APPENDIX B: HABITAT CONSERVATION PLAN

PUBLIC REVIEW DRAFT

SACRAMENTO MUNICIPAL UTILITY DISTRICT CONSERVATION PLAN

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1 Introduction

The Sacramento Municipal Utility District (SMUD) is applying for an incidental take permit (ITP, or Permit) under Section 10(a)(1)(B) of the federal Endangered Species Act (ESA), and an ITP under state law, pursuant to Section 2081(b) of the California Fish and Game Code and the California Endangered Species Act (CESA). This *SMUD Operations, Maintenance, and New Construction Habitat Conservation Plan* (HCP, or Plan) provides a strategy for protecting threatened and endangered species during the proposed 30-year term of the Permit (Permit Term). The strategy includes avoiding, minimizing, and mitigating for species impacts resulting from SMUD's projects and activities that are covered under the Permit (Covered Activities).

1.1 Purpose

SMUD is applying for ITPs under both ESA and the CESA. The ESA prohibits the take[1] of endangered and threatened species without special exemption. Individuals and state and local agencies proposing an action that is expected to result in the take of federally listed species apply for a Permit under Section 10(a)(1)(B) of the ESA to be in compliance with the law. The U.S. Fish and Wildlife Service (USFWS) may issue such incidental take permits when take is not the intention of, and is incidental to, otherwise legal activities. An application for a federal ITP must be accompanied by an HCP.

Similarly, under Section 2081(b) of the CESA, the California Department of Fish and Wildlife (CDFW) may issue a permit to authorize the take[2] of state-listed species when take is incidental to an otherwise lawful activity and the impacts of the authorized take are minimized and fully mitigated. The application for a state ITP will utilize the information developed for the HCP.

The general purpose of SMUD's HCP is to help conserve (avoid, minimize, and mitigate) Covered Species that may be affected by specific covered SMUD operation and maintenance (O&M) activities and new facility construction activities within the SMUD HCP Permit Area (Permit Area).

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1 The ESA defines *take* as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." The ESA further defines *harass* as: "Harass in the definition of 'take' means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering." The ESA further defines *harm* as: "*Harm* in the definition of 'take' in the Act means an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." (50 Code of Federal Regulations 17.3).

2 California Fish and Game Code (86) defines *take* as to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

1.2 Overview of SMUD

SMUD is a locally controlled not-for-profit municipal utility with more than 70 years of experience as an energy provider. SMUD generates, transmits, and distributes electric power to serve an approximately 900-square-mile service area that includes almost all of Sacramento County and a small portion of Placer County. SMUD also owns and operates 76 miles of natural gas pipeline in Sacramento County and Yolo County that serves four gas-fired cogeneration power plants, transmission line in Placer County, and electrical facilities in small portions of Amador and San Joaquin Counties. SMUD's existing electrical and natural gas pipeline infrastructure requires long-term O&M to deliver reliable electricity. SMUD also owns and operates a 200-mile telecommunication system located on existing electric line poles and towers. For a detailed description of SMUD projects and activities covered by this Plan, see *Covered Activities* in Chapter 2.

1.3 Scope of the SMUD HCP

This section introduces key elements of the HCP: activities proposed to be covered in the Permits, geographic scope of the HCP, Permit Term, and the species proposed for coverage by the Permits (Covered Species).

1.3.1 Covered Activities

Covered Activities as described in detail in Chapter 2 are the O&M activities and construction activities that are analyzed in the HCP for coverage under the ESA and CESA Permits. SMUD operates and maintains electrical and gas utility structures and constructs new electrical facilities and structures to maintain uniform, adequate, safe, and reliable electric service.

SMUD's Covered Activities include O&M activities as well as new construction and conservation strategy implementation.

- **O&M Activities** include inspecting, monitoring, testing, operating, repairing, and replacing facilities (i.e., electrical transmission, subtransmission, and distribution conductors with associated poles and towers and other components; and gas transmission pipelines, valve stations, and ancillary components). They also include emergency repair and replacement of facilities, and vegetation management, including tree trimming.
- **New Construction Activities** include installing new structures to upgrade existing facilities, reconstruction and relocation of electrical and natural gas facilities, installation of new electrical and natural gas facilities, and expansion or construction of new electrical substations.

1.3.2 Conservation Strategy Implementation includes oak tree plantings and habitat management enhancement on the SMUD Bank (SMUD's mitigation bank in the Permit Area). Permit Area and Plan Area

The Permit Area is the area within which SMUD is requesting take authorization from USFWS and CDFW for activities covered by this HCP. The Plan Area is the area within which SMUD will implement conservation to mitigate impacts on Covered Species resulting from the Covered Activities (Figure 1-1).

The Permit Area includes approximately 577,554 acres within Sacramento, Placer, Yolo, Amador, and San Joaquin Counties. The Permit Area includes:

- All of Sacramento County (approximately 566,547 acres), except for the area south of U.S. Highway 160 and Walnut Grove, which extends into the Sacramento-San Joaquin River Delta.
- Portions of southwestern Placer County (approximately 4,000 acres), to which SMUD provides electricity, and a transmission line outside of the area SMUD serves, approximately 17.5 miles long.
- A portion of Yolo County (approximately 4,495 acres) that encompasses the natural gas pipeline between Winters and cogeneration power plants in Sacramento County.
- Small portions of Amador County (approximately 17 acres) and San Joaquin County (approximately 302 acres) located adjacent to Sacramento County.

Figure 1-2 provides an aerial image of the Permit Area.

The Plan Area includes the Permit Area and the following conservation banks and other HCP Plan Areas that SMUD may partner with to accomplish the Conservation Strategy (Figure 1-1).

- Nicholas Ranch VELB Conservation Bank
- River Ranch VELB Conservation Bank
- French Camp VELB Conservation Bank
- Bryte Ranch Conservation Bank
- Clay Station Conservation Bank
- Yolo HCP/NCCP Plan Area
- Western Placer HCP/NCCP Plan Area
- Natomas Basin HCP Plan Area

1.3.3 Permit Term

The Permit Term is the length of time in which ITPs issued by the USFWS and CDFW can be used by SMUD to cover incidental take resulting from the Covered Activities. All conservation actions outlined in the HCP must be completed within the Permit Term. This HCP is a 30-year plan, and SMUD is requesting authorization from USFWS and CDFW for a corresponding 30-year Permit Term. Accordingly, all assessments made in this HCP are based on a 30-year time period. As discussed in Chapter 7, *Implementation*, prior to the expiration of the SMUD HCP and Permits, SMUD may apply to renew or amend the HCP and Permits to include an extension of the Permit Term.

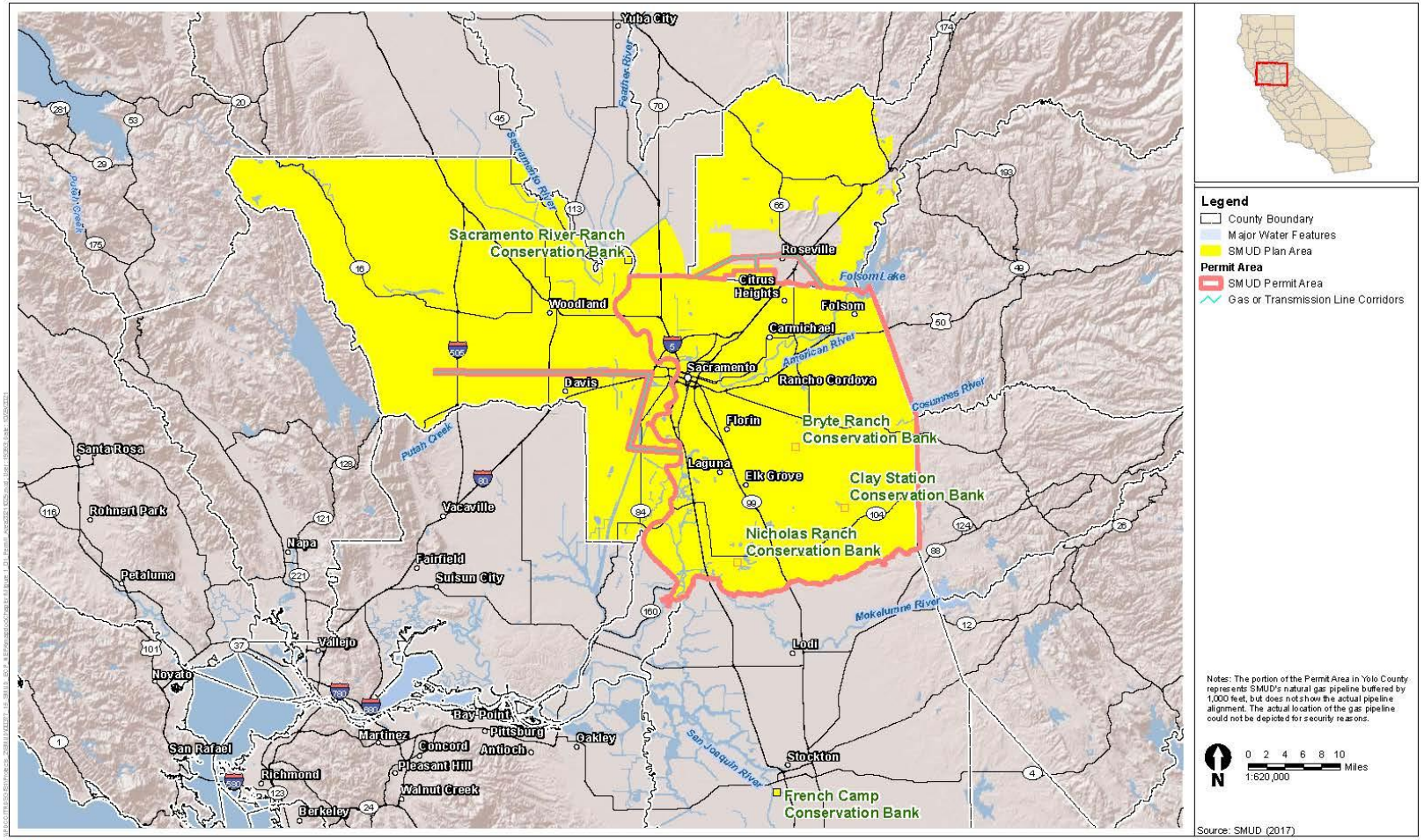

Figure 1-1
Plan Area and Permit Area
SMUD HCP

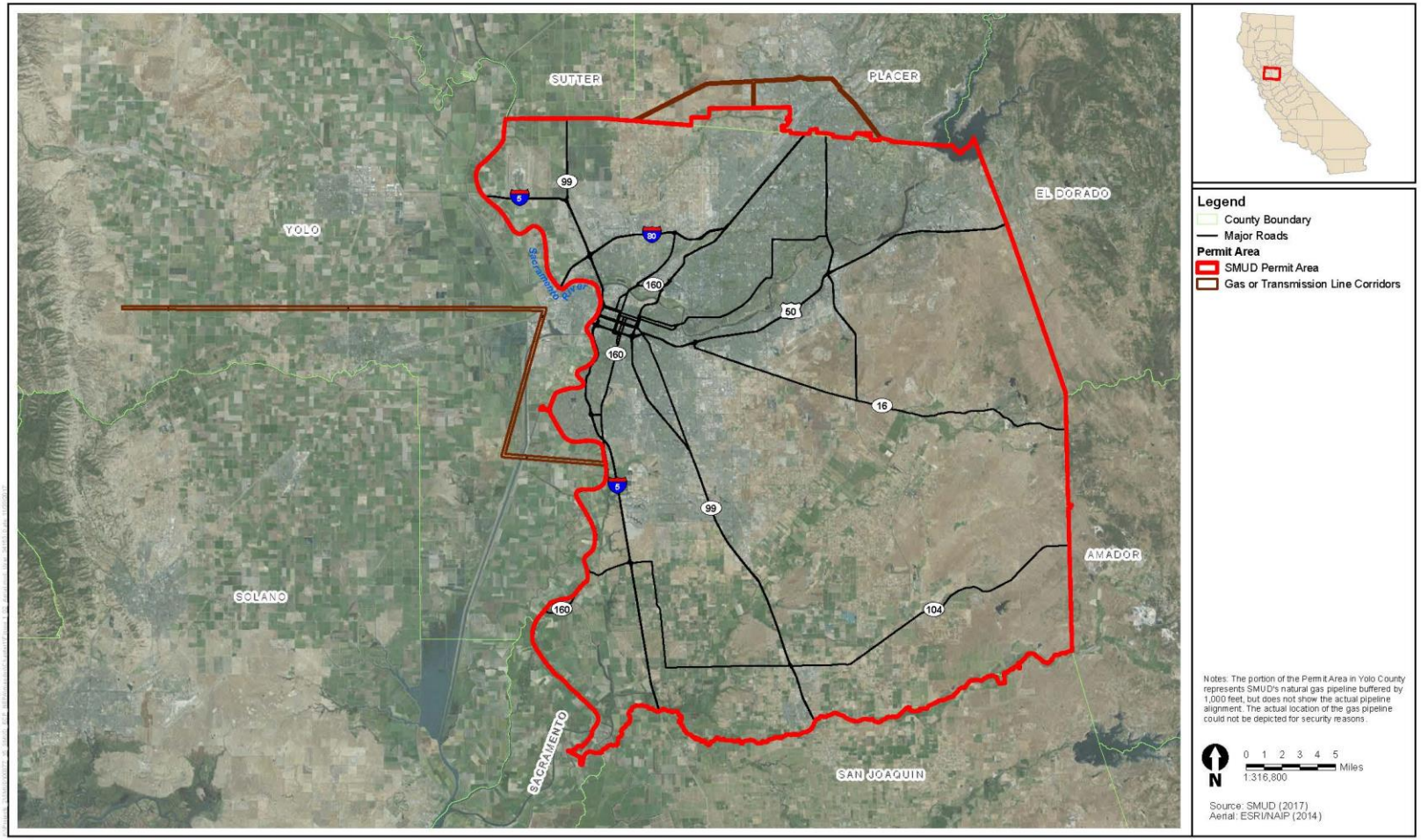

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Figure 1-2
Permit Area, Aerial View
SMUD HCP

1.3.4 Covered Species

SMUD evaluated a comprehensive list of potential special-status species to determine the species proposed to be covered by the Permits (see Appendices B and C). SMUD has identified seven plant and animal species that occur in the Permit Area, have the potential to be adversely impacted by its Covered Activities, and that are either state- and/or federally listed.

The seven HCP Covered Species include two plants, three invertebrates, one amphibian, and one reptile. Table 1-1 provides a list of the Covered Species. SMUD developed this Covered Species list based on professional knowledge, literature review, and input from its HCP Steering Committee. Additional information on the species selection process can be found in Appendix B.

The state 2081(b) Permit can include only Covered Species that are currently listed under CESA as endangered, threatened, or candidate plants or wildlife, or as rare plants. Covered Species that are currently not listed by the state but become listed under CESA during the Permit Term will require an amendment to the CDFW Permit (see Chapter 7, *Implementation*).

Table 1-1. Covered Species

Common and Scientific Name	Federal/State/ CNPS Listing Status
Slender Orcutt grass *Orcuttia tenuis*	FT/SE/1B.1
Sacramento Orcutt grass *Orcuttia viscida*	FE/SE/1B.1
Vernal pool fairy shrimp *Branchinecta lynchi*	FT/--/--
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT/--/--
Vernal pool tadpole shrimp *Lepidurus packardi*	FE/--/--
California tiger salamander *Ambystoma californiense*	FT/ST/--
Giant garter snake *Thamnophis gigas*	FT/ST/--

1.4 HCP Planning Process

This section describes the planning process, including roles of plan participants, integration of other SMUD plans and agreements into the HCP, and consideration of regional overlapping HCPs.

1.4.1 Plan Participants

SMUD will be the permit holder for the Permits. As the permittee, SMUD is responsible for preparing the HCP, implementing the HCP, and complying with all HCP requirements and any terms and conditions of the Permits.

This HCP is the result of detailed discussions with USFWS and CDFW staff, SMUD field supervisors, biologists, and other natural resource planners. These meetings provided technical assistance during development of SMUD's list of Covered Activities, size and location of the Permit Area, list of Covered Species and modeled habitats, methods for impact analysis, development of the HCP conservation strategy, including the biological goals and objectives, and HCP implementation and funding.

1.4.1.1 Steering Committee

SMUD invited members of conservation groups, community groups, cities, counties, and other agencies within the Permit Area to form a Steering Committee. SMUD provided information and solicited input from Steering Committee members during development of the HCP. SMUD met with the Steering Committee on August 9, 2011, September 21, 2011, and May 8, 2014, to provide input regarding Covered Species and land cover types. The Steering Committee participants included the following representatives and agencies: USFWS; CDFW; Sacramento County, Placer County, City of Sacramento; City of Galt; City of Citrus Heights; City of Folsom; City of Elk Grove; City of Rancho Cordova, Sacramento Tree Foundation; California Native Plant Society; Friends of the Swainson's Hawk; Laguna Creek Watershed Council; Sacramento Valley Conservancy; and Environmental Council of Sacramento.

