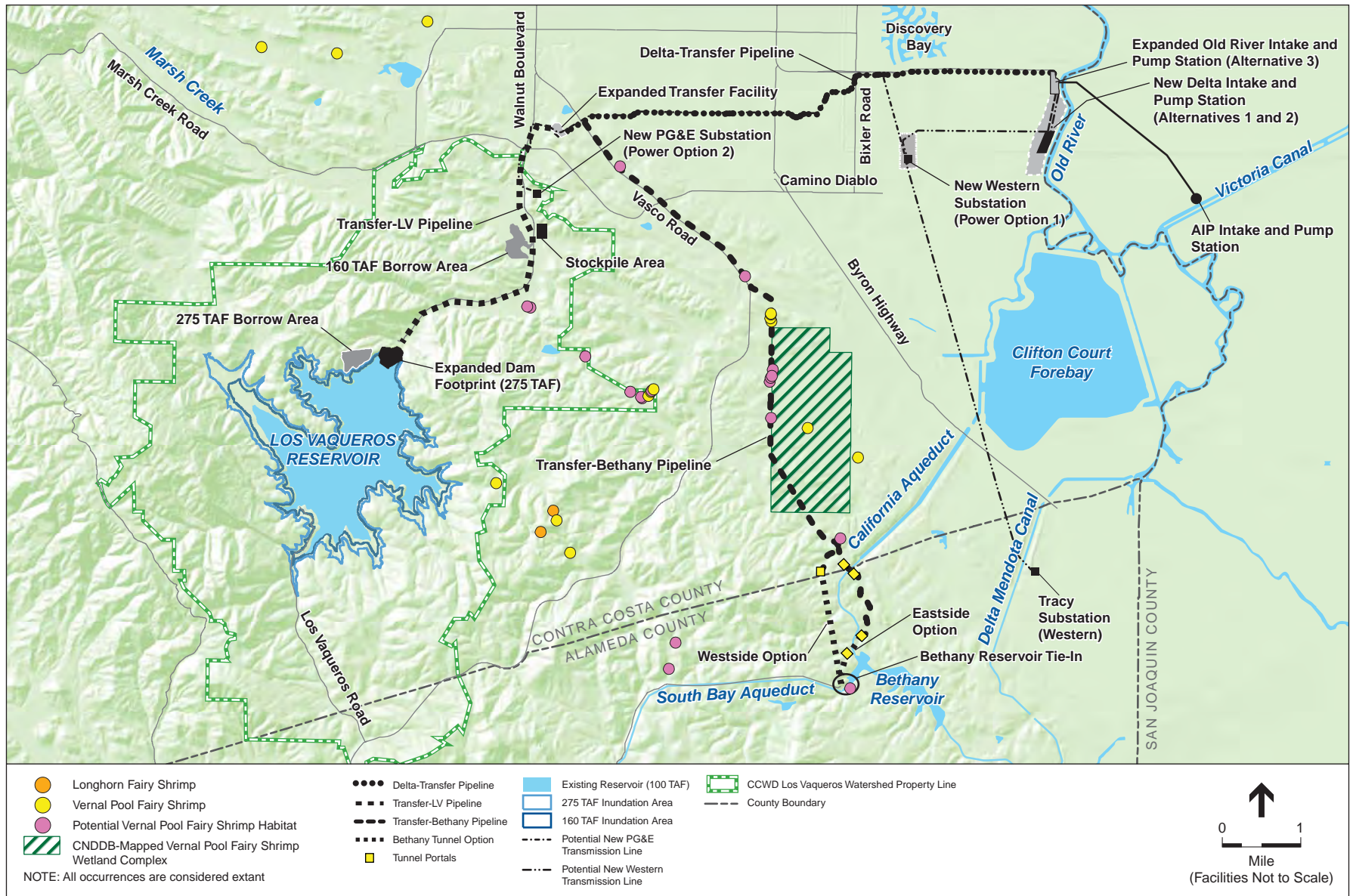
Potential habitat for vernal pool fairy shrimp is present in a single swale on the Delta-Transfer Pipeline. During dip netting surveys in 2008, this species was identified in 4 vernal pools in the Transfer-Bethany Pipeline alignment, with another 12 pools deemed to provide suitable habitat (ESA, 2008a). 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



SOURCE: USGS, 1993 (base map); Jones & Stokes Associates, 1992; and ESA, 2007

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Figure 4.6-6
Listed Vernal Pool Branchiopod Locations in
Project Study Area

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).