1.4.2 Regional Overlapping HCPs and Analysis

During development of the SMUD HCP, SMUD examined other regional conservation plans located near or within the Permit Area. The Permit Area overlaps six other regional HCPs and Natural Community Conservation Plans (NCCP), some of which are still under development (Figure 1-3). HCPs are developed pursuant to the ESA, and NCCPs are prepared under the California Natural Community Conservation Planning Act. These regional HCPs and NCCPs include: Natomas Basin HCP, Metro Air Park HCP, the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP; an HCP), Western Placer HCP/NCCP, South Sacramento HCP, and the Yolo HCP/NCCP. SMUD utilized biological and land use information already compiled by these adjacent or overlapping HCPs and HCP/NCCPs during the planning process to help determine the scope of the SMUD HCP.

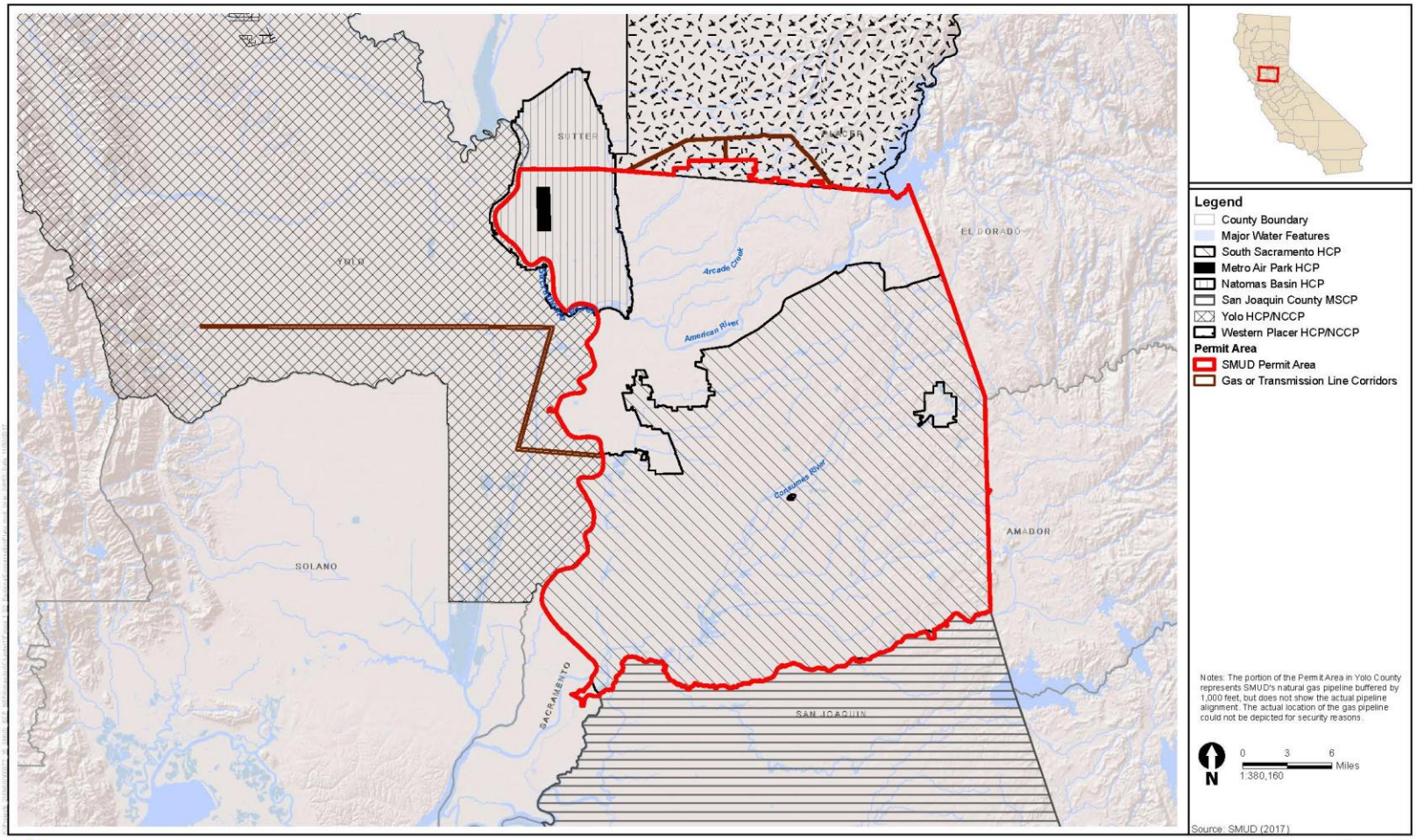


Figure 1-3
Regional Conservation Plans
SMUD HCP

1.4.2.1 Regional HCPs Boundaries and Common Topics

The Natomas Basin HCP (City of Sacramento et al. 2003) is located in the northern portion of Sacramento County and southern portion of Sutter County, and covers a total of 65,164 acres. The Natomas Basin HCP overlaps 39,067 acres of the Permit Area in the northwest corner of the Permit Area. Land cover types and several species in the Natomas Basin HCP were selected for inclusion in SMUD's HCP. The Natomas Basin HCP was adopted in November 1997 and revised in 2003. Similarly, the ITP was initially issued by the USFWS in 1997 and subsequently re-issued in 2003 based on the revised HCP.

The Metro Air Park Project, an area adjacent to the Sacramento International Airport, is part of the future planned development considered by the Natomas Basin HCP and was established as the Metro Air Park HCP area (City of Sacramento et al. 2003). The Metro Air Park HCP area covers a total of 1,538 acres and lies completely within the Permit Area.

The SJMSCP (SJCOG 2000) covers approximately 900,000 acres in San Joaquin County. The Permit Area overlaps a total of 302 acres within the SJMSCP area. The SJMSCP was adopted in 2001.

The Western Placer HCP/NCCP is a joint HCP/NCCP that covers 275,331 acres of land in western Placer County (Placer County 2011). The Permit Area overlaps a total of 5,693 acres within the Western Placer HCP/NCCP area. The Final Western Placer HCP/NCCP was released for public review in May 2020 and was permitted in December 2020. SMUD selected land cover types and several species addressed in the Western Placer HCP/NCCP for inclusion in SMUD's HCP.

The South Sacramento HCP (SSHCP) covers 317,656 acres in Sacramento County, which lies completely within the southern portion of the Permit Area (County of Sacramento et al. 2017). The geographic boundaries of the SSHCP are U.S. Highway 50 to the north, the Sacramento River levee and County Road J11 to the west, the Sacramento County line with El Dorado and Amador Counties to the east, and the San Joaquin County line to the south. The SSHCP plan area excludes the City of Sacramento, the City of Folsom and Folsom's Sphere of Influence, the City of Elk Grove, the lands of the Miwok tribe, and the Sacramento County community of Rancho Murieta. The SSHCP was finalized in 2019. Land cover types and the federally listed species in the SSHCP were included in SMUD's HCP.

The Yolo HCP/NCCP is a joint HCP/NCCP that covers a 653,549-acre planning area in Yolo County, west of Sacramento County (Yolo Habitat Conservancy 2017). The Yolo HCP/NCCP overlaps 4,449 acres of the Permit Area. The Yolo HCP/NCCP was finalized in June 2018. The final Yolo HCP/NCCP identifies land cover types surrounding SMUD's natural gas pipeline. Some of the land cover types and Covered Species in the Yolo HCP/NCCP area were selected for inclusion in SMUD's HCP.

1.4.2.2 Analysis of Regional HCPs

Land cover types, habitats, and lists of covered species from these overlapping regional HCPs and NCCPs were evaluated for inclusion in SMUD's HCP. The land cover types used in this HCP were compiled and selected from sources that represented the most complete and current data.

Not all species included in the overlapping HCPs were selected for inclusion in SMUD's HCP. The process for selection of species is explained in Chapter 3, *Biological Resources Setting*.

1.5 Regulatory and Legal Framework

SMUD must comply with all state and federal laws, including those related to natural resource protection. Accordingly, SMUD Covered Activities are subject to regulation by USFWS, CDFW, the U.S. Army Corps of Engineers (USACE), the State Water Resources Control Board (SWRCB), and the Regional Water Quality Control Board (RWQCB), among others.

The following federal and state laws and regulations apply directly or indirectly to this HCP.

1.5.1 Federal Endangered Species Act

The U.S. Congress passed the ESA in 1973 to protect various species of plants, invertebrates, fish, and other wildlife from extinction. The ESA law is administered by the Interior Department's USFWS and National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). However, all federal agencies are required to protect species and preserve their habitat.

1.5.1.1 Section 9

Section 9 of the ESA prohibits the taking of endangered and threatened species without special exemption. Pursuant to Section 11(a) and (b) of the ESA, any person who knowingly violates Section 9 of the ESA, or any permit, certificate, or regulation related to Section 9, may be subject to civil penalties of up to $25,000 for each violation or criminal penalties up to $50,000 and/or imprisonment of up to 1 year.

1.5.1.2 Section 10

Until 1982, state, local, and private entities had no means to acquire incidental take authorization, as federal agencies could under Section 7. Private landowners and local and state agencies risked violation of the federal ESA no matter how carefully their projects were implemented. This statutory dilemma led Congress to amend Section 10 of the ESA in 1982 to authorize the issuance of an ITP to non-federal project proponents

upon completion of an approved conservation plan. The term *conservation plan* has changed to *habitat conservation plan*.

In cases where federal land, funding, or authorization is not required for an action by a non-federal entity, the take of listed fish and wildlife species can be permitted by USFWS and/or NMFS through the Section 10 process. Private landowners, corporations, state agencies, local agencies, and other non-federal entities must obtain a Section 10(a)(1)(B) ITP for take of federally listed fish and wildlife species "that is incidental to, but not the purpose of, otherwise lawful activities." The regulatory standard under Section 10(a)(1)(B) of the ESA is that the effects of authorized incidental take must be minimized and mitigated to the maximum extent practicable. Under Section 10(a)(1)(B) of the ESA, a proposed project also must not appreciably reduce the likelihood of the survival and recovery of the species in the wild, and adequate funding for a plan to minimize and mitigate impacts must be ensured.

The Section 10(a)(1)(B) process for obtaining a Permit has three primary phases: (1) the HCP development phase, (2) the formal permit processing phase, and (3) the post-issuance phase.

All HCPs must specify the following mandatory elements.

- The impact that will likely result from the taking of Covered Species.
- The steps the Plan Permittee will take to monitor, minimize, and mitigate such impacts to the maximum extent practicable.
- The funding that will be available to implement such steps.
- The procedures to be used to deal with changed/unforeseen circumstances.[3]
- The alternative actions to such taking the Plan Permittee considered and the reasons why such alternatives are not proposed to be utilized.
- Such other measures that the Director [of the Department of Interior or Commerce] may require as being necessary or appropriate for purposes of the plan (50 Code of Federal Regulations [CFR] 17.22[b]).

This HCP is intended to provide this required information. To receive an ITP, Section 10(a)(2)(B) of the federal ESA and permit regulations 50 CFR 17.22(b)(2) and 17.32(b)(2) require the HCP meet the following permit issuance criteria.

- The taking will be incidental to otherwise lawful activities.
- The Plan Permittee will minimize and mitigate the impacts of such taking to the maximum extent practicable.

[3] *Changed circumstances* are changes in circumstances affecting a Covered Species or geographic area covered by the HCP that can reasonably be anticipated by the plan developers and the USFWS and that can be planned for (e.g., the listing of a new species, a fire, or other natural catastrophic event in areas prone to such natural events).

- The Plan Permittee will ensure adequate funding for the HCP and for procedures to deal with changed circumstances.
- The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild (i.e., will not cause jeopardy under Section 7(a)(2) of the ESA).
- The Plan Permittee will ensure that other measures that the USFWS may require as being necessary or appropriate will be provided.
- The USFWS has received such other assurances as may be required that the HCP will be implemented.

The permit application phase begins when a complete application package is submitted to the appropriate USFWS office. A complete application package consists of (1) the proposed HCP, (2) a completed permit application form, and (3) a $100 application fee from the applicant. Prior to the approval of an HCP, USFWS is required to undertake an internal Section 7 consultation because issuance of a permit is a federal action, and a draft NEPA document.[4] (See the discussion of ESA Section 7 below.) Elements specific to the Section 7 process that are not required under the Section 10 process (e.g., analysis of impacts on designated critical habitat and analysis of impacts on listed plant species) are included in this HCP in part to meet the requirements of Section 7.

The USFWS then prepares its Findings and Recommendations, which evaluates the Section 10(a)(1)(B) permit application against the permit issuance criteria stated in Section 10(a)(2)(B) and makes a recommendation to issue the ITP or not. If the USFWS determines that all requirements for permit issuance have been met, a Section 10(a)(1)(B) Permit will be granted. During the post-issuance phase, the permit applicant and other responsible entities implement the HCP and prepare annual reports on progress toward achieving the HCP's stated biological goals. The USFWS monitors the permittee's compliance with the HCP Permit requirements, including the applicant's progress and success of the stated biological goals and objectives.

1.5.1.3 Section 7

Section 7 of the ESA requires federal agencies to ensure that their actions, including issuing permits, do not jeopardize the continued existence of listed species or destroy or adversely modify listed species' critical habitat. Pursuant to CFR Title 50 Wildlife and Fisheries Section 402.2, "Jeopardize the continued existence of…" means to engage in an action that reasonably will be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. While there are no federal prohibitions under the ESA for the take of listed plants on non-federal lands, unless taking those plants is in violation of state law, the USFWS analyzes the effects of the permit on listed plant species. Section 7 of the ESA requires that the issuing of a Permit may not jeopardize any listed species, including plants.

[4] When USFWS issues a permit, they will conduct an internal consultation under Section 7 of the ESA.

Issuance of a Permit under Section 10(a)(1)(B) of the ESA by the USFWS is a federal action subject to Section 7 of the ESA. As a federal agency issuing a discretionary permit, the USFWS is required to consult with itself (that is, conduct an internal consultation). USFWS will issue a biological opinion during the permit process that will determine whether the permit actions will jeopardize the continued existence of the listed species or adversely modify its critical habitat.

1.5.2 National Environmental Policy Act

NEPA requires federal agencies to include in their decision-making process appropriate and careful consideration of all environmental effects of a proposed action and of possible alternatives, and ensure the environmental information is available to public officials and citizens before decisions are made and before actions are taken. Documentation of the environmental impact analysis and efforts to avoid or minimize the adverse effects of proposed actions must be made available for public notice and review. This analysis is documented in either an EA or an EIS. The issuance by USFWS of an ITP under Section 10 of the ESA constitutes a federal action with a decision-making process. Therefore, USFWS must comply with NEPA.

1.5.3 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA), 16 United States Code (U.S.C.) 470 et seq., requires federal agencies to consider the effects of their undertakings on historic properties (cultural resources), and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. The federal agency first determines whether they could affect historic properties that are included in the National Register of Historic Places (NRHP) or that meet the criteria for the NRHP. If so, the federal agency must identify the appropriate State Historic Preservation Officer (SHPO) to consult with during the process. If the federal agency determines that the activity has no potential to affect historic properties, the agency has no further Section 106 obligations. If there are potential impacts, the federal agency seeks ways to avoid or mitigate those effects. The issuance of a Permit is an undertaking subject to Section 106 of the NHPA.

1.5.4 Clean Water Act

The Clean Water Act (CWA), 33 U.S.C. Section 1251, originally enacted as the Federal Water Pollution Control Act Amendments of 1972, has the goal to “restore and maintain the chemical, physical, and biological integrity of the nation’s waters.” The CWA embodies the concept that all discharges into the nation’s waters are unlawful unless specifically authorized by a permit; issuance of such permits constitutes the CWA’s principal regulatory tool. Under the CWA, both point-source pollution (wastes discharged from discrete sources such as pipes and outfalls) and nonpoint-source pollution (stormwater runoff from land areas, including construction sites) are regulated. The United States Environmental Protection Agency sets national standards and effluent

limitations. Some Covered Activities may require SMUD to obtain CWA permits prior to implementation of the activity.

1.5.4.1 Section 404

Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the U.S., including wetlands. Under Section 404, USACE is responsible for issuing Department of the Army permits (Section 404 permits) to authorize the placement of dredged or fill materials into jurisdictional waters, including wetlands. USACE issues two types of permits under Section 404: general permits (nationwide permits [NWPs] or regional permits) and standard permits (letters of permission or individual permits). General permits are issued by USACE to streamline the Section 404 process for nationwide, statewide, or regional activities that have minimal environmental impacts on the waters of the U.S. Standard permits are issued for activities that do not qualify for a general permit (i.e., that may have more than a minimal adverse environmental impact). SMUD applies for general and standard permits as needed for specific O&M and new construction activities.

1.5.4.2 Section 401

Section 401 of the CWA requires that when applicants request a federal license or permit for any activity that may result in a discharge to navigable waters, such as a Section 404 permit, they must obtain a water quality certification from the state. The USACE cannot issue the Section 404 permit unless the state issues or waives Section 401 certification, and any conditions of the state's certification must be included as conditions of the federal permit. If the state denies the request, the federal permit cannot be issued. The SWRCB is the California agency designated to issue Section 401 certifications, but it delegates its authority to nine regional boards. The Central Valley RWQCB issues 401 water quality certification for projects within the Permit Area.