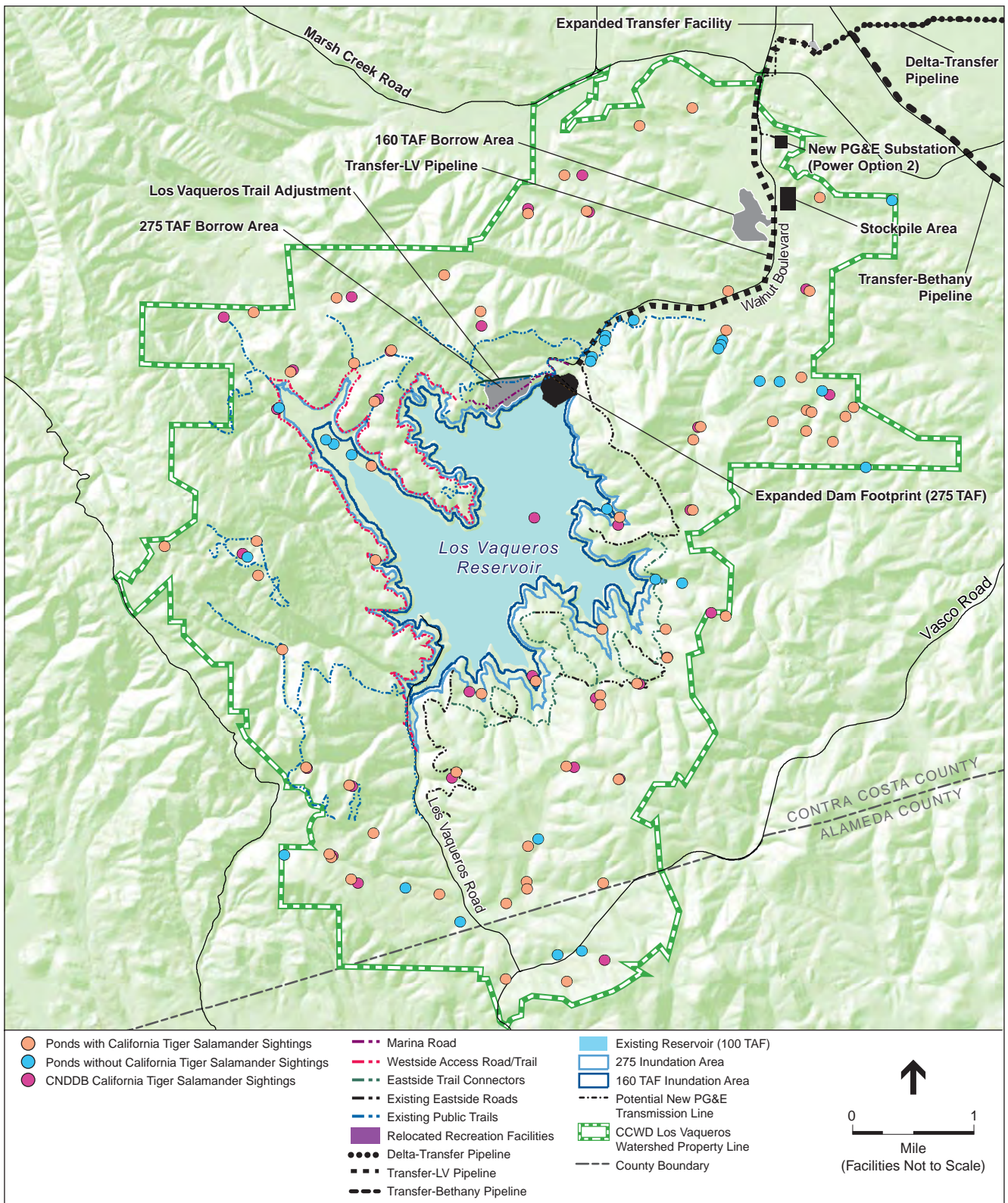
During drought years when ponds do not form, adults may spend the entire year in upland environments, while juveniles may spend 4 to 5 years in their upland burrows before reaching sexual maturity and breeding for the first time (Petranka, 1998; Trenham et al, 2000). Adult tiger salamanders swiftly disperse 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 aestivate⁴ 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.

⁴ Aestivation is a state of dormancy similar to hibernation that occurs during summer and fall.



SOURCE: USGS, 1993 (base map); CNDDB, 2007; and ESA, 2008

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Figure 4.6-7
Distribution of California Tiger Salamander Occurrences in the Los Vaqueros Watershed

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.

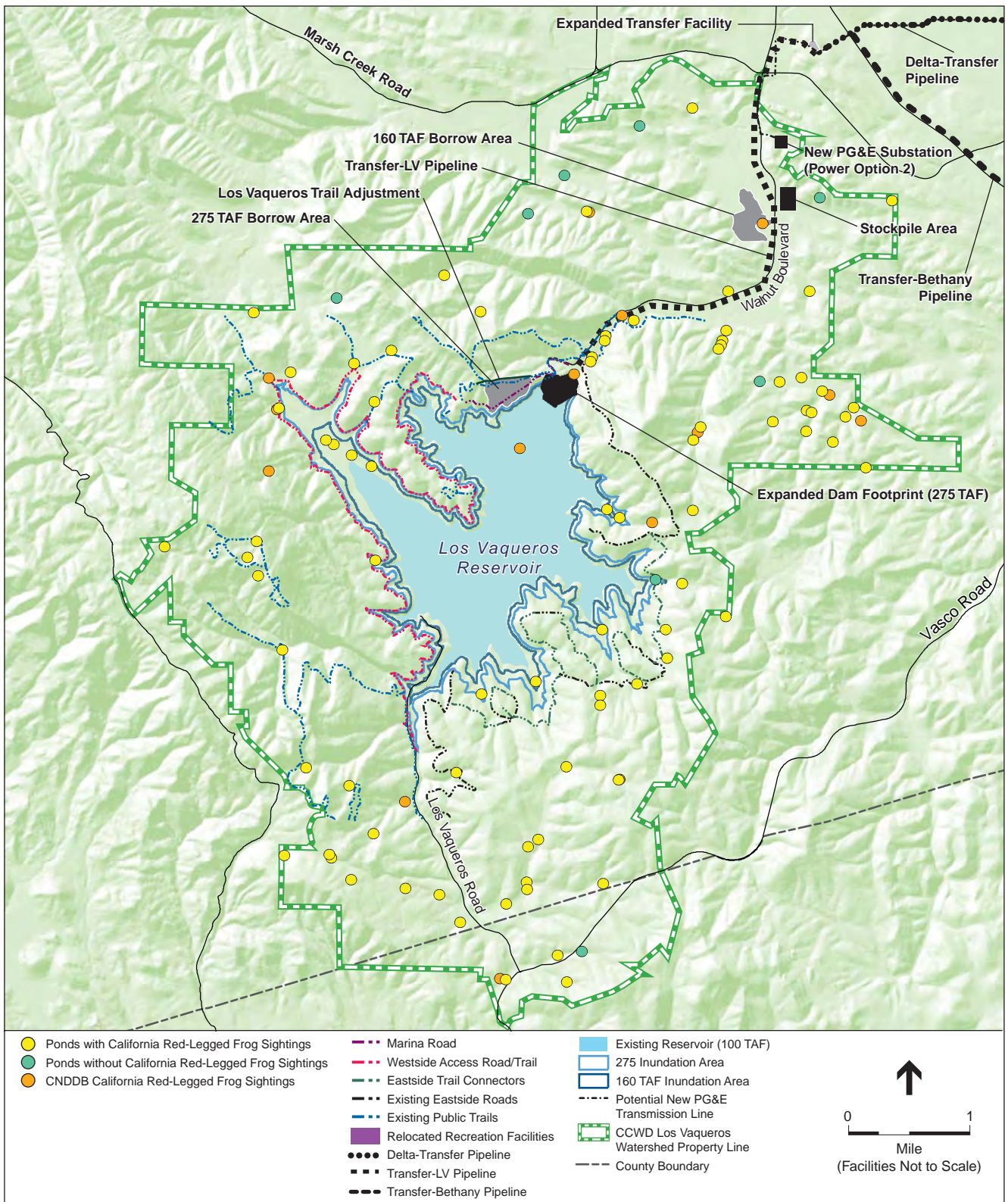
Five California tiger salamander populations are noted within 0.25 mile of the Transfer-Bethany Pipeline (CDFG, 2008), and three additional breeding sites were identified during biological surveys in spring 2008 (B. Pittman, pers. obs.). One known breeding site and four potential breeding sites near 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 CNDDDB 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.