1.5.4.3 Section 402

Section 402 of the CWA establishes the National Pollution Discharge Elimination System (NPDES), a permitting system for the discharges (except for dredge or fill material) of any pollutant into waters of the U.S. In California, RWQCBs administer this permitting program and issue NPDES permits. SMUD would apply for permits under the NPDES as necessary for its projects.

1.5.4.4 Relationship to ESA

Because issuance of a CWA 404 permit by the USACE is a federal action subject to ESA review, USACE is required to consult with USFWS and/or NOAA Fisheries Service under Section 7 of the ESA before issuing Section 404 permit for Covered Activities in the Permit Area.

The USACE may use the analysis in the HCP to provide the basis for a consultation with the USFWS under Section 7 of the ESA before issuing a Section 404 permit for future

Covered Activities. The species avoidance, minimization, and mitigation required by the HCP conservation strategy are expected to satisfy all requirements of the Section 7 consultation for the Covered Species for the 404 permit. Thus, the HCP is expected to streamline the 404 permit process. The HCP may also help streamline future Covered Activities to obtain Section 401 water quality certification, which is also required for the Section 404 permit.

1.5.5 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918, as amended, implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the MBTA, taking, killing, or possessing migratory birds is unlawful, as is taking of any parts, nests, or eggs of such birds (16 U.S.C. 703).

1.5.6 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C Section 668, enacted in 1940, prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions. Under the BGEPA, it is a violation to "...take, possess, sell, purchase, barter, offer to sell, transport, export or import, at any time or in any manner, any bald eagle commonly known as the American eagle, or golden eagle, alive or dead, or any part, nest or egg, thereof..." Take is defined to include pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, and disturb. Recent revisions to the BGEPA authorize take of bald and golden eagles under the following conditions: (1) where the take is compatible with the preservation of the bald and golden eagle; (2) is necessary to protect an interest in a particular locality; (3) is associated with but not the purpose of an otherwise lawful activity; and (4) for individual instances of take, the take cannot be practicably avoided; or (5) for programmatic take, the take is unavoidable even though advanced conservation practices or adaptive management measures are being implemented (50 CFR 22.26). Permits recently issued under this regulation provide for take of the species, but there are additional detailed compliance requirements.

1.5.7 California Endangered Species Act

The CESA is part of the California Fish and Game Code (Section 2050–2116). Under Fish and Game Code Section 2080, and Sections 1900-1913 (the Native Plant Protection Act [NPPA]), the take of listed species is prohibited except as otherwise provided under CESA and NPPA. Take is defined as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Under Section 2081(b), the CDFW may authorize, by permit, the taking of state-listed endangered, threatened, and candidate species (but not for fully protected species, except for scientific research) if all of the following conditions are met.

- The take is incidental to an otherwise lawful activity.

- The impacts of the authorized take are minimized and fully mitigated.
- The measures required to meet this obligation must be roughly proportional in extent to the impact of the authorized take of the species. Where various measures are available to meet this obligation, the measures required shall maintain the applicant's objectives to the greatest extent possible. All required measures shall be capable of successful implementation.
- The applicant must ensure adequate funding to implement the minimization and mitigation measures, and for monitoring compliance with, and effectiveness of, those measures.
- The permit will not jeopardize the continued existence of a state-listed species.

CDFW may also authorize incidental take by two other regulations: (1) pursuant to Section 2835 in association with an approved NCCP; or (2) pursuant to Section 2080.11. CDFW has the ability to provide take authorization for species that are jointly state and federally listed through a consistency determination under 2080.1. The ITP is based on the analysis of effects presented in the HCP for those species and determines that the conditions in the federal permit are consistent with CESA. SMUD will be requesting an ITP from CDFW based on this HCP. CDFW cannot authorize take of non-listed species or fully protected species through a Section 2081(b) ITP.

1.5.8 California Environmental Quality Act

Public Resources Code, Sections 21000-21177, requires environmental review of actions by state and local public agencies in California through CEQA. CEQA processes closely parallel those for NEPA. Although similar to NEPA, CEQA requires that significant environmental impacts of proposed projects be avoided or reduced to the extent feasible through adoption of feasible avoidance, minimization, or mitigation measures unless overriding considerations are identified and documented that make the mitigation measures or alternative infeasible. Whenever substantial evidence supports a fair argument that the proposed project may result in a significant effect on the environment, the lead agency must prepare an Environmental Impact Report (EIR).).

SMUD's adoption of the HCP also constitutes a local agency discretionary action, which is subject to compliance with the CEQA. SMUD is serving as the lead agency under CEQA and will prepare an EIR to satisfy its CEQA compliance obligations.

In issuing the 2081(b) permit, CDFW must comply with CEQA. CDFW is a responsible and trustee agency and will provide input on the EIR and adopt their own findings to satisfy their CEQA requirements.

1.5.9 Fully Protected Species under the California Fish and Game Code

California Fish and Game Codes describe species for which CDFW may not authorize take, except for scientific research, including Sections 3511 (fully protected birds), 4700 (fully protected mammals), 5050 (fully protected reptiles and amphibians), and 5515 (fully

protected fish). These protections state that "...no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected [bird], [mammal], [reptile or amphibian], [fish] and no permits or licenses heretofore issued shall have any force or effect for that purpose." None of SMUD's Covered Species are listed as fully protected.

1.5.10 Protection of Birds and their Nests under the California Fish and Game Code

Section 3503.5 of the Fish and Game Code prohibits the take, possession, or destruction of any birds of prey (Orders Falconiformes or Strigiformes) or their nests or eggs. Likewise, Section 3503 provides "it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any other regulation adopted pursuant thereto." Further, Section 3513 codifies the MBTA, making it unlawful to take or possess any migratory nongame bird species as designated in the MBTA.

1.5.11 California Department of Fish and Wildlife Streambed Alteration Agreement

The CDFW regulates work that will "substantially divert or obstruct the natural flow of, or substantially change or use any material of the bed, channel or bank of any river, stream and lake or deposit or dispose of debris, waste or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake" pursuant to Fish and Game Code Sections 1600-1616. Notification is required prior to any such activity, and CDFW may issue an agreement with any necessary mitigation to ensure protection of the state's fish and wildlife resources. At times, Covered Activities may need a Streambed Alteration Agreement.

1.5.12 State of California Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act, Water Code Section 13020, mandates that "all waters of the State shall be protected, that all activities and factors affecting the quality of water shall be regulated to attain the highest water quality within reason, and the State must be prepared to exercise its full power and jurisdiction to protect the quality of water in the State from degradation." Water Code Section 13260 requires "any person discharging waste, or proposing to discharge waste, within any region that could affect the waters of the State to file a report of discharge (Waste Discharge Requirements application)." The term *waters of the state* is defined as "any surface water or groundwater, including saline waters, within the boundaries of the state" in Section 13050(e). This permit process would not be covered under the HCP, but it may be streamlined by providing the information and provisions in the HCP.

1.5.13 Native Plant Protection Act

The 1977 NPPA, Fish and Game Code Section 1901, Chapter 10, directs the CDFW to designate native plants as rare or endangered and provides the authority to protect endangered and rare plants from take. With recent adoption of regulations by the Fish and Game Commission, the CDFW may now authorize the take of the 64 plants that are designated as state-listed rare under the NPPA. The NPPA prohibits the take of state-listed rare plants but includes some exceptions for certain activities including agricultural operations; timber operations; nursery operations; emergencies; vegetation removal from canals, lateral ditches, building sites, roads, or other rights-of-way by landowners or their agent; or the performance by a public agency or publicly or privately owned utility of its obligation to provide service to the public. None of SMUD's Covered Species are listed as rare under the NPPA.

1.5.14 Oak Woodlands Conservation Act

The Oak Woodlands Conservation Act recognizes the importance of oak woodlands, including their aesthetic value, and the threats to oak woodland habitats from development, firewood harvesting, and agricultural conversions. The Oak Woodlands Conservation Act established the Oak Woodlands Conservation Program, which provides funding to conserve and restore California's oak woodlands. In addition, the Oak Woodland Conservation Act requires an environmental analysis under CEQA for impacts on oak woodlands and requires county jurisdictions to adopt management plans and ordinances, require permits, and set mitigation standards. Oak woodlands are present in the Permit Area.

1.6 Document Organization

The HCP and supporting information are presented in the following chapters.

Chapter 1, Introduction, discusses the purpose and scope of the HCP; defines the Permit Area; provides a brief overview of SMUD's Covered Activities and the list of Covered Species; and describes the HCP planning process and legal framework for the HCP.

Chapter 2, Covered Activities, provides a description of SMUD's O&M Covered Activities and the new construction Covered Activities that will be covered by the HCP. The chapter summarizes how each Covered activity is implemented including the equipment used, the footprint acreage (if any) of ground disturbance expected from a Covered Activity, the frequency with which each Covered Activity will be implemented over the Permit Term, the types and extent of direct or indirect environmental stressors associated with each Covered Activity, and the estimated acreage of land disturbed by each category of Covered Activity.

Chapter 3, Biological Resources Setting, provides a description of SMUD HCP land cover types and data sources; the process used for habitat classification of the SMUD

HCP land cover types, the species covered by the HCP, and the Covered Species selection process and rationale for their inclusion in the HCP; and defines modeled habitat for each Covered Species based on the SMUD HCP land cover types in the Permit Area.

Chapter 4, Impact Analysis and Levels of Take, describes Covered Activity avoidance and minimization measures; identifies methods used for calculating Covered Activity effects on each Covered Species; quantifies or qualitatively describes the direct, indirect, and cumulative effects to each Covered Species and critical habitat resulting from the Covered Activities; and requests an amount of take authorization for each Covered Species.

Chapter 5, Conservation Strategy, provides the SMUD HCP biological goals and measurable objectives and describes the conservation measures that will avoid, minimize, and mitigate impacts on the Covered Species to the maximum extent practicable.

Chapter 6, Monitoring, Reporting, and Adaptive Management Program, describes the approach for monitoring effects of Covered Activity implementation, and for monitoring the effectiveness of the operating conservation strategy, including monitoring the effectiveness of the avoidance, minimization, and mitigation measures; and presents the SMUD HCP adaptive management program that may recommend changes to the operating Conservation Strategy based on monitoring results. Chapter 6 also explains the process that will be used for data tracking, data analysis, and reporting.

Chapter 7, Implementation, describes the implementation schedule for the HCP, and the roles and responsibilities of the Permittee and the wildlife agencies in HCP implementation. Chapter 7 identifies the changed and unforeseen circumstances that will be addressed by this HCP and assurances requested by the Permittee for the USFWS Permit. The chapter also explains the process for any future modifications to the HCP including administrative changes, minor modifications, and full amendments.

Chapter 8, Cost and Funding, describes the costs and funding mechanisms to implement the HCP.

Chapter 9, Alternatives to Take, describes alternative actions to the proposed HCP that would reduce take of the Covered Species.

Chapter 10, References, includes references used in preparing the chapters.

Chapter 11, Preparers, lists the organizations and individuals that contributed to preparing the HCP.

2 Covered Activities

This chapter describes the activities covered by this Plan and that would receive take authorization from the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW). Sacramento Municipal Utility District's (SMUD) Covered Activities would occur on or in association with SMUD's electrical system, natural gas transmission system, vegetation management, and miscellaneous activities as described in the sections below. These Covered Activities are necessary for the safe and efficient operation of SMUD's facilities in the Permit Area. All of SMUD's activities that are expected to occur within the 30-year permit term and that are expected to take the Covered Species are described in this chapter.

2.1 Introduction

SMUD's Covered Activities consist of operation and maintenance (O&M) and construction activities that are described under six main sections: electrical facilities, natural gas transmission facilities, vegetation management, telecommunications, conservation strategy, and miscellaneous activities. For each of these six sections, the nature of the facilities is described first, followed by a description of the specific Covered Activities that are expected to occur within each set of facilities. The Take from more or slightly different activities than those described below can be covered by the HCP permit as long as such activities and the effects of such activities are similar to these Covered Activities and fall within the descriptions and Take limits described in Chapter 4 for each Covered Species.

Throughout this chapter, the following definitions are used for O&M and construction activities.

- **Operation and Maintenance (O&M) Activities** include inspecting, monitoring, testing, operating, repairing, and replacing facilities. They also include emergency repair and replacement, and vegetation management, including tree trimming.
- **Construction Activities** include installing new structures to upgrade existing facilities, reconstruction and relocation of electrical and natural gas facilities, installation of new electrical and natural gas facilities, and expansion or construction of new electrical substations.

For all Covered Activities described below, SMUD uses the terms "(temporary) work area" and "temporary disturbance" to describe certain impacts. The work area is where access, pedestrian movement, vehicle movement and parking, and equipment and material staging will occur for Covered Activities. The work areas will be temporarily impacted, but are expected to recover within a year and would not be contoured or seeded. In contrast, temporary disturbance refers to areas where the ground is disturbed by earth moving equipment, including grading. It may also be where soil is stored from excavation sites. SMUD will recontour and seed all temporary disturbances greater than 0.1 acres in Modeled Habitat. Temporary disturbances are evaluated at the project-level; for example,

all temporary disturbances for each pole in a new subtransmission line would be summed, and if the total temporary disturbance for the entire project is greater than 0.1 acres, all temporary disturbance sites will be recontoured and seeded with native seed even though the temporary disturbance for each component is less than 0.1 acres. The amount of mitigation required to offset impacts is not calculated by the size of the work area, but rather the amount of temporary disturbance and permanent Modeled Habitat loss.

2.2 Electrical Facilities and Covered Activities

SMUD's existing electrical facilities within the Permit Area consist of approximately 17,420 miles of overhead and underground transmission, subtransmission, and distribution conductors. All overhead wires are referred to as *conductors* and a segment of conductors strung between two or more poles or towers is referred to as a *line,* or *lines*. All underground conductors are referred to as *cable*. In many areas, SMUD has more than one line of conductors on the same set of poles and more than one cable in the same underground trench.

SMUD's electrical system consists of approximately 158 miles of transmission line easement and 8,792 miles of subtransmission and distribution line easement. The 230,000 volt (230kV) transmission conductors transport electricity from electrical generation plants to transmission substations, which transform the electricity down to 115,000 volts (115kV) or 69,000 volts (69kV). From the transmission substations, 115kV transmission conductors or 69kV subtransmission conductors transport electricity to distribution substations, which transform the electricity from 115kV or 69kV to 21,000 volts (21kV), 12,000 volts (12kV), or 4,000 volts (4kV) for the distribution system. The distribution conductors then carry the lower voltage power to industries, businesses, and homes. Conductors are installed either underground (which are then referred to as *cables*) or on overhead poles, which are typically found along highways, streets, or other linear facilities. Section 2.2.1, below, describes these facilities and Section 2.2.2 describes operation and maintenance of these facilities.

SMUD's overhead and underground electrical facilities are generally constructed within dedicated easements or public utility easements (PUEs). Dedicated easements and PUEs allow an entity, such as SMUD, to use real property that it does not own for the construction and maintenance of its facilities. Dedicated easements convey rights directly to SMUD, and PUEs convey rights to SMUD and other utilities. SMUD owns less than 2 percent of the land on which its facilities are located in fee title; the remainder is in PUEs or in dedicated easements. Easement widths for different SMUD electrical facilities are presented below.

Any temporary impacts that are greater than 0.1 acre will be revegetated and recontoured, as needed.

2.2.1 Electrical Facilities

The electric facilities described below include the transmission system, subtransmission system, and distribution system. The transmission system carries electricity from generation plants to transmission substations, while the subtransmission system carries electricity from the transmission substations to the distribution substations, and the distribution system carries electricity to SMUD's customers.

2.2.1.1 Transmission System

As of October 2013, SMUD's Permit Area encompasses approximately 158 miles of transmission line easement (144 miles overhead and 14 miles underground), and 1,427 transmission towers or poles. SMUD's transmission system consists of 230kV and 115kV lines. Transmission conductors carry power (alternating current [AC]) from electrical generation plants to 18 transmission substations within the Permit Area. SMUD's transmission facilities are located in both urban and undeveloped areas throughout the Permit Area. SMUD also has transmission facilities and electrical generation plants located outside of the Permit Area that are not covered by this Plan.

SMUD's 230kV transmission lines are composed of overhead conductors supported on steel lattice towers or tubular steel poles. The overhead 115kV transmission conductors are supported by steel lattice towers, tubular steel poles, concrete poles, or wood poles; and the 14 miles of underground cable is in conduit.

Electrical components on poles and towers primarily include breakers, relays, cutouts, signs, cross arms, insulators, pins, transformers, conductors, guy wires, anchors, switches, fuses, footings, reclosers, capacitor bank, lightning arrestors, and overhead fiber-optic cables.

Transmission poles and towers are typically spaced every 900 to 1,300 feet, and approximately four to six towers/poles are required per mile of transmission line. Generally, transmission towers and poles range in height from 90 to 130 feet above the ground, and their conductors maintain a minimum clearance of 30 feet above the ground.