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

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Figure 4.6-8
 Distribution of California Red-Legged Frog Occurrences in the Los Vaqueros Watershed

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 through 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 CNDDDB 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).

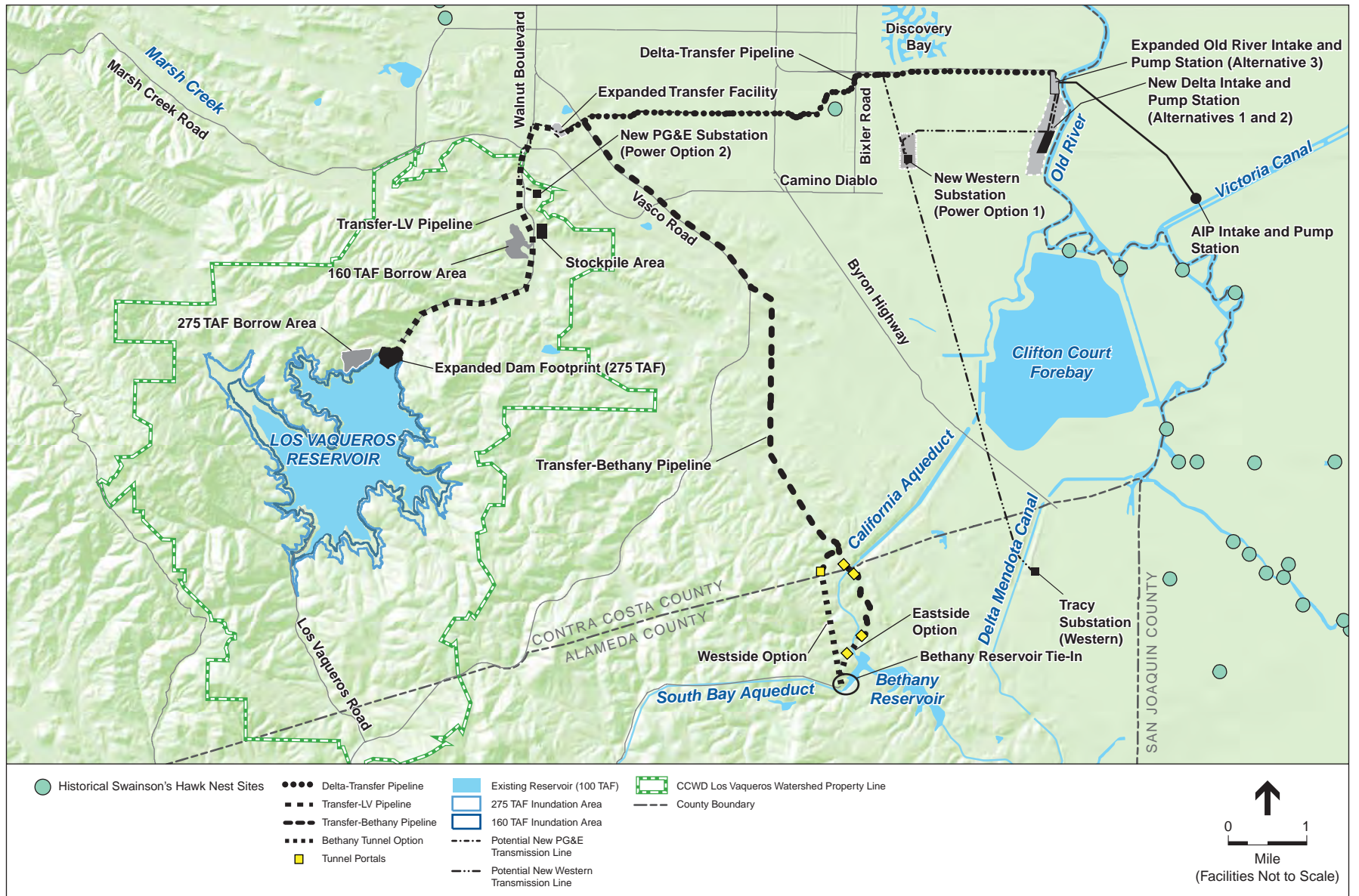
The nearest reported bald eagle nest sites are reported at Del Valle Reservoir in Alameda County, 15 miles southeast of the Los Vaqueros Watershed (CDFG, 2008); and since 2006, bald eagles have also nested at San Pablo Reservoir in Contra Costa County, about 25 miles west of the watershed (CDFG, 2008).

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



SOURCE: USGS, 1993 (base map); Jones & Stokes Associates, 1992; and ESA, 2007

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Figure 4.6-9
Swainson's Hawk Nesting Sites in the
Project Study Area

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 CNDDDB 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 CNDDDB 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.

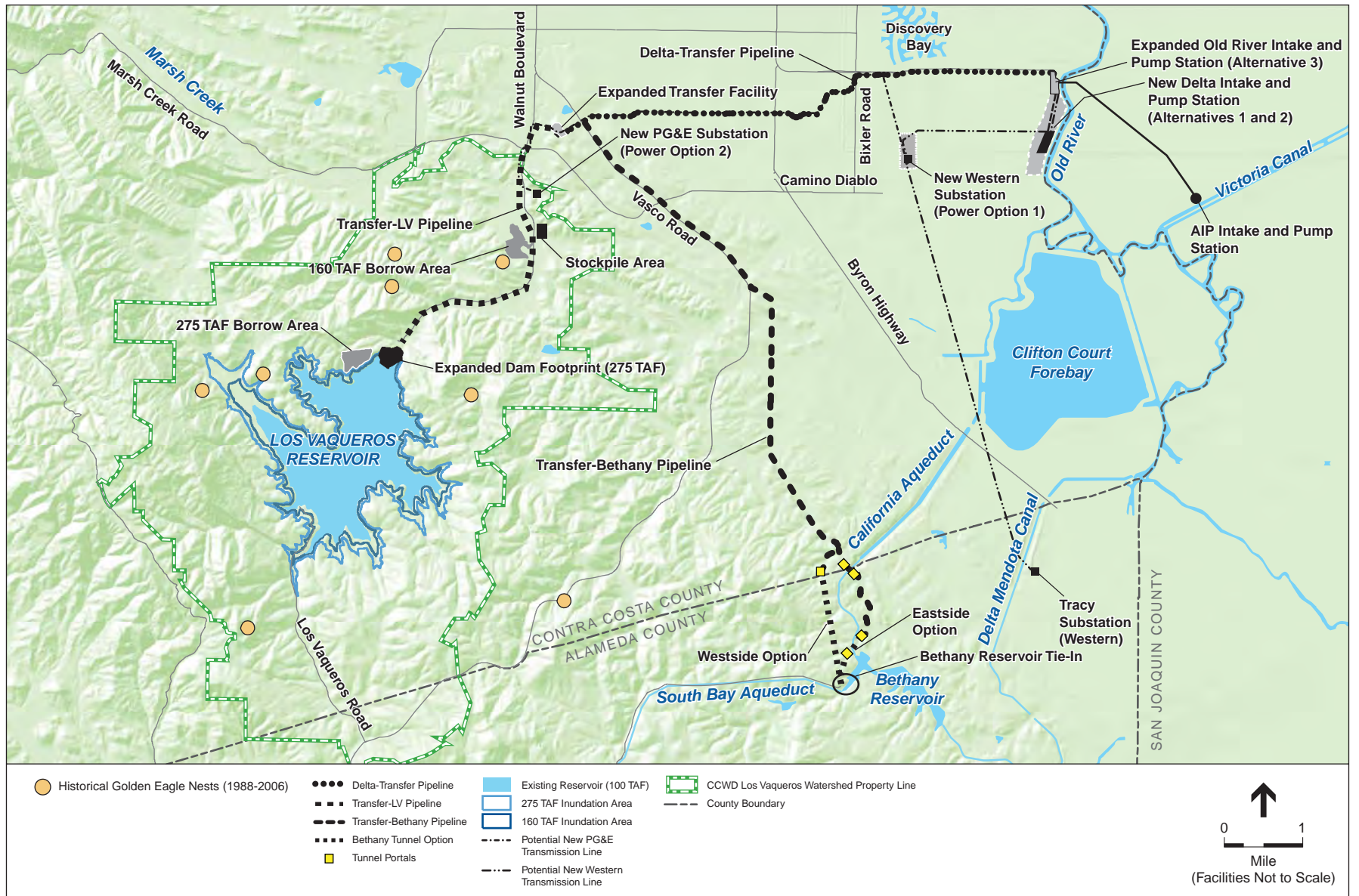
Tricolored blackbird nesting could occur in mustard fields and annual grassland communities on the Western powerline alignment under Power Options 1 and 2, or in association with agricultural drainages on these alignments. Breeding may occur locally to the Western substation siting zone under Power Option 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.