SMUD has 18 transmission substations within the Permit Area that receive power from electrical generation plants and step down the voltage from 230kV to 69kV, or from 115kV to either 21kV or 12kV. The 18 transmission substations each encompass 5 to 11 acres. Most of the transmission substation sites are graded, paved, or surfaced with gravel, and fenced for safety and security. Electrical components at substations include: transformer(s), capacitor banks, backup battery, metal clad switchgear, a grounding system, bus structure, new electric line outlets, fuses, disconnect switches, surge arresters, digital fault recorders, and circuit breakers.

Additionally, the typical transmission easement width is 200 feet, but the easement width can vary from 75 to 200 feet.

2.2.1.2 Subtransmission System

As of October 2013, the Permit Area encompasses approximately 630 miles of subtransmission (69kV) conductor (615 miles overhead and 15 miles underground). SMUD's subtransmission and distribution easements total approximately 8,792 miles. Because the subtransmission and distribution conductors are often supported by the same set of poles, the easement length cannot be calculated separately. Subtransmission lines carry AC power from the 18 transmission substations to 211 distribution substations. Subtransmission lines are typically found along highways, streets, or other linear facilities. The overhead 69kV subtransmission conductors are supported by tubular steel poles or wood poles. The underground 69kV subtransmission cable is direct buried (approximately 8 miles) or buried in conduit (approximately 7 miles).

Electrical components mounted on subtransmission poles include: breakers, relays, cutouts, signs, cross arms, insulators, pins, transformers, conductors, guy wires, anchors, switches, fuses, footings, reclosers, capacitor bank, lightning arrestors, and overhead fiber-optic cables.

Subtransmission poles are typically spaced every 250 to 350 feet, and approximately 15 to 21 poles are required per mile of subtransmission line. Generally, subtransmission poles range from 55 to 65 feet aboveground, and the conductors maintain a minimum clearance of 30 feet aboveground.

The typical subtransmission easement width is 25 feet.

2.2.1.3 Distribution System

As of October 2013, the Permit Area encompasses approximately 16,450 miles of distribution conductor (6,888 miles overhead and 9,562 miles underground). The underground distribution cable is direct buried (approximately 3,687 miles) or buried in conduit (approximately 5,875 miles). As mentioned above, SMUD's subtransmission and distribution easements total approximately 8,792 miles. SMUD's distribution facilities include 21kV, 12kV, and 4kV lines, and 211 distribution substations. The distribution system includes distribution lines that deliver electricity and the 211 distribution substations transformers that step down 69kV from subtransmission to distribution levels (i.e., 21kV, 12kV, or 4kV).

Distribution facilities are typically found along highways, streets, or other linear facilities. The distribution lines carry AC power to commercial and industrial customers. The distribution facilities also serve residential customers with 120 and 240 volt electricity, which provide electric power for most appliances. Overhead distribution conductors are supported on wood or tubular steel poles, and the underground cable is in conduit or is direct-buried.

Overhead electrical components on poles could include breakers, relays, cutouts, signs, cross arms, insulators, pins, transformers, conductors, guy wires, anchors, switches,

fuses, footings, reclosers, capacitor bank, lightning arrestors, and overhead fiber-optic cables.

Overhead distribution poles are typically spaced every 200 to 300 feet and approximately 17 to 26 poles are required per mile of distribution lines. Generally, distribution conductors maintain a minimum clearance of 30 feet aboveground.

Pad-mounted transformers are associated with the underground component of the distribution system. The pad-mounted transformers step down distribution voltage to 120 or 240 volts for customer use. They are in locked steel cabinets mounted on 5-foot by 5-foot concrete pads and located throughout the Permit Area. As of October 2013, SMUD's Permit Area contains approximately 42,776 pad-mounted transformers.

Most (99 percent) of SMUD's underground facilities are associated with its distribution system. Approximately 85 percent of the subtransmission and distribution system facilities are in urban areas.

SMUD's underground distribution network system in downtown Sacramento has large underground vaults (typically 20 feet long, 10 feet wide, and 8 feet deep) and manholes that provide access to underground facilities. Outside the downtown area, underground facilities are accessed at underground pull boxes (typically either 17 inches by 30 inches by 24 inches, 4 feet by 6 feet by 4 feet, or 6 feet by 8 feet by 4 feet).

SMUD's 211 distribution substations are typically located close to residential, commercial, or industrial development and range in size from 0.25 to 1.0 acre. Distribution substations transform electricity from 69kV to 21kV, 12kV, or 4kV. Distribution substation sites are graded, paved or surfaced with gravel, and fenced or walled for safety and security. Electrical components at substations include: transformer(s), capacitor banks, backup battery, metal clad switchgear, a grounding grid, bus structure, new electric line outlets, fuses, and circuit breakers.

A typical overhead distribution line easement is 12.5 feet wide, and an underground distribution line easement is 25 feet wide.

2.2.2 Electrical System O&M and Construction Covered Activities

Electrical system O&M and construction Covered Activities include the following.

- Overhead Facilities Inspection (E1)
- Underground Facilities Inspection (E2)
- Substation Insulator Washing (E3)
- Substation Inspection, Maintenance, and Minor Upgrades (E4)
- Emergency Outage Inspection and Minor Repair (E5)

- Wood Pole Testing and Treatment (E6)
- Overhead Component Repair and Replacement (E7)
- Pole Replacement (E8)
- Underground Component Repair and Replacement (E9)
- Steel Lattice Tower Repair and Replacement (E10)
- Overhead Reconstruction and Reconductoring (E11)
- Electrical Facility Operations (E12)[1]
- New and Relocated Overhead Subtransmission and Distribution Line Construction (E13)
- New Underground Subtransmission and Distribution Line Construction (E14)
- Existing Distribution Substation Expansion (E15)
- New Substation Construction (E16)

Each Covered Activity is identified by an activity number (e.g., E1). The following sections provide a description of each Covered Activity, approximate frequency, equipment used by SMUD to implement the Covered Activity, and an estimate of the work area, temporary disturbance area, and/or permanent land cover loss associated with the activity. The descriptions below are intended to summarize typical actions associated with each Covered Activity. These descriptions also provide the basis for assumptions of average effects per activity occurrence, which is discussed in Chapter 4, *Impact Assessment and Levels of Take.*[2]

E1 Overhead Facilities Inspections

SMUD expects to conduct inspections of their overhead transmission, subtransmission, and distribution facilities to verify stability, structural integrity, and condition of the poles or towers, and overhead components, including fuses, breakers, relays, cutouts, switches, transformers, footings, insulators, conductors, signs, and overhead fiber-optic cables. SMUD would conduct both ground-based and air-based overhead facilities inspections as discussed below.

[1] No longer a Covered Activity under this HCP as it is unlikely to result in take of Covered Species. The activity was left in the document to prevent document reorganization and renumbering of all Covered Activities, and to minimize inconsistencies.
[2] The Take from more or slightly different activities than those described below can be covered by the HCP permit as long as such activities and the effects of such activities are similar to these Covered Activities and fall within the descriptions and Take limits described in Chapter 4 for each Covered Species.

E1a Ground-Based Overhead Line Inspection

Ground-based inspections of overhead subtransmission and distribution facilities would consist of the following activities.

- A brief visual drive-by inspection of all facilities, conducted annually to look for components with obvious problems that need repair or replacement.
- A detailed line inspection that would require the inspector to access the pole, inventory the pole components (e.g., fuses, breakers, relays, cutouts, switches, transformers, paint), carefully examine individual components visually or through use of routine diagnostic tests, record the condition of each component, and record the GPS coordinates.

Detailed line inspections are expected to occur annually on approximately one-fifth of SMUD's overhead subtransmission and distribution facilities (an estimated 28,973 poles and 750 miles) such that the entire overhead electrical system (an estimated 144,865 poles and 3,748 miles) would be inspected over a 5-year period (individual poles are inspected once every 5 years). (See Table 2-1.)

For both drive-by inspections and detailed line inspections, under normal conditions, SMUD would access poles in pickup trucks or service trucks using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. The inspector may use binoculars to reduce the amount of off-road travel required and enhance the visual inspection. Ground-based overhead facilities inspections could result in vehicle movement, vehicle noise, human presence, and dust generation and lay down of vegetation caused by off-road travel. Ground-based facilities inspections would be completed year-round.

Ground inspections of the approximately 158 miles of transmission easements encompassing conductors and components would be performed every 2 years using binoculars and infrared and corona cameras to identify issues with the transmission line components, including the tower structures and tubular steel poles. All transmission wood poles would be patrolled annually, and detailed inspections would be performed every 5 years (see Table 2-1).

An estimated 57.4 percent (82 miles) of the overhead transmission and 17.3 percent (648 miles) of the overhead subtransmission and distribution lines are in non-urban areas that could require off-road travel for access. One-half of SMUD's transmission facilities and one-fifth of subtransmission and distribution facilities are inspected annually. It is assumed that a 10-foot-wide corridor approximately 171 miles long (41 miles of transmission and 130 miles of subtransmission and distribution) would be crossed by SMUD vehicles during ground-based inspections annually. SMUD estimates that approximately 207 acres would be crossed by vehicles annually for overhead inspections (an estimated 6,210 acres over the 30-year permit term). To access the overhead transmission, subtransmission, and distribution facility located in non-urban land cover, this Covered Activity would require less than a day of off-road travel in any given location.

Table 2-1. Frequency of Ground-Based Overhead Line Inspections

Type of Inspection	Inspection Cycle (Frequency)
Transmission	
Wood Pole (transmission) patrol	Annual
Wood Pole Detailed Inspection	5 years
Detailed Line Inspection of transmission line components and conductors	2 years
Subtransmission and Distribution	
Drive-By Inspection	Annual
Detail Line Inspection*	Annual
* Occurs annually on one-fifth of SMUD's subtransmission and distribution overhead facilities.	

E1b Overhead Transmission Facilities Inspection by Air

Overhead facilities inspections of transmission lines by air would be conducted annually using fix-wing aircraft equipped with light detection and ranging (LiDAR) optical remote sensing technology. This technology is used to measure the precise heights of transmission conductors, determine if any conductors need to be raised or tensioned to meet ground clearance requirements, and identify locations with potential transmission line or vegetation management clearance issues. Take-offs and landings would occur at local municipal airports, and land cover would not be disturbed during air-based overhead facility inspections.

An estimated 25 miles of transmission lines located in rural areas without road access would also be inspected once a year during the spring or summer by helicopter. The helicopter would fly over the easement, as low as 100 feet off the ground, and may hover over SMUD facilities for focused inspection. No vegetation would be disturbed from the helicopter flying over SMUD facilities. Take-off and landing locations would include licensed airports located inside or outside the Permit Area.

Helicopters would be in any given location along the transmission line less than a day. Air-based overhead facilities inspections of transmission may increase noise levels associated with operation of the helicopter during the activity.

E2 Underground Facilities Inspection

E2a Underground Subtransmission and Distribution Components

SMUD would conduct inspections of underground subtransmission and distribution components including pad-mounted transformers and pad-mounted switching cubicles on a 5-year cycle. Components in vaults would be inspected every 3 years to verify stability, structural integrity, and condition.

As of 2013, SMUD's Permit Area contains an estimated 42,776 pad-mounted transformers. Pad-mounted transformers, which are located aboveground on concrete pads, would be inspected by manually opening the transformer and checking where the conductors connect to the transformer for signs of wear or resistance.

SMUD would access components associated with SMUD's underground facilities, including the network underground system, in pickup trucks or service trucks using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Underground facility inspections could result in vehicle movement, vehicle noise, human presence, and dust generation and lay down of vegetation caused by vehicle off-road travel.

Components associated with SMUD's underground facilities would be inspected year-round and on a 5-year cycle. An estimated 3 percent (150 miles) of SMUD's underground facilities are in non-urban areas that could require off-road travel for access. SMUD estimates that one-fifth of those underground facilities would be inspected annually. SMUD assumes that a corridor approximately 10 feet wide and 30 miles long would be crossed by vehicles traveling off-road. An estimated 36 acres would be crossed by vehicles annually to access underground facilities (1,080 acres over the 30-year permit term). This Covered Activity would take less than a day to complete, including any off-road travel.

E2b Underground Transmission Lines

SMUD has eight underground transmission lines; six lines are located in the downtown area and two lines are located in the Carmichael area. Four of the transmission lines in the downtown area and the two lines in the Carmichael area are high-pressure oil-filled (HPOF) pipe-type cables. The remaining two lines in the downtown area have cross-linked polyethylene solid dielectric insulated cables installed in PVC conduits in a concrete-encased duct bank. Both types of cables run through a system of manholes and terminate at substations.

High-pressure oil-filled cables have oil-pumping plants located in four substations to maintain the oil pressure within the pipe. Buried metal, particularly long pieces such as pipe, attracts electromagnetic waves, or current. The current collects on and enters the conductor (pipeline) at an anode, and exits the conductor at a cathode. Damage does not occur from current exiting a conductor, but the anode slowly disintegrates as current enters, which could result in pipeline pitting or corrosion. Pipelines are coated to ensure that they act as a cathode, but the coating can degrade over time. Degradation can occur faster in areas of high moisture content (e.g., resulting from precipitation or irrigation) and where the pipeline is exposed to large amounts of induced AC. The pipe-type cable requires cathodic protection systems to protect the steel pipe from corrosion.

SMUD crews are required to visit the HPOF pumping plants and perform a visual inspection at least once per month, but weekly inspections are typically performed. SMUD monitors oil pressure in the pipes by checking pressure charts and collects the charts during inspection visits. SMUD crews perform identified corrective maintenance at the pumping stations as needed.

To protect underground pipe-type cable systems from corrosion, SMUD has installed two kinds of cathodic protection systems. The 115kV pipe-type cables have an impressed

current cathodic protection system, and the 230kV pipe-type cables rely on a passive, or galvanic, cathodic protection system using sacrificial anodes.

SMUD crews inspect the cathodic protection systems and take measurements at all tests boxes located along the length of cable. The test boxes have terminals that tie to the different sections of pipe. These measurements indicate if the pipe has adequate protection from corrosion by the passive or impressed current cathodic protection system. SMUD visually inspects the condition of the isolator/surge protector (ISP) as well. The solid-state ISPs do not require maintenance.

Manholes are visually inspected to check for damaged lids, disposition of lid covers (for safety and trip hazards), and the presence of water. While inspecting manholes, the network crews annually inspect the condition of cable splices and grounding for the cable.

Table 2-2. Frequency of Inspections of Underground Transmission Lines

Equipment	Inspection, CMTs or Tests	Interval
Pumping Plant	Visual Inspection	Weekly
Manholes	Visual Inspection	Annually
Insulating Fluid Pressure	Visual Inspection, Monitor Pressure	Weekly
Cathodic Protection System	Direct Current Voltage Survey	Annually

SMUD's underground transmission equipment would be inspected on an annual cycle, and pumping plant inspections in substations would occur weekly (see Table 2-2). SMUD would access components associated with SMUD's underground transmission facilities in pickup trucks or service trucks using existing roads; no off-road travel would be necessary. Inspections would take less than a day. Inspection of SMUD's underground transmission facilities could result in vehicle movement, vehicle noise, and human presence.

E3 Substation Insulator Washing

Substation insulator washing would consist of cleaning ceramic insulators that accumulate residue from birds and other animals. The substations would typically be energized during insulator washing. When the substation is energized, ground pumice or ground corncobs would be sprayed onto the insulators. If the Covered Activity is conducted when the substations are de-energized, deionized water would be used to wash the insulators for 20 minutes each; the total volume would not exceed 25 gallons per substation, and no soap or solvents would be used during the washing process. Wash water would not leave the substation footprint.

Insulators are located within existing substations where the ground is covered with gravel or pavement. SMUD would access the substations in service trucks from established roads. Equipment used for substation insulator washing could include a service truck and another service truck with a mounted pressure washer. Substation insulator washing could result in vehicle movement, vehicle and equipment noise, and human presence within the substation.

SMUD would wash substation insulators every 5 years at three substations (Hedge, Station B, and Pocket substations). SMUD assumes one additional substation would require insulator washing over the 30-year permit term. These substations are accessible from existing roads, and no off-road travel would be necessary. Substation insulator washing would be performed in less than a day.

E4 Substation Inspection, Maintenance, and Minor Upgrades

SMUD would conduct substation inspections of all existing 229 substations (18 transmission and 211 distribution) and all future substations (an estimated 278 substations by the end of the 30-year permit term) within the Permit Area monthly. Monthly substation inspections would be performed visually and consist of verifying component operation, determining the need for maintenance and/or component replacement, and inspecting the facility for safety.

SMUD estimates that 46 of the 229 existing substations (up to 56 of 278 substations including those assumed to be built in the future) would require some type of maintenance each year (each substation would require maintenance every 6 years). Substation maintenance includes repair or replacement of circuit breakers, power transformers, disconnect switches, capacitors, reactors, and other substation equipment such as bushings, surge arresters, bus and structures, control and metering equipment, auxiliary systems (fans, radiators, pumps, motors, controls, and nitrogen replenishment system), and the yard area.

An estimated 20 substations (up to 24 substations by the end of the 30-year permit term) would require component upgrades or repairs, or new components installed every year. Component upgrades and installation include transformer(s), capacitor banks, backup battery, metal clad switchgear, grounding grid, bus structure, new electric line outlets, fuses, and circuit breakers.

Gravel or pavement comprises most of the ground cover within transmission substations and all of the ground cover in distribution substations. Perimeter fences surround all substations. Additional maintenance activities could include adding gravel, constructing new secondary spill containment areas, or replacing fencing or walls. All substation inspection, maintenance, and minor upgrades would be completed within the existing substation perimeter.

SMUD would access substations for maintenance and equipment delivery in pickup trucks and flatbed trucks using existing roads; no off-road travel would be necessary. Substation inspections could result in vehicle movement, vehicle and equipment noise, and human presence within the substation. Work would occur inside existing fences and would be completed in 3 days or less. Land cover outside of the substations would not be affected during inspections, maintenance, or minor upgrades.

E5 Emergency Outage Inspection and Minor Repair

SMUD estimates that it would conduct an average of 3,523 emergency outage repairs annually, of which approximately 75 percent are on the overhead facilities and 25 percent are on the underground facilities. Power outages can occur because of weather, component failure, accidents, fire, or animal electrocution. Repairs would occur year-round.

SMUD would initially inspect electrical conductors or components to determine the location and probable cause of the outage. Simple repairs to restore power, such as re-closing a switch, would be completed during this Covered Activity. SMUD estimates that 80 to 85 percent of outage repairs could be resolved during the initial visit. For the other 15 to 20 percent, an additional SMUD crew would be dispatched to replace overhead or underground components, or poles (see Covered Activities E7, *Overhead Component Repair and Replacement*; E8, *Pole Replacement*; and E9, *Underground Component Repair and Replacement*). Emergency outage inspections and minor repairs for overhead facilities would be performed by accessing facilities, inspecting facilities and components from the ground, climbing towers and poles or using an aerial lift mounted on a service or line truck, and performing minor repairs. SMUD crews would access underground facilities through vault/pull boxes and make any repairs in those facilities.

SMUD would access electrical facilities using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Completion of one inspection and minor repair activity would take as short as 15 minutes and as long as 1 day, averaging approximately 2 hours. Equipment used for outage repair could include pickup trucks, service trucks, line trucks, and an aerial lift mounted on a service or line truck. Emergency outage inspection and minor repair activities could result in vehicle movement, vehicle and equipment noise, human presence, and dust generation and lay down of vegetation caused by off-road travel.

Emergency outage inspections and minor repairs would occur in a work area approximately 10 by 25 feet (0.006 acre) (an estimated 21.4 acres annually, and 642 acres over the 30-year permit term). An estimated 9 percent of SMUD's subtransmission and distribution lines is located in non-urban areas and could require off-road access. Assuming that the proportion of emergency outage repairs located in non-urban land cover that requires off-road access is equivalent to the proportion of the lines located in non-urban areas that require off-road access, an estimated 317 emergency outage repairs would require off-road travel. Off-road travel for each non-urban off-road emergency outage repair could use a corridor approximately 10 by 250 feet (0.06 acre) that would be crossed by vehicles. To access poles, towers, and underground facilities, SMUD estimates that approximately 19 acres would be crossed by vehicles annually (570 acres over the 30-year permit term). SMUD will apply the avoidance and minimization measures described in Chapter 5, *Conservation Strategy,* for emergency inspections and minor repairs where feasible, but it will not always be possible for SMUD to implement all applicable avoidance and minimization measures for emergency activities.

This Covered Activity covers only the initial inspection and repair associated with the emergency. Activities associated with replacement of overhead components, poles, or underground electric components are described in Covered Activities E7, *Overhead Component Repair and Replacement*; E8, *Pole Replacement*; or E9, *Underground Cable Repair and Replacement*.

E6 Wood Pole Testing and Treatment

Wood poles over 10 years old are intrusively inspected and tested every 10 years. Wood pole testing determines which wood poles are in need of repairs, such as fiber wrapping or trussing (also known as stubbing), or replacement. Wood poles that pass the intrusive inspection are tested again after 10 years. SMUD has an estimated 131,357 wood poles supporting transmission, subtransmission, and distribution lines in the Permit Area.

E6a Wood Pole Testing

Wood pole testing would be performed by excavating an area around the base of the pole approximately 20 inches deep and 12 inches wide using hand tools. Excavated material would be placed in a pile where it can be reused as backfill. A minimum of three half-inch holes would be bored into the wood pole at 45-degree angles to the axis of the pole using a handheld drill. Each successive boring would be 120 degrees to the right and 12 inches above the previous bore.

SMUD would determine, in the field, if the pole would need to be fiber-wrapped, trussed, or replaced based on the internal condition of the pole, the shell thickness, and the circumference of the pole. After testing, the interior of all tested poles would be treated with a fumigant following all applicable state and federal laws. Pole wrapping, trussing, and replacement activities are discussed below under Covered Activities E6b, *Wood Pole Repair—Fiber Wrapping*; E6c, *Wood Pole Repair—Trussing*; and E8, *Pole Replacement*. After testing is completed, the excavated area would be backfilled, using the previously excavated soil.

SMUD estimates that approximately 10 percent of the total amount of wood poles would be tested each year. An average of 13,600 poles would be tested each year over the 30-year permit term, and up to 14,028 by the end of the 30-year permit term.

In total, for all methods under Covered Activity E6, *Wood Pole Testing and Repair*, SMUD would access wood poles in pickup trucks and service trucks using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Testing one wood pole would take approximately 10 to 20 minutes. Equipment used for pole testing would include hand tools. The activities associated with wood pole testing could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, and temporary ground disturbance from excavation.

Removing soil to complete the wood pole testing would occur in a work area approximately 10 by 25 feet (0.006 acre) and temporarily disturb approximately 240

square inches for excavation and 240 square inches for soil stockpile (3.33 square feet total) adjacent to each of the 13,600 poles annually. Wood pole testing would temporarily disturb an estimated average of 1.09 acres annually (32.7 acres over the 30-year permit term).

An estimated 10.9 percent (1,482) of the wood poles tested annually under this Covered Activity could require off-road access. It is assumed that a corridor 10 feet wide and 250 feet long (0.06 acre) would be crossed by vehicles traveling off-road. To access wood poles for testing, SMUD estimates that approximately 88.92 acres would be crossed by vehicles annually (2,667.6 acres over the 30-year permit term). Wood pole testing would occur year-round, and for each pole tested the work would be completed in less than a day.

E6b Wood Pole Treatment—Fiber Wrapping

If wood pole testing under Covered Activity E6a reveals that minor treatment of the pole is needed, the pole would be fiber-wrapped. Fiber wrapping entails wrapping the pole at or below ground level with material that contains preservatives to slow the deterioration of the pole. This repair activity would occur in the field immediately following testing; no additional excavation or vehicle trips to the site would be required. Fiber wrapping a wood pole would be performed within the 20 minutes needed for the wood pole testing activity.

E6c Wood Pole Repair—Trussing

If wood pole testing reveals that the shell thickness of the pole is too thin at the ground line, the pole would be trussed. A second trip to the pole would be made to truss the pole following testing. Trussing would entail driving or setting a short steel truss (a steel bar approximately 14 by 3 inches wide, and 10 to 16 feet tall) into the ground and attaching it to the existing pole to provide additional support to the pole butt. This activity would involve jackhammering the steel truss into the ground approximately 5 to 8 feet deep directly adjacent to the pole and installing steel bands to secure the truss to the pole. SMUD estimates approximately 500 of the 13,600 wooden poles tested would be trussed each year (an average of 518 annually and up to 534 by the end of the 30-year permit term).

Equipment used for pole trussing could include jackhammers and hand tools. Pole trussing would take approximately 2 hours to complete. The activities associated with wood pole trussing could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, permanent vegetation loss, permanent ground disturbance, and ground vibration.

Wood pole trussing would occur in a work area approximately 10 by 25 feet (0.006 acre per event; 3.11 acres annually and 93.3 acres over the 30-year permit term). SMUD estimates approximately 42 square inches per truss would be permanently lost (an average of approximately 0.004 acre annually; 0.12 acre over the 30-year permit term).

An estimated 10.6 percent (55) of the 518 wood poles trussed annually under this Covered Activity could require off-road access. It is assumed that a corridor approximately 10 feet wide and 250 feet long corridor (0.06 acre) would be crossed by vehicles traveling off-road. To access wood poles for testing, SMUD estimates that 3.3 acres would be crossed by vehicles annually (99 acres over the 30-year permit term). Wood pole trussing would occur year-round, and for each pole the work would be completed in less than a day.

E7 Overhead Component Repair and Replacement

As described in Covered Activities E1, *Overhead Facilities Inspection,* and E5, *Emergency Outage Inspection and Minor Repair*, SMUD conducts routine and emergency inspections on their overhead transmission, subtransmission, and distribution facilities to verify stability, structural integrity, and condition of the electrical components mounted on the poles and towers. Overhead components must be repaired or replaced when they fail or become unsafe, when inspection reveals an anomaly that could lead to failure, or when a component is identified for replacement.

Covered Activity E7 addresses only the repair and replacement of components that are mounted on the pole or lattice tower. Other facility repairs, such as replacement of poles and towers are addressed under Covered Activity E8, *Pole Replacement,* and Covered Activity E10, *Steel Lattice Tower Repair or Replacement*.

Based on historical activities, SMUD estimates that 10,000 repairs or replacements of overhead components would occur each year in the Permit Area. To complete this activity, workers would either climb the pole or tower, or use an aerial lift on a service truck or line truck to access the component, and then repair or replace the component. This activity would occur year-round and may occur under emergency conditions.

SMUD would access electrical components on poles and towers in pickup trucks, service trucks, or line trucks using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Helicopters may be used up to 10 times annually to assist workers in the repair or replacement of components on transmission lines in sensitive habitat areas, in areas that are difficult to access, or if there are timing constraints. To accomplish this, the workers would be lowered on to the pole or tower by helicopter and then picked up by the helicopter.

This activity could result in vehicle movement, vehicle and equipment noise, helicopter noise, human presence, dust generation and lay down of vegetation caused by off-road vehicle travel, and temporary night lighting (under emergency conditions).

Overhead component repair and replacement would occur in a work area approximately 10 by 25 feet (0.006 acre; 60 acres annually, and 1,800 acres over the 30-year permit term).

An estimated 10.9 percent of SMUD’s overhead transmission, subtransmission, and distribution towers or poles is located in non-urban areas that could require off-road travel

for access. SMUD therefore assumes that approximately 10.9 percent (1,090) of repairs or replacements of overhead components would occur in non-urban areas that could require off-road travel. It is assumed that a corridor approximately 10 feet wide and 250 feet long (0.06 acre) would be crossed by vehicles for each repair or replacement. SMUD estimates that 65.4 acres would be crossed by vehicles annually for access to electrical components mounted on the towers and poles in SMUD's overhead transmission, subtransmission, and distribution facilities (1,962 acres over the 30-year permit term). Component repairs may take less than an hour or up to a full day for more complex jobs to be completed.

E8 Pole Replacement

SMUD estimates that 650 tubular steel and wood pole replacements occur each year in the Permit Area (an average of 671 tubular steel and wood pole replacements would occur yearly over the 30-year permit term, up to 690 at year 30).

Covered Activity E8 includes all pole replacement actions including those identified in Covered Activity E5, *Emergency Outage Inspection and Minor Repair*, Covered Activity E6, *Wood Pole Testing and Repair*, and as needed under Covered Activity E11, *Overhead Reconstruction and Reconductoring*. It also includes all transmission, subtransmission, and distribution pole replacements.

When pole replacement is warranted, the new pole would be installed adjacent to the existing pole, generally within 10 feet, to facilitate the transfer of the conductor from the old pole to the new pole. For purposes of describing Covered Activity E8, the excavated holes for new poles would average 24 inches in diameter.

The new poles would be *framed* (cross arms, pins, insulators, grounds, bonding, markers, and other mounted electrical components), and any anchors and guy wires attached before the pole is set in the ground.

To set the new pole, SMUD would typically excavate a pole hole and any necessary anchor holes using a truck-mounted machine auger and a line truck. An auger drill, slightly larger in diameter than the pole, would be used to excavate the hole, approximately 24 inches in diameter. The soil would be stockpiled directly adjacent to the hole. Pole setting depths would range from 5 to 14 feet.

In areas with hard and compacted soils, or when other underground utilities are present, SMUD may excavate pole holes with a technique called *hydro-excavation*. This is a non-mechanical process that uses pressurized water and an industrial strength vacuum to simultaneously excavate and evacuate soil. Use of this technique virtually eliminates any risk of underground utility damage. As hydro-excavation breaks up soil, the soil and water slurry would be conveyed by vacuum to a debris tank on the truck. The soil slurry would be hauled offsite and disposed of in accordance with state and federal law.

SMUD would use a line truck with a mounted boom to hold the new pole in place in the pole hole. The space between the pole and the hole would be backfilled with the

stockpiled soil or with imported fill material when hydro-excavation is used. After the new pole is set, the existing conductors would be moved from the old pole to the new pole.

The old pole would be removed from the ground using a pole jack (a 10-inch by 18-inch hydraulic jack mounted on a line truck). The hole would be backfilled using hand tools with native soil excavated from the new hole or with imported soil if hydro-excavation was used to excavate the pole hole. Most pole removals would be done from vehicles that remain on adjacent roadways, using a boom that can reach the pole from the truck. The old pole may be cut into segments to facilitate disposal.

In easily accessible locations, pole replacement would take less than a day. In areas that require manual labor (e.g., backyards or sensitive-habitat areas that are not accessible by a line truck and truck-mounted auger), the replacement work could take up to 3 days. Pole replacement projects would occur year-round and may occur under emergency conditions.

SMUD would access poles using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. The new pole would be delivered to the site on a pole dolly (which connects to the line truck). Other equipment used could include pickup trucks, service trucks, line trucks, a pole jack, truck-mounted machine auger, backyard pole setter, and hand tools such as chainsaws and pole saws.

Pole replacement activities could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary and permanent vegetation removal and ground disturbance, ground vibration, and temporary night lighting (under emergency conditions). When poles are replaced, either the new pole would be placed in the original pole hole, or the original pole would be removed and vegetation would passively reestablish at the old pole location. Flexibility in the exact pole placement location would typically allow the new replacement poles to be sited to avoid sensitive habitats (e.g., vernal pools).

A work area up to approximately 100 feet by 100 feet (typical in rural areas and less in urban areas; 0.23 acre) would be used to complete this Covered Activity (an estimated 154.33 acres annually, and 4,629.9 acres over the 30-year permit term). SMUD would park any vehicles and equipment within this area for less than a day. Within the work areas, each pole replacement would temporarily disturb an estimated 103.14 square feet (100 square feet for soil stockpile, approximately 3.14 square feet to backfill of the old hole, or 0.002 acre). The average of 671 replacements would temporarily disturb an average of 1.34 acres annually (40.2 acres over the 30-year permit term).

As described below in Covered Activity V6, *Pole Vegetation Clearing*, SMUD is required to clear vegetation at the base of poles located in California Department of Forestry and Fire Protection State Responsibility Areas (SRAs) that have hardware with the potential to cause sparks, such as a switch, fuse, transformer, or lightning arrester (per Public Resources Code [Public Res. Code] § 4292). Approximately 1,000 poles in the Permit Area need SRA clearance. All vegetation within a radial distance of approximately 10 feet (an estimated 376.8 square feet, or 0.009 acre) around the base of these existing

poles must be maintained clear. The vegetation-clear zones are cleared in perpetuity (before and after an existing pole is replaced).

SMUD assumes that 20 poles would be replaced each year within the SRA under this Covered Activity, around which a new area of vegetation would need to be removed that would correspond to the permanent loss of an estimated 0.18 acre from vegetation removal (5.4 acres over the 30-year permit term). Following this initial vegetation removal, implementation of Covered Activity V6, *Pole Vegetation Clearing*, would maintain the absence of vegetation around the base of these new poles indefinitely.

An estimated 11 percent (73 poles) of SMUD's total 671 wood and tubular steel poles to be replaced each year are in non-urban areas and could require off-road access. It is assumed that a corridor 10 feet by 250 feet (0.06 acre) would be crossed by vehicles traveling off-road during each pole replacement. Therefore, SMUD estimates that 4.38 acres would be crossed by vehicles annually for access to poles under Covered Activity E8 (131.4 acres over the 30-year permit term). Pole replacement activities located in non-urban land cover would require less than a day of off-road travel in any given location.

E9 Underground Component Repair and Replacement

Repair or replacement of SMUD's underground electric components (transformers, bus work and switches in vaults, aboveground pad-mounted transformers, pad-mounted switching cubicles, and cable) would occur as a result of inspections described in SMUD's Covered Activities E2, *Underground Facilities Inspection*, and E5, *Emergency Outage Inspection and Minor Repair*.

E9a Cable Replacement in Conduit

Replacement of cable in conduit would entail driving to the vault or pull box in a pickup truck and completing any activities in the vault or pull box. The damaged cable would be pulled out through the vault or pull box. The new segment of cable would be pulled in through the conduit.

SMUD would access the vaults and pull boxes using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used could include pickup trucks, service trucks, a truck- or trailer-mounted bull-wheel puller, rewinders with collapsible reels, truck-mounted tensioners, conductor reel trailers, and conductor reels.