SOURCE: USGS, 1993 (base map); Jones & Stokes Associates, 1992; and ESA, 2007

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Figure 4.6-10
Golden Eagle Nesting Sites in the
Project Study Area

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 CNDDDB 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 CNDDDB 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 CNDDDB 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, CNDDDB, 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 CNDDDB; 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 haliaetus*). 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.

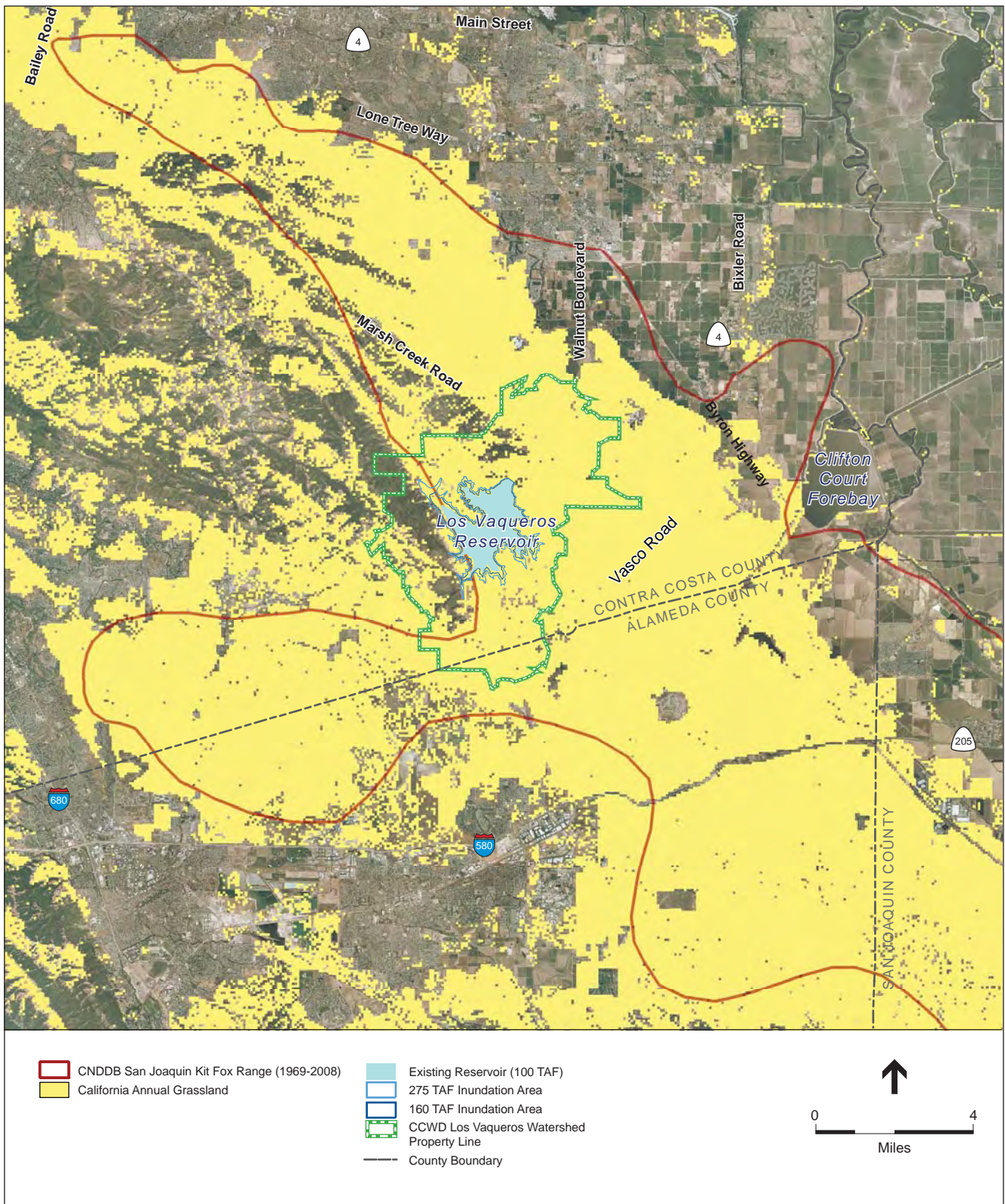
The *Contra Costa County Breeding Bird Atlas* (2005) cites osprey breeding in the watershed and areas east of the watershed. Nesting has been noted in the watershed by CCWD staff and the potential exists that they may breed in oak woodlands or large snags (i.e., dead trees) throughout the watershed.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