A work area approximately 100 feet by 100 feet at both ends (0.46 acre) adjacent to existing vaults or pull boxes would be used to complete this Covered Activity (an estimated 23 acres annually, and 690 acres over the 30-year permit term). SMUD would park any vehicles and equipment within this area. Covered Activity E9a could result in vehicle movement, vehicle and equipment noise, human presence, and dust generation and lay down of vegetation, and temporary night lighting (under emergency conditions). Land cover would not be modified during this Covered Activity. SMUD assumes that this Covered Activity would occur 50 times annually, under both emergency and non-

emergency conditions. A typical underground cable replacement in conduit activity would take a day.

An estimated 5.4 percent (1,358) of the 25,141 total vaults/pull boxes is located in non-urban areas that would require off-road travel for access. It is assumed that 5.4 percent of the 50 cable replacement in conduit activities (three activities) would require off-road travel each year. For replacement of cable in conduit requiring off-road access, it is assumed that a 10-foot-wide and 3,500-foot-long corridor (0.8 acre) would be crossed by vehicles traveling off-road (an estimated 2.4 acres annually, and 72 acres over the 30-year permit term).

E9b Pad-Mounted Transformer Repair and Replacement

SMUD estimates that an average of 150 of the total 42,776 aboveground pad-mounted transformers would be repaired or replaced annually.

Aboveground pad-mounted transformers would be replaced by first removing the underground cable terminations from the transformer. The transformer would then be unbolted from the cement pad and lifted off the pad by a boom on a truck or crane. The new transformer would be placed on the pad using a crane, bolted down, and the underground terminations reconnected. If the transformer pad was damaged, then it would be replaced with a new prefabricated cement pad prior to the installation of the new transformer. A boom on a truck or crane would be used to place the new pad.

SMUD would access aboveground transformers using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used could include pickup trucks (with a trailer), service trucks, line trucks, hand tools, and a crane (boom truck). This Covered Activity could occur year-round and may be completed under both emergency and non-emergency conditions. Repair and replacement of a pad-mounted transformer would take half a day. Covered Activity E9b could result in vehicle movement, vehicle and equipment noise, human presence, dust generation and lay down of vegetation, and temporary ground disturbance.

A work area approximately 100 feet by 100 feet (0.23 acre) would be used to complete this Covered Activity (an estimated 34.5 acres annually, and 1,035 acres over the 30-year permit term). SMUD would park any vehicles and equipment and repair or replace transformers within this area. Approximately 1,600 square feet (0.04 acre) of land would be temporarily disturbed during repair or replacement of a pad-mounted transformer (6 acres annually, and 180 acres over the 30-year permit term).

An estimated 3.4 percent (1,455) of the 42,776 pad-mounted transformers is located in non-urban areas that would require off-road travel for access. SMUD therefore assumes that approximately 3.4 percent of the 150 transformers to be replaced annually (five transformers) would be located in non-urban areas and could require off-road travel for access. SMUD assumes that a corridor approximately 10 feet wide and 500 feet long (0.12 acre) would be crossed by vehicles traveling off-road. SMUD estimates that 0.6 acre would be crossed by vehicles annually for transformer repair or replacement

(18 acres over the 30-year permit term). This Covered Activity of repairing or replacing a pad-mounted transformer would be performed in less than a day.

E9c Direct-Buried Cable Replacement—Trenching

Direct-buried cables (cable not in conduit) that have failed and require replacement may be removed or abandoned in place. In most cases, SMUD would install replacement cable in new conduit, using either trenching or horizontal directional drilling (HDD) as described below. Occasionally, SMUD would use the trenching technique to repair direct-buried line.

SMUD estimates that approximately 300,000 feet (56.82 miles) of direct-buried subtransmission and distribution cable is replaced annually with conduit using the trenching method (1,000 feet per activity, 300 activities annually).

Trenching involves temporarily removing the surface material and soil to create void in which new conduit would be placed. Where appropriate, SMUD would preserve the top 6 inches of topsoil by segregating and storing it near the site. Typically, a construction work area width of 25 feet would be required to allow for the open trench and equipment. The typical trench dimensions for installation of new conduit measures 2 feet wide and 4 feet deep. Once the trench is excavated, one to six segments of 4- or 6-inch-diameter plastic conduit would be installed on the trench floor and partially backfilled with concrete slurry. The trench would be backfilled with the previously excavated soil and the conduit buried under at least 2 feet of cover.

After the conduit is placed, pull boxes constructed of prefabricated, steel-reinforced concrete would be installed. These boxes are typically one of three sizes: 17 inches by 30 inches by 24 inches; 4 feet by 6 feet by 4 feet; or 6 feet by 8 feet by 4 feet. The total excavation footprint for a pull box would typically be about 2 feet bigger than the box. Construction equipment and workers installing prefabricated pull boxes will stay within the 25-foot-wide construction work area. New pull boxes would typically be installed at 200- to 1,000-foot intervals on straight runs and at junctions. The pull boxes would be used initially to pull the new cables through the conduit and to splice cables together. During electrical line operation, pull boxes provide access to the underground cables for inspections and repairs.

Cable would be installed through the conduit at the pull boxes. A cable reel would be placed in a pull box at one end of the new conduit, and a pulling rig would be placed in a pull box at the other end of the conduit. A wire rope would be attached to cable pulling eyes and the cable would be pulled through the conduit. To ease pulling tensions, a lubricant may be applied to the cable as it enters the conduit. The ends of the segments would be spliced together at pull boxes after they are completely pulled through the conduit.

SMUD would access direct-buried cable sites using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used could include pickup trucks, service trucks, line trucks, trailer-mounted cable reels, trailer-

mounted pulling rigs, and backhoes or wheel trenchers. Equipment used for this activity in roadways could include the equipment listed above and a jackhammer, a compressor, a compactor, and repaving equipment. Covered Activity E9c could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, temporary ground disturbance from excavation, permanent vegetation and land cover loss at pull box sites, ground vibration (in roadways).

A work area approximately 25 feet by 1,000 feet (0.57 acre) would be used to complete this Covered Activity (an estimated 171 acres annually, and 5,130 acres over the 30-year permit term). SMUD assumes the entire work area would be temporarily disturbed. Each pull box installed for cable replacement using trenching would permanently remove approximately 43 square feet (an estimated 0.6 acre each year, 18 acres over the 30-year permit term assuming 600, 6-foot by 8-foot pull boxes would be installed each year). Generally, installation of 1,000 feet of underground conduit, pull boxes, and cable using the trenching method would take approximately 1 day if the soil can be easily trenched and 2 to 3 days if the ground is difficult to trench. This activity could occur year-round, and would be completed primarily under non-emergency conditions.

An estimated 1.5 percent of SMUD's direct buried conduit (30 miles) is located in non-urban areas that could require off-road travel for access. SMUD therefore assumes that 1.5 percent, or five, of the direct-buried cable replacement projects would be located in a non-urban area that could require off-road travel for access. SMUD assumes that a corridor approximately 10 feet by 500 feet (0.11 acre) would be crossed by vehicles traveling off-road. SMUD estimates that 0.55 acre would be crossed by vehicles annually for cable replacement using trenching (an estimated 16.5 acres over the 30-year permit term).

E9d Direct-Buried Cable Replacement—Horizontal Directional Drilling

SMUD estimates that 115,000 linear feet (21.78 miles) of existing direct-buried cable is replaced each year by the HDD method (700 feet per activity, 164 activities annually). HDD is a construction method of installing underground conduit in a shallow arc along a prescribed underground bore path by using a surface-launched drilling rig, with minimal disturbance to the surrounding area. Replacement of direct-buried line by HDD minimizes disturbance to the surface.

The HDD process would start with the transportation of a drilling rig to the site and excavation of a receiving pit (approximately 12 square feet) and a launching pit (approximately 9 square feet). The drilling rig would drill a pilot hole from the launching pit to the receiving pit along the designated underground path. The drilling rig would use a second stage drill bit to enlarge the pilot hole by passing a larger cutting tool known as the back reamer. In the third stage, the plastic conduit would be pulled through the enlarged hole behind the reamer to allow centering of the conduit in the bore path.

HDD is done with the help of a drilling fluid, a mixture of water and usually bentonite or a polymer that is continuously pumped to the drill bit or reamer to facilitate the removal of

soil cuttings, stabilize the bore path hole, cool the cutting head, and lubricate the passage of the drill bit and pipe. Drilling fluids hold the soil cuttings in suspension to prevent them from clogging the bore path. The drilling fluid accumulates in the launching pit until it is vacuumed out and disposed of in accordance with state and federal law.

After the HDD is complete, cable would be pulled through the conduit using the method described above in Covered Activity E9c, *Direct-Buried Cable Replacement—Trenching*. After the conduit is placed, pull boxes constructed of prefabricated, steel-reinforced concrete would be installed. These boxes are typically one of three standard sizes: 17 inches by 30 inches by 24 inches, 4 feet by 6 feet by 4 feet, or 6 feet by 8 feet by 4 feet. The total excavation footprint for a pull box is typically about 2 feet bigger than the box. New pull boxes would typically be installed at both ends of the HDD. The pull boxes would be used initially to pull the new cables through the conduits and to splice new cables together. During later electrical line operation, pull boxes provide access to the underground cables for inspections and repairs. A cable reel would be placed in a pull box at one end of the new conduit, and a pulling rig would be placed in a second pull box at the other end of the conduit. A wire rope would be attached to cable pulling eyes and the cable would be pulled through the conduit. To ease pulling tensions, a lubricant may be applied to the cable as it enters the conduit. The ends of the segments would be spliced together at pull boxes after they are completely pulled through the conduit.

Generally, installation of 700 feet of underground conduit and cable using the HDD method would take 4 days. This Covered Activity could occur year-round but would primarily be completed in dry weather conditions.

SMUD would access direct-buried cable for replacement by the HDD method using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used would include a drilling rig, backhoes, welding equipment, water trucks, pickup trucks, a bulldozer, trailer-mounted cable reels, and trailer-mounted pulling rigs.

Activities associated with HDD could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, temporary ground disturbance from excavation, permanent vegetation and land cover loss at pull box sites, ground vibration, and temporary night lighting.

A work area approximately 50 feet by 100 feet (0.12 acre) would be used to complete this Covered Activity (19.68 acres annually, and 590.4 acres over the 30-year permit term). SMUD would park any vehicles and equipment and perform the work within this area. SMUD assumes the entire work area would be temporarily disturbed. Each HDD activity would require the following components.

- Receiving pit (12-square-foot excavation and 25-square-foot soil stockpile [0.0008 acre]).

- Launching pit (9-square-foot excavation and 25-square-foot soil stockpile [0.0008 acre]).
- Drilling rig staging (625 square feet, or 0.01 acre).
- Pull box installations (two 80-square-foot excavations and two 100-square-foot soil piles [0.008 acre]).

Each of the HDD activities each year would require two pull boxes. Assuming 328 pull boxes (6 feet by 8 feet) would be installed each year, a total of approximately 0.33 acre would be permanently lost annually (an estimated 9.9 acres over the 30-year permit term).

An estimated 1.5 percent of SMUD's direct-buried cable (30 miles) is in non-urban areas that could require off-road travel for access. It is assumed that two of the 164 events would require off-road travel, and a corridor approximately 10 feet by 1,000 feet would be crossed by vehicles traveling off-road. SMUD estimates that 0.23 acre would be crossed by vehicles per event for cable replacement using HDD (an estimated 0.46 acre annually, and 13.8 acres over the 30-year permit term). A typical direct-buried cable replacement using HDD would take 4 days.

E9e Cable Repair (Third Party Damage/Dig In)

If a third party damaged cable in conduit, the section of damaged conduit would first be removed and repaired. The damaged section of cable would be removed after the conduit is repaired, and the new cable would be pulled through the repaired conduit from the closest pull boxes. If direct-buried cable were damaged, then a splice kit would be used to replace the damaged section of cable.

SMUD would access damaged cable or damaged conduit sites using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used would include pickup trucks, a backhoe or small excavator, trailer-mounted cable reels, and trailer-mounted pulling rigs. Equipment used for this activity in roadways could include the equipment listed above and a jackhammer, a compressor, a compactor, and repaving equipment. This Covered Activity could occur year-round and would be completed under emergency conditions.

Activities associated with cable repair could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, temporary ground disturbance from excavation, and ground vibration (in roadways).

SMUD assumes that it will need to repair cable damaged by a third party 20 times a year (600 times over the 30-year period). To repair cable or conduit that is damaged during ground-disturbing activities conducted by a third party, SMUD would use a work area approximately 30 feet by 20 feet (0.01 acre) and excavate an area approximately 4 feet by 6 feet by 5 feet deep (0.0006 acre) to allow access to the damaged area. An estimated

0.2 acre would be temporarily disturbed each year (an estimated 6 acres over the 30-year permit term).

An estimated 3 percent (150 miles) of SMUD's direct-buried cable or conduit is located in non-urban areas that could require off-road travel for access. SMUD assumes that one cable repair due to third party damage or a dig in would occur in non-urban areas that require off-road access each year. A corridor approximately 10 feet by 250 feet long (0.06 acre) would be crossed by vehicles. SMUD estimates that 0.06 acre would be crossed by vehicles annually for access to replace cable in conduit (an estimated 1.8 acres over the 30-year permit term). A typical cable or conduit repair would take less than a day.

E10 Steel Lattice Tower Repair and Replacement

SMUD currently has 560 steel lattice towers that support its transmission lines in the Permit Area. SMUD would inspect lattice towers as described above under Covered Activity E1, *Overhead Facilities Inspection*, for structures in need of repair or replacement. SMUD estimates that two lattice tower superstructures and two lattice tower foundations would need to be repaired annually, and 10 lattice towers would need to be completely replaced over the 30-year permit term.

E10a Steel Lattice Tower Superstructure Repair

If an overhead facility inspection reveals that a steel lattice tower needs to be repaired, it would typically be strengthened through the replacement, modification, or addition of steel lattice pieces on the superstructure. SMUD crews would either climb the structure or use a line truck to be lifted to the area that needed repair, and then replace, modify, or add steel lattice pieces using hand tools. Depending on the size and location of the new steel pieces, a crane may be used to lift the piece(s). A work area of approximately 100 feet by 100 feet would be used to complete this Covered Activity. SMUD would park any vehicles and equipment within this area.

SMUD would access lattice towers for superstructure repairs using existing roads. In the event that no road exists, driving off-road may be necessary. Equipment used could include pickup trucks, service trucks, line trucks, manual hand tools, mechanical tools, and a crane brought to the site on a trailer, depending on the location of the repair work. If a lattice tower was located in a sensitive habitat area that precludes access by ground, then a helicopter could be used to place workers and move equipment to and from the tower.

Covered Activity E10a would be done during the dry season unless an emergency repair was required during the wet season. Steel lattice tower superstructure repair could result in vehicle movement, vehicle and equipment noise, helicopter noise, human presence, and dust generation and lay down of vegetation caused by off-road travel.

SMUD estimates two lattice tower superstructures would need to be repaired each year. SMUD estimates that each superstructure repair work area would be approximately

10,000 square feet (an estimated 0.23 acre each, or 0.46 acre annually, and approximately 13.8 acres during the 30-year permit term).

An estimated 67.5 percent of SMUD's lattice towers (378 towers) is located in non-urban areas. An estimated 96.8 percent (366 towers) of SMUD's lattice towers located in non-urban areas could require off-road travel for access. It is assumed that one lattice tower superstructure located in non-urban areas would need to be repaired and could require off-road travel each year. SMUD assumes a corridor 10 feet by 1,000 feet would be crossed by vehicles. SMUD estimates that approximately 0.23 acre would be crossed by vehicles annually for access to towers (6.9 acres over the 30-year permit term). A typical lattice tower superstructure repair would take 7 days.

E10b Steel Lattice Tower Foundation Repair

If an overhead line inspection reveals that foundation repair is required, tower foundations would typically be strengthened by adding steel bars and concrete. A hole approximately 6 feet by 6 feet by 6 feet (0.001 acre) would be excavated around the existing footing (which measures approximately 18 inches in diameter) using a backhoe. The soil would be stockpiled directly adjacent to the excavation (a stockpile approximately 625 square feet, or 0.01 acre). SMUD workers would remove the existing concrete using handheld jackhammers, which would expose the steel reinforcements. Additional steel reinforcement bars would be placed in the excavated hole, and a cement form expanding the footing by an additional 2 feet in diameter would be placed in the hole. A cement truck would be used to pour concrete into the form around the steel reinforcements.

SMUD would access lattice towers for foundation repair using existing roads. In the event that no road exists, driving off-road may be necessary. Equipment used could include pickup trucks, line trucks, cement trucks, jackhammers, backhoes, and dump trucks. Foundation repair could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, temporary ground disturbance from excavation, permanent vegetation and land cover loss from expanded footings, ground vibration, and temporary night lighting (under emergency conditions). This Covered Activity would be done during the dry season unless an emergency repair was required during the wet season.

SMUD estimates that two lattice tower foundations would need to be repaired each year. A work area approximately 100 feet by 100 feet (0.23 acre) (0.46 acre annually, 13.8 acres over the 30-year permit term) would be used to complete this Covered Activity. SMUD would park any vehicles and equipment within this area.