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

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Figure 4.6-11
Regional Distribution of
San Joaquin Kit Fox

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 CNDDDB 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 canyons, 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 CNDDDB 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

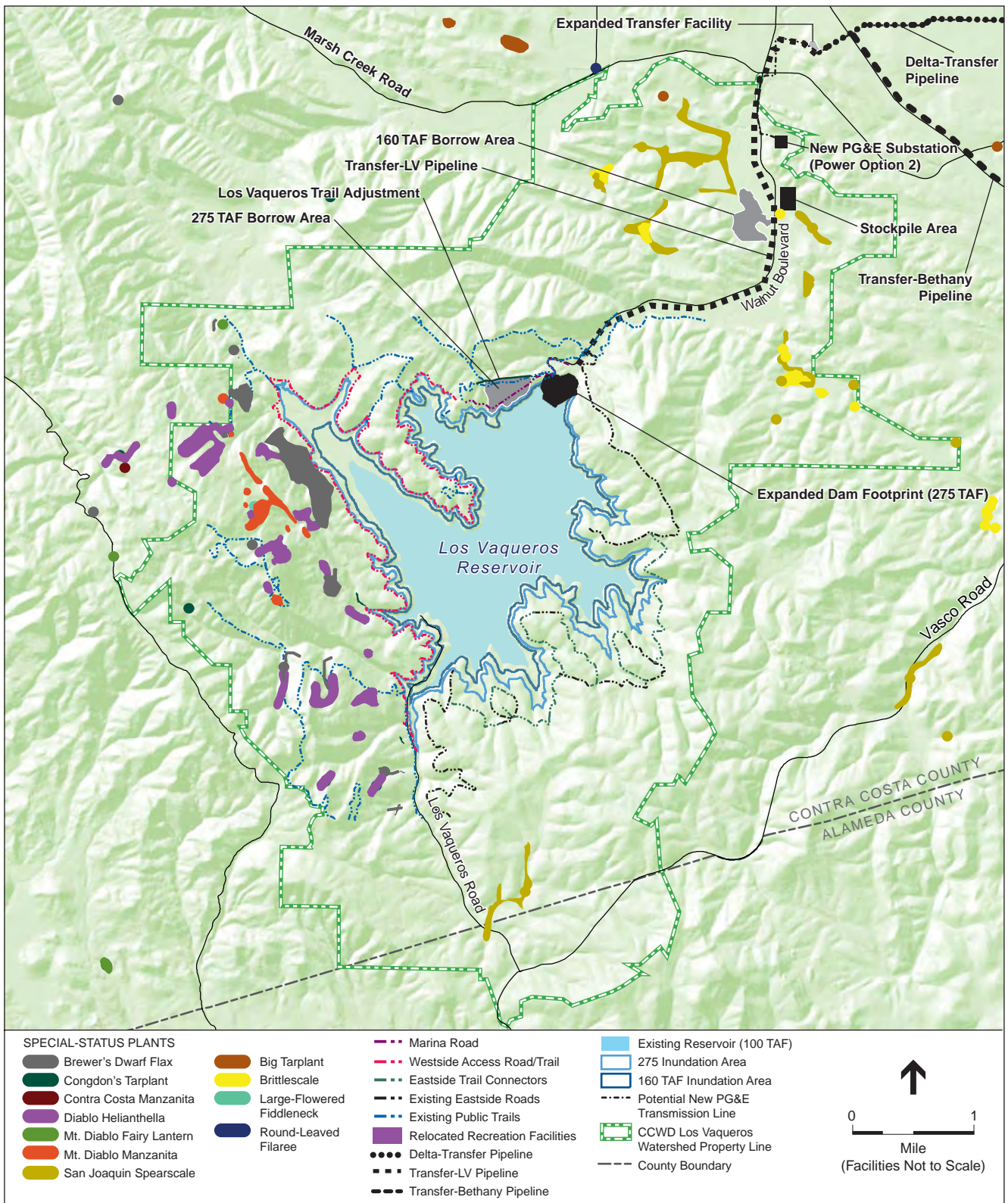
Figures 4.6-12 and 4.6-13 show the known distribution of special-status plants within the watershed and outside the watershed, respectively.

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.

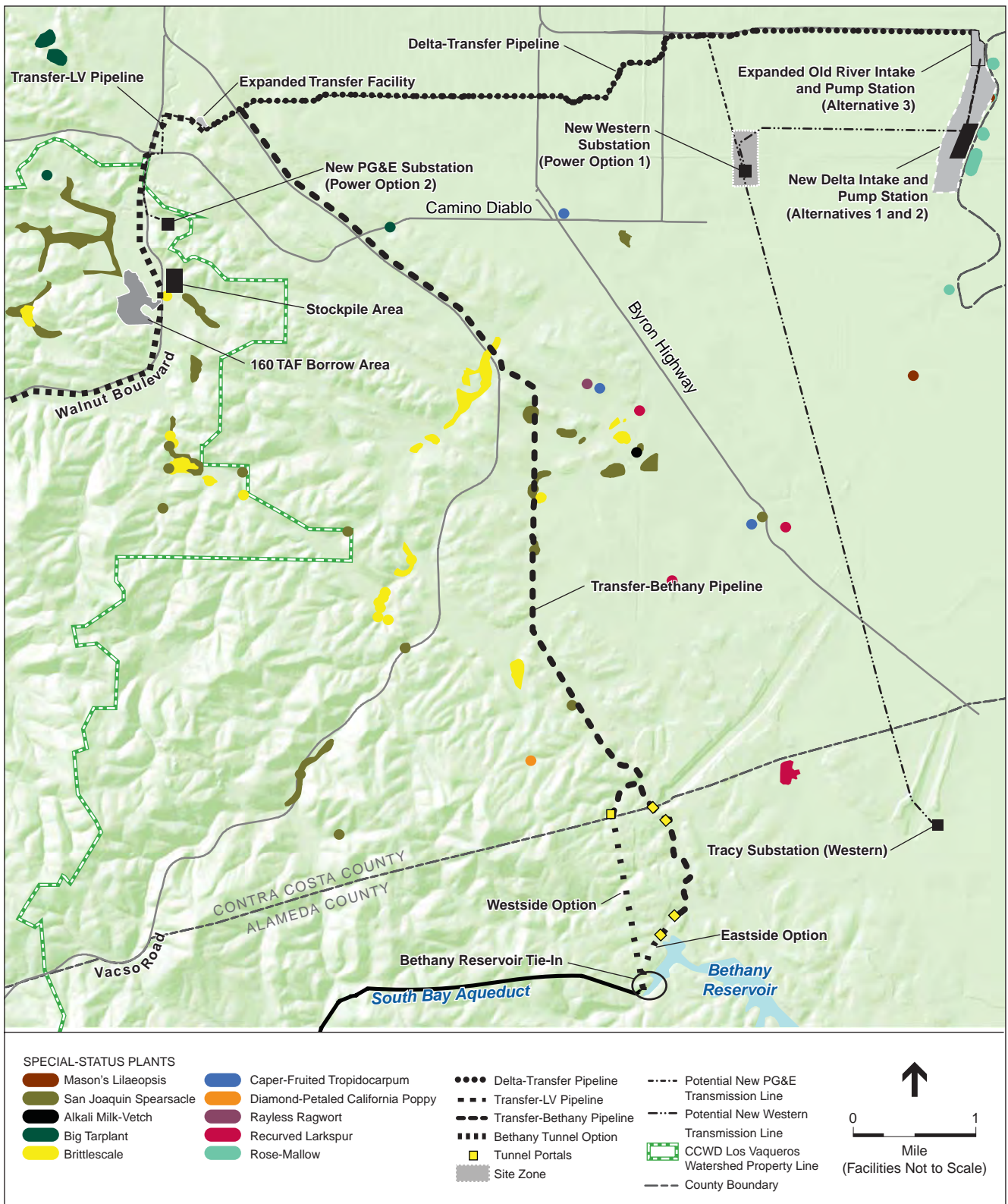
No occurrences of Contra Costa goldfields are known within the watershed, with the nearest occurrence reported 11 miles north of Los Vaqueros Dam (CDFG, 2008). Based on protocol-level survey findings, this species is not expected to occur in the study area for any proposed facilities.



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

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Figure 4.6-12
Distribution of Special-Status Plants in the
Los Vaqueros Watershed



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

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Figure 4.6-13
 Distribution of Special-Status Plants Along Pipeline Routes Outside of the Los Vaqueros Watershed

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 CNDDDB 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 Lilaepsis (*Lilaeopsis masonii*). Mason's lilaepsis 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 lilaepsis 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.