An estimated 0.011 acre would be temporarily disturbed for each foundation repair, including both the excavated area and the stockpile area (an estimated 0.022 acre annually, 0.66 acre over the 30-year permit term).

Each foundation repair would also permanently remove approximately 8 square feet (0.0002 acre) assuming that the tower footing would be expanded by an additional 2 feet in diameter (0.0004 acre annually, and 0.01 acre over the 30-year permit term).

An estimated 67.5 percent (378 towers) of SMUD's lattice towers is located in non-urban areas. An estimated 96.8 percent (366 towers) of SMUD's lattice towers located in non-urban areas could require off-road travel for access. SMUD assumes that one lattice tower foundation repair would be located in non-urban areas and would require off-road travel for access each year. SMUD assumes that a corridor approximately 10 feet by 1,000 feet would be crossed by vehicles traveling off-road. SMUD assumes approximately 0.46 acre would be crossed by vehicles annually for access to towers (13.8 acres over the 30-year permit term). A typical lattice tower foundation repair would take 4 days.

E10c Steel Lattice Tower Replacement—with a Tubular Steel Pole

Steel lattice towers may need to be replaced if inspection reveals that the superstructure is bent or broken, or more than one footing is compromised and cannot be repaired.

In most situations, SMUD would use a tubular steel pole to replace the damaged steel lattice tower, but in limited situations, a damaged lattice tower would be replaced with a new lattice tower as described in E10d, *Lattice Tower Replacement—with a New Lattice Tower*, below. Of the 10 towers that may need to be replaced over the proposed 30-year permit term, SMUD assumes that eight would be replaced with a tubular steel pole and two would be replaced with a steel lattice tower.

To replace a lattice tower with a tubular steel pole, a 9-foot-diameter hole would be augered up to 30 feet deep using a truck-mounted machine auger. The excavated soil would be stored onsite adjacent to the hole. An 18-inch-diameter steel reinforcing cage would be lowered into the hole by a crane. Approximately 1,900 cubic feet of concrete would be poured from a cement truck to form the new reinforced concrete foundation. New electrical components (cross arms, pins, insulators, etc.) would be attached to the tubular steel pole, which would then be lifted to an upright position by a crane and bolted to the concrete foundation by workers using handheld power tools. The transmission line conductors would be removed from the old tower using a crane and attached to the new tubular steel pole.

The existing lattice tower footings would be removed using handheld jackhammers to break up the concrete, a backhoe to remove the rubble, and a dump truck to haul the rubble offsite to an appropriate disposal site; then the four holes would be backfilled with native soil excavated from the new tower. The old tower would be removed from the site and taken to an appropriate disposal site (permitted under state law and with existing federal Endangered Species Act [ESA]/California Endangered Species Act [CESA] clearances) or recycled. Soil excavated from the tubular steel pole hole would be used to backfill the holes from the lattice tower, spread out onsite in an area 50 feet by 30 feet, or hauled offsite for disposal.

The new tubular steel pole would be constructed as close to the existing lattice tower as possible. Construction of a temporary pole or poles (shoo-fly) may be required to support the conductors during the tower replacement. A shoo-fly consists of a number of wood poles and anchors temporarily installed to support the conductors. Pole setting depths range from 4 to 14 feet. Equipment to construct the shoo-fly includes hand tools to attach electrical components (cross arms, pins, insulators, etc.) to the shoo-fly pole, a truck-mounted auger, truck-mounted pole setter, and a line truck. Existing conductors would be removed from the old lattice tower structure and attached to the temporary shoo-fly poles. In most cases, this can be accomplished with one to two poles for every conductor attached to the structure being shoo-flied. SMUD assumes one steel lattice tower replacement with tubular steel pole would require six temporary shoo-fly poles. Once the tubular steel pole is installed and the conductors replaced, the temporary wood poles would be removed.

SMUD would access steel lattice towers using existing roads. In the event that no road exists, driving off-road may be necessary. Equipment used could include pickup trucks, line trucks, backhoes, a crane, a truck-mounted machine auger, cement trucks, and dump trucks.

Replacing a lattice tower could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, temporary ground disturbance from excavation, and ground vibration. This Covered Activity would be done during the dry season unless an emergency repair was required during the wet season.

For each steel lattice tower replacement with a tubular steel pole, a work area approximately 150 feet by 150 feet (0.52 acre) would be used. SMUD would park any vehicles and equipment and perform the activity within this area. The temporary work area would include the following elements:

- An area approximately 50 feet by 100 feet (5,000 square feet, or 0.11 acre) for removal of the old tower.
- An area approximately 10 feet by 40 feet (400 square feet, or 0.009 acre) for the crane footprint.
- A staging area approximately 25 feet by 100 feet (2,500 square feet, or 0.06 acre).
- A soil stockpile area approximately 50 feet by 30 feet (1,500 square feet, or 0.03 acre).
- Six temporary shoo-fly poles and shoo-fly soil stockpile (estimated 103 square feet per pole; 636 square feet, or 0.01 acre total).

The total temporary disturbance would be approximately 10,036 square feet (0.23 acre for each and 1.84 acres, assuming eight replacements, over the 30-year permit term). Permanent land cover loss from the foundation would be an estimated 63.59 square feet (0.001 acre each, and 0.008 acre, assuming eight replacements, over the 30-year permit term).

An estimated 67.5 percent (378 towers) of SMUD's lattice towers is located in non-urban areas. An estimated 96.8 percent (366 towers) of SMUD's lattice towers located in non-urban areas could require off-road travel for access. SMUD assumes that five steel lattice towers would be replaced in non-urban areas and would require off-road access. It is assumed that a corridor approximately 10 feet by 1,000 feet would be crossed by vehicles and equipment (0.23 acre per event; 1.15 acres over the 30-year-permit term). A typical steel lattice tower replacement would take approximately 4 weeks.

E10d Lattice Tower Replacement—with a New Lattice Tower

Of the 10 towers that may need to be replaced over the proposed 30-year permit term, SMUD assumes that two would be replaced with a steel lattice tower and eight would be replaced with a tubular steel pole (Covered Activity E10c, *Steel Lattice Tower Replacement—with a Tubular Steel Pole*).

To replace a lattice tower with a new lattice tower, four 5-foot-diameter holes would be augured up to 10 to 15 feet deep using a truck-mounted machine auger. The excavated soil would be stored onsite and either used to backfill holes from the old tower, spread out onsite, or hauled offsite and disposed of appropriately. Steel reinforcing cages measuring 18 inches in diameter would be lowered into the holes by a crane, and concrete from a cement truck would be poured to form the reinforced foundation. Electrical components (cross arms, pins, insulators, etc.) would be attached to the tower, which would then be lifted upright and set on the foundations using a crane and bolted to the concrete foundations by workers using hand tools. The new lattice tower would be constructed as close to the existing lattice tower as possible. The transmission line conductors would be removed from the old tower using a crane and attached to the new tower.

The existing lattice tower footings would be removed using handheld jackhammers to break up the concrete, a backhoe to remove the rubble, and a dump truck to haul the rubble offsite to an appropriate disposal site; then the four holes would be backfilled with native soil excavated from the new tower. The old tower would be removed from the site and taken to an appropriate disposal site (permitted under state law and with existing federal ESA/CESA clearances) or recycled. Soil excavated for the new steel lattice tower would be used to backfill the holes from the old steel lattice tower, spread out onsite in an approximately 50-foot-by-30-foot area, or hauled offsite for disposal.

Construction of a shoo-fly may be required to support the conductors during the tower replacement. A shoo-fly consists of a number of wood poles and anchors temporarily installed to support the conductors. Pole setting depths range from 4 to 14 feet. Equipment to construct the shoo-fly includes hand tools to attach electrical components (cross arms, pins, insulators, etc.) to the shoo-fly pole, a truck-mounted auger, truck-mounted pole setter, and a line truck. Existing conductors are removed from the old lattice tower structure and attached to the temporary shoo-fly poles. In most cases, this can be accomplished with one to two poles for every conductor attached to the structure being shoo-flied. SMUD assumes one steel lattice tower replacement with a steel lattice

tower would require six temporary shoo-fly poles. Once the new lattice tower is installed and the conductors replaced, the temporary wood poles would be removed.

SMUD would access lattice towers using existing roads. In the event that no road exists, driving off-road may be necessary. Equipment used could include pickup trucks, line trucks, backhoes, a crane, a truck-mounted machine auger, cement trucks, and dump trucks.

Replacing a lattice tower could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, temporary ground disturbance from excavation, and ground vibration. This Covered Activity would primarily be completed during the dry season unless an emergency repair was required during the wet season.

For each lattice tower replacement with a new lattice tower, a work area approximately 150 feet by 150 feet (0.52 acre) would be used to complete this Covered Activity. SMUD would park any vehicles and equipment and perform the activity within this area. The temporary work area would include the following elements:

- An area approximately 50 feet by 100 feet (5,000 square feet, or 0.11 acre) for removal of the old tower.
- An area approximately 10 feet by 40 feet (400 square feet, or 0.009 acre) for the crane footprint.
- A staging area approximately 25 feet by 100 feet (2,500 square feet, or 0.06 acre).
- A soil stockpile area approximately 50 feet by 50 feet (2,500 square feet, or 0.06 acre).
- Six temporary shoo-fly poles and shoo-fly soil stockpile (an estimated 103 square feet per pole; 636 square feet or 0.01 acre total).

The total temporary disturbance would be an estimated 11,036 square feet (0.25 acre, and 0.5 acre over the 30-year permit term). Permanent land cover loss from the footings would be an estimated 78.52 square feet for each tower (0.002 acre, and 0.004 acre over the 30-year permit term).

An estimated 67.5 percent (378 towers) of SMUD's lattice towers is located in non-urban areas. An estimated 96.8 percent (366 towers) of SMUD's lattice towers located in non-urban areas could require off-road travel for access. SMUD assumes that one steel lattice tower would be replaced in non-urban areas and would require off-road access. SMUD assumes that a corridor approximately 10 feet by 1,000 feet would be crossed by vehicles and equipment (0.23 acre over the 30-year permit term). A typical steel lattice tower replacement would take approximately 4 weeks.

E11 Overhead Reconstruction and Reconductoring

SMUD may undertake activities to allow more energy to flow through its system, including reconstruction and reconductoring projects.

Reconstruction entails adding new subtransmission or distribution conductors to existing poles that support existing conductor. Reconductoring also entails replacing existing conductor with a thicker conductor to allow for an increase in capacity to accommodate planned growth consistent with existing general plans (not to anticipate or facilitate more growth than is currently planned). Reconstruction and reconductoring projects would occur within existing distribution or subtransmission easements. SMUD can conduct reconstruction and reconductoring projects on existing tubular steel poles and wood poles where pole strength and height are adequate to support the additional conductor and components. However, typically the strength and/or height are not adequate. Replacement of the existing poles is included in Covered Activity E8, *Pole Replacement*.

This Covered Activity only addresses adding new conductors (reconstruction) or replacing existing conductor with thicker conductor (reconductor) on existing subtransmission or distribution lines.

For reconstruction and reconductoring, conductors would be strung on existing poles, or strung on new poles after the poles are set (see E8, *Pole Replacement*). Conductors are strung using travelers that would be attached to the cross arms on each pole, either during construction of the new pole or on an existing pole by means of a line truck. Installing the travelers would require a work area of approximately 10 feet by 25 feet (250 square feet, or 0.006 acre) per pole. New conductors would be pulled through the travelers using rope and either a reel trailer or a payout reel from a pull site. The temporary pull sites would be approximately 100 feet by 100 feet (10,000 square feet, or 0.23 acre), and centered on the existing easement, typically approximately every 0.5 mile or where the conductors cross a public road. After the conductors are strung through the travelers and properly tensioned, the insulators would be installed, the conductors would be permanently attached to the insulators, and the travelers would be removed. For reconductoring, the old conductor would be taken offsite and properly disposed of.

Shoo-fly structures (a temporary wood pole) may be installed where conductors cross over roadways, and at other locations where necessary, to prevent the conductors from contacting existing electric or communication facilities or to prevent contact with passing vehicles. Shoo-flies consist of wood poles and anchors temporarily installed to support the conductors. Pole setting depths range from 5 to 14 feet. Equipment used to construct the shoo-fly includes hand tools to attach electrical components (cross arms, pins, insulators, etc.) to the temporary pole, a truck-mounted auger, a truck-mounted pole setter, and a line truck. Existing conductors are removed from the old poles and attached to the shoo-fly poles. In most cases, this can be accomplished with one to two poles for every structure being replaced. The work area for each temporary pole (shoo-fly) would be approximately 100 feet by 100 feet (10,000 square feet, or 0.23 acre) including the temporary disturbance area of approximately 10 feet by 10 feet for soil storage (100 square feet, or 0.002 acre) and 3.14 square feet for the temporary pole.

SMUD would access reconstruction and reconductoring project sites using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used could include pickup trucks, service trucks, line trucks, a flatbed delivery truck, a truck- or trailer-mounted bull-wheel puller, rewinders with collapsible reels, truck-mounted tensioners, conductor reel trailers, and conductor reels.

Reconstruction and reconductoring could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, and temporary ground disturbance. This Covered Activity would not be completed under emergency conditions.

SMUD estimates that an average of 5 miles of distribution lines would be reconstructed each year within the Permit Area. SMUD estimates that an average of 1 mile of subtransmission or distribution line would be reconductored each year within the Permit Area. Reconstruction or reconductoring 1 mile of distribution or subtransmission line (including any pole replacement) would take up to 2 weeks, depending on the accessibility of the site.

The estimated temporary disturbance area corresponding to a reconstruction or reconductoring project 1 mile long would be an estimated 1.08 acres and includes the following elements.

- 0.16 acre for the travelers placed at poles (assuming 26 poles).
- 0.69 acre for three pull sites (one at each end and one in the middle).
- 0.23 acre for one shoo-fly.

The estimated temporary disturbance area corresponding to the work completed annually would total 6.48 acres for 5 miles of reconstructed line and 1 mile of reconductored line (194.4 acres over the 30-year permit term).

An estimated 17.3 percent (648 miles) of SMUD's overhead subtransmission and distribution lines is located in non-urban areas that could require off-road travel for access. SMUD, therefore, assumes that 17.3 percent of the 6 miles (1.04 miles) of subtransmission and distribution lines reconstructed and reconductored would be in non-urban areas and would require off-road travel for access. It is assumed that a corridor approximately 10 feet wide and 1.04 miles long (1.3 acres), would be crossed by vehicles to reach reconstruction and reconductoring project sites annually (37.5 acres over the 30-year permit term).

E12 Electrical System Operation

This is no longer a Covered Activity but the numbering remains, to reduce the need for document reorganization and potential inconsistencies.

E13 New and Relocated Overhead Subtransmission and Distribution Line Construction

New subtransmission and distribution lines may be needed to meet increased demand for electrical power from residential and commercial growth approved by local land-use agencies, including the counties and cities located within the Permit Area. Additionally, SMUD may be required to relocate existing subtransmission or distribution lines in response to road widening, residential development activities, or when the location of a line poses a hazard. Construction of new subtransmission and distribution lines and line relocations are expected to occur outside existing SMUD easements but within the Permit Area.

Covered Activities associated with the construction of new or relocated subtransmission and distribution lines would include: survey and staking of the new easement; removal of woody vegetation from the new easement (if necessary); and identification of pole sites, pull and tension sites, construction access routes, and temporary work areas for storing construction equipment and materials. Approximately 15 to 21 new poles (wood or tubular steel poles) are required for each mile of subtransmission line; approximately 17 to 26 new poles (wood or tubular steel poles) are required for each mile of distribution line.

The new poles (wood or tubular steel) would be framed (cross arms, pins, insulators, grounds, bonding, markers, and any components installed), and any anchors and guy wires installed before the pole is set. SMUD would excavate pole holes and any necessary anchor holes using a machine auger and line truck. An auger drill, slightly larger in diameter than the pole, would be used to excavate the hole; very little additional ground disturbance would be needed. The width and depth of the hole depends on the size of the pole, soil type, span, and wind loading. Typically, the diameter of the hole is approximately 24 inches (see Covered Activity E8, *Pole Replacement*). Pole setting depths range from 5 to 14 feet and between 15.7 and 43.96 cubic feet of soil would be removed from the hole. The excavated soil is used to backfill the pole hole and the excess soil is either spread out onsite or hauled offsite and disposed of appropriately. The work area to set new poles would be approximately 100 feet by 100 feet (0.23 acre), which is typical in rural areas; a smaller area is needed in urban areas. An estimated 3.14 square feet (0.00007 acre) would be permanently lost for each pole.

SMUD workers would string new conductors after all the poles in the new line are set, using travelers that are attached on the cross arms on each pole. Conductors would be pulled through the travelers using rope and either a reel trailer or a payout reel from a pull site (travelers would be installed on the pole when framed). The temporary pull sites would be approximately 100 feet by 100 feet each (10,000 square feet, or 0.23 acre) in size and located approximately every 0.5 mile or where the new line would cross a road. After the conductors are strung through the travelers, the insulators would be installed, the conductors would be permanently attached to the insulators, and the travelers would be removed.

Vegetation removal along the new line would only be required to comply with California Public Resource Code Sections 4292 and 4293, North American Electric Reliability Corporation (NERC) standard FAC-003-1, and California Public Utilities Commission General Order 95, Rule 35. These regulations identify by voltage specific clearance distances that must be maintained between vegetation and conductors. Additionally, SMUD is required to clear vegetation at the base of poles located in California Department of Forestry and Fire Protection SRAs that have hardware with the potential to cause sparks, such as a switch, fuse, transformer, or lightning arrester (Public Res. Code § 4292). All vegetation within a radial distance of 10 feet (376.8 square feet, or 0.009 acre) around the base of these poles must be cleared. Following this initial vegetation removal, the implementation of Covered Activity V6, *Pole Vegetation Clearing*, would maintain the absence of vegetation around the base of these poles indefinitely. SMUD assumes five new poles would be constructed under this Covered Activity in SRAs each year (150 over the 30-year permit term), which would result in permanent land cover removal of approximately 0.05 acre annually and 1.5 acres over the 30-year permit term.

Installing 1,000 feet of new distribution line (four to five poles and conductors) would take 2 to 3 days; 1,000 feet of new subtransmission line and tensioning would take 3 days. Relocation of 1,000 feet of distribution or subtransmission line would take 2 to 3 days, including the time needed to remove the existing poles and conductors.

Equipment used during construction or relocation of overhead subtransmission and distribution lines could include pickup trucks, a pole jack, a truck-mounted machine auger, line trucks, a vegetation mower, a flatbed material delivery truck, a pole dolly, a truck- or trailer-mounted bull-wheel puller, rewinders with collapsible reels, truck-mounted tensioners, conductor reel trailers, conductor reels, and hand tools for vegetation removal.

Construction or relocation of overhead subtransmission and distribution lines could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, temporary ground disturbance, permanent vegetation and land cover loss, and ground vibration. This Covered Activity would not be completed under emergency conditions.

SMUD estimates that 5 miles of new subtransmission lines (with up to 105 new poles) and 7.5 miles of new distribution lines (with up to 195 new poles) would be constructed or relocated each year (approximately 150 miles of subtransmission lines [3,150 new poles] and 225 miles of distribution lines [5,850 new poles] over the 30-year permit term). Assuming that the new lines are installed or relocated in 1,000-foot increments, approximately 66 projects would occur annually. The work area corridor for each project would be 25 feet by 1,200 feet plus two temporary pull sites 100 feet by 100 feet, and would total 1.15 acres. The work areas for construction or relocation of 5 miles of subtransmission lines and 7.5 miles of distribution lines would total 75.9 acres annually, and 2,277 acres over the 30-year permit term.

SMUD estimates that temporary ground disturbance associated with each pole installation would total 100 square feet (a 10-foot by 10-foot area, or 0.002 acre), and

permanent removal of land cover would be 3.14 square feet (assuming a 24-inch-diameter pole). SMUD estimates 0.60 acre would be temporarily disturbed and 0.02 acre of land cover would be permanently removed each year (18 acres temporarily disturbed and 0.6 acre of land cover would be permanently removed over the 30-year permit term). Trailer-mounted bull-wheel pullers, rewinders with collapsible reels, truck-mounted tensioners, or conductor reel trailers would be used for less than 2 days.

Based on the current distribution of their facilities, SMUD assumes that approximately 83 percent of new and relocated subtransmission and distribution line facility and relocation projects would be located adjacent to existing roads, and would not require vehicles to travel off-road. SMUD estimates approximately 17 percent of new and relocated subtransmission and distribution line (0.85 mile of subtransmission line and 1.23 miles of distribution line) would be located off existing roads. It is assumed that a corridor approximately 10 feet wide and 2.08 miles long would be crossed by vehicles for reconductoring and reconstruction projects each year. SMUD estimates that approximately 2.52 acres would be crossed by vehicles annually for access to reconductoring and reconstruction project sites (75.6 acres over the 30-year permit term).

SMUD assumes that once every 4 years, it will be required to construct a temporary access road, approximately 15 feet wide and up to 1,000 feet long. Construction of the access road would be done with a grader and may require placement of gravel, which would be removed after the line is constructed. Constructing an access road would temporarily disturb 0.34 acre every 4 years (2.72 acres over the 30-year permit term). The land at any access road would be returned to pre-project contours and conditions following construction and would not be maintained as an access road.

E14 New Underground Subtransmission and Distribution Line Construction

New underground facility construction is almost exclusively done in urban settings and by developers. The developer would install the conduit and pull boxes, and SMUD would install the cable. However, SMUD assumes that it would install approximately 10 underground lines annually (eight in trenches and two using HDD), typically 100 feet or less in length, to connect existing SMUD facilities to new underground lines installed by developers in new subdivisions or to new businesses. SMUD estimates that three longer underground lines, of an estimated 2,000 feet each, would be installed within the 30-year permit term.

For both subtransmission and distribution underground lines, SMUD would install additional underground conductor cable using a trenching or HDD construction method, described in greater detail, below. Areas would be graded and returned to preexisting topographic contours following construction.

E14a Trenching

Trenching involves temporarily removing the surface material and soil to create void in which new conduit would be placed. Where appropriate, SMUD would preserve the top 6 inches of topsoil by segregating and storing it near the site. Typically, a construction

work area width of 25 feet would be required to allow for the open trench and equipment. The typical trench dimensions for installation of new conduit measures 2 feet wide and 4 feet deep. Once the trench is excavated, one to six segments of 4- or 6-inch-diameter plastic conduit would be installed on the trench floor and partially backfilled with concrete slurry. The trench would be backfilled with the previously excavated soil and the conduit buried under at least 2 feet of cover.

After the conduit is placed, pull boxes, constructed of prefabricated, steel-reinforced concrete, would be installed. These boxes are typically one of three sizes: 17 inches by 30 inches by 24 inches; 4 feet by 6 feet by 4 feet; or 6 feet by 8 feet by 4 feet. The total excavation footprint for a pull box would typically be about 2 feet bigger than the box. Construction equipment and workers installing prefabricated pull boxes would stay within the 25-foot-wide construction work area. Two new pull boxes would typically be installed for each new underground line. The pull boxes would be used initially to pull cable through the conduit and to splice cables together. During electrical line operation, pull boxes provide access to the underground cables for inspections and repairs.

Cable would be installed through the conduit at the pull boxes. A cable reel would be placed in a pull box at one end of the new conduit, and a pulling rig would be placed in a pull box at the other end of the conduit. A wire rope would be attached to cable pulling eyes and the cable would be pulled through the conduit. To ease pulling tensions, a lubricant may be applied to the cable as it enters the conduit. The ends of the segments would be spliced together at pull boxes after they are completely pulled through the conduit.

SMUD would access new underground facility locations using existing roads. Equipment used could include with pickup trucks, service trucks, line trucks, trailers, trailer-mounted cable reels, trailer-mounted pulling rigs, and backhoes or wheel trenchers. Equipment used for this activity in roadways could include the equipment listed above and a jackhammer, a compressor, a compactor, and repaving equipment. Covered Activity E14a could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, temporary ground disturbance from excavation, permanent vegetation and land cover loss from pull boxes, and ground vibration. This Covered Activity would not be completed under emergency conditions.

Typically, a work area approximately 25 feet by 150 feet would be required to allow for the open trench and equipment, or an area up to 25 feet by 2,200 feet for longer underground lines. The entire work area would be temporarily disturbed. After the conduit is placed, pull boxes, constructed of prefabricated, steel-reinforced concrete, would be installed.

Assuming a work area of 25 feet by and 150 feet (0.09 acre), trenching eight new underground facilities annually to connect new development or businesses to SMUD's existing distribution facilities would temporarily disturb 0.72 acre annually (21.6 acres during the 30-year permit term). Each pull box installed after new underground conduit

is placed would permanently remove 0.001 acre (0.02 acre each year, 0.6 acre over the 30-year permit term, assuming 16, 8-foot by 6-foot pull boxes installed each year).

SMUD assumes three 2,000-foot-long underground lines would be installed by trenching within the 30-year permit term. This would require a work area approximately 25 feet by 2,200 feet, and each line would temporarily disturb approximately 1.26 acres (3.78 acres over the 30-year permit term). Pull boxes would be installed at both ends of the line and approximately every 700 feet; for a project that is 2,000 feet long, four pull boxes would be installed. Each pull box installed would permanently remove 0.001 acre (0.004 acre for each activity, 0.01 acre over the 30-year permit term, assuming 12, 8-foot by 6-foot pull boxes would be installed).

SMUD assumes that no off-road travel would be required outside of the temporary work area required for construction activities. A typical underground line construction project with trenching would take 1 to 3 days.

E14b Horizontal Directional Drilling

HDD is a construction method of installing underground conduit in a shallow arc along a prescribed underground bore path by using a surface-launched drilling rig, with minimal disturbance to the surrounding area.

The HDD process would start with the transportation of a drilling rig to the site and excavation of a receiving pit (approximately 12 square feet) and a launching pit (approximately 9 square feet). The drilling rig would drill a small pilot hole from the launching pit to the receiving pit along the designated underground path. The drilling rig would use a second stage drill bit to enlarge the pilot hole by passing a larger cutting tool known as the back reamer. In the third stage, the plastic conduit would be pulled through the enlarged hole behind the reamer to allow centering of the conduit in the bore path.

HDD is done with the help of a drilling fluid, a mixture of water and usually bentonite or polymer that is continuously pumped to the drill bit or reamer to facilitate the removal of soil cuttings, stabilize the bore path hole, cool the cutting head, and lubricate the passage of the drill bit and pipe. Drilling fluids hold the soil cuttings in suspension to prevent them from clogging the bore path. The drilling fluid accumulates in the launching pit until it is vacuumed out and disposed of in accordance with state and federal law.

After the HDD is complete, cable would then be pulled through the conduit using the method described above under Covered Activity E9c, *Direct-Buried Cable Replacement—Trenching*. After the conduit is placed, pull boxes, constructed of prefabricated, steel-reinforced concrete, would be installed. These boxes are typically one of three standard sizes: 17 inches by 30 inches by 24 inches, 4 feet by 6 feet by 4 feet, or 6 feet by 8 feet by 4 feet. The total excavation footprint for a pull box is typically about 2 feet bigger than the box. New pull boxes would typically be installed at both ends of the HDD. The pull boxes would be used initially to pull the new cables through the conduits and to splice new cables together. During later electrical line operation, pull boxes would provide access to the underground cables for inspections and repairs. A

cable reel would be placed in a pull box at one end of the new conduit, and a pulling rig would be placed in a second pull box at the other end of the conduit. A wire rope would be attached to cable pulling eyes and the cable would be pulled through the conduit. To ease pulling tensions, a lubricant may be applied to the cable as it enters the conduit. The ends of the segments would be spliced together at pull boxes after they are completely pulled through the conduit.

SMUD would access new cable installation projects using HDD work areas along existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used would include pickup trucks, a drilling rig, backhoes, welding equipment, water trucks, a bulldozer, trailer-mounted cable reels, and trailer-mounted pulling rigs.

Activities associated with HDD could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, temporary ground disturbance from excavation, permanent vegetation and land cover loss from pull boxes, and ground vibration. This Covered Activity would not be completed under emergency conditions.

SMUD estimates that two HDD activities approximately 100 feet long would occur annually. A work area, approximately 50 feet by 100 feet (0.12 acre), would be used to complete this Covered Activity (0.24 acre annually; 7.2 acres over the 30-year permit term). SMUD would park any vehicles and equipment and perform the work within this area. SMUD assumes the entire work area would be temporarily disturbed. Each HDD activity would require the following components.

- Receiving pit (approximately 12-square-foot excavation and 25-square-foot soil stockpile; 0.0008 acre).
- Launching pit (approximately 9-square-foot excavation and 25-square-foot soil stockpile; 0.0008 acre).
- Pull box installations (approximately two 80-square-foot excavations and two 100-square-foot soil stockpiles; 0.008 acre).
- Drilling rig staging (approximately 625 square feet, or 0.01 acre).

Each of the two HDD activities each year would require two pull boxes. Each pull box installed after new underground conduit is placed would permanently remove an estimated 43 square feet (an estimated 0.004 acre each year, and 0.12 acre over the 30-year permit term, assuming four 8-foot by 6-foot pull boxes would be installed each year).

An estimated 3 percent (150 miles) of SMUD's direct-buried cable is located in non-urban areas and could require off-road travel for access. Assuming the proportion of new development is consistent with the existing distribution, two HDD activities over the 30-year permit term would be located in a non-urban area and require off-road travel. SMUD assumes that a corridor approximately 10 feet by 500 feet (0.11 acre) would be crossed by vehicles traveling off-road. SMUD estimates that approximately 0.22 acre would be

crossed by vehicles over the 30-year permit term. A typical new cable installation project using HDD would take 3 days.

E15 Existing Distribution Substation Expansion

Expansion of existing distribution substations may be needed to meet increased demand for electrical power from residential and commercial growth approved by local land-use agencies, including the counties and cities located within the Permit Area. SMUD assumes one substation would be expanded every 5 years (six expansions total over the proposed permit term). Substation expansion activities would occur outside the existing substation perimeter. Each substation expansion would increase the substation by an estimated 0.3 acre and would include a work area of 100-feet by 100-feet (10,000 square feet, or 0.23 acre). The expansion site would be cleared, grubbed, and graded with a bulldozer or grader, compactor, and roller. The site would be excavated with an excavator or backhoe, dump truck, and water truck. Drilled pier foundations would be excavated with an auger. The underground electrical grounding grid and conduits would be installed. Concrete foundations would be placed with cement trucks and small tools. Components (transformer[s], capacitor banks, a backup battery, a metal clad switchgear, steel structures, bus and insulators, new electric line outlets, fuses, and circuit breakers) would be delivered on an 18-wheel tractor-trailer and installed with a crane. The components would be wired and tested. Water drainage would be incorporated into the existing substation drainage systems. The expanded substation site would be covered in crushed gravel, except where permanent concrete foundations for the transformer, oil containment, and metal clad switchgear would be built or where paved roads are constructed.

SMUD would access substations using existing roads, and no off-road travel would be required. Equipment used could include pickup trucks, flatbed trucks, service trucks, concrete trucks, tracker trailers, dump trucks, water trucks, a bulldozer, a grader, backhoes, excavators, small and large cranes, compactors, a roller, an auger, cement trucks, a jackhammer, and hand tools. Construction at existing substations could result in vehicle movement, vehicle and equipment noise, human presence, dust generation from construction activities, temporary vegetation removal, temporary ground disturbance within work areas, permanent vegetation and land cover loss, ground vibration, and temporary and permanent changes to surface hydrology or runoff. This Covered Activity would not be completed under emergency conditions.

SMUD estimates six substations would require expansion over the 30-year permit term. Each substation expansion would temporarily disturb 0.23 acre associated with the work area (1.38 acres over the 30-year permit term) and permanently affect approximately 0.3 acre (1.8 acres over the 30-year permit term). Expansion of an existing substation would take approximately 4 months to complete.

E16 New Substation Construction

New substations may be needed to meet increased demand for electrical power from residential and commercial growth approved by local land-use agencies, including the counties and cities located within the Permit Area

New transmission substation sites would be mass-graded by SMUD prior to construction activities. Transmission substation construction would permanently impact approximately 11 acres per new substation. SMUD assumes four new transmission substations would be constructed over the 30-year permit term.

Most new distribution substation sites are included in the environmental analysis and permitting completed by the developer of the project. The sites are mass-graded by the developer prior to SMUD's construction activities, and SMUD activities would not create any additional temporary disturbance or permanent land cover loss beyond those identified during the developer's environmental analysis and subsequent permitting. Prior to distribution substation construction, SMUD would require proper documentation of permit compliance from the developer, including environmental compliance.

Approximately 45 new distribution substations, each 0.5 acre in size, would be constructed in the Permit Area over the 30-year permit term. However, SMUD anticipates the construction of only two 0.5-acre distribution substations over the 30-year permit term that would not be permitted by the developer, and are Covered Activities in this HCP.

SMUD's preparation of a new transmission or distribution substation would include clearing, grubbing, and grading with a bulldozer or grader, compactor, and roller. The site would be excavated with an excavator or backhoe, dump truck, and water truck. Drilled pier foundations would be excavated with an auger. The underground electrical grounding grid and conduits would be installed. The concrete foundations would be placed with a concrete truck and small tools. Components (transformer[s], capacitor banks, a backup battery, a metal clad switchgear, steel structures, bus and insulators, new electric line outlets, fuses, and circuit breakers) would be delivered on an 18-wheel tractor-trailer, installed with a crane, wired, and tested. The substation site would be covered in crushed gravel, except where permanent concrete foundations for the transformer, oil containment, and metal clad switchgear would be built or where paved roads are constructed. Water drainage from the substation site would be conveyed via subsurface pipes to the existing storm drainage systems or retained on site. The substation site would be fenced. Construction of a new distribution substation would require about 5 months to complete, and construction of a transmission substation would take approximately 18 months. No construction activities would occur outside of the substation work area.

Equipment used could include pickup trucks, flatbed trucks, service trucks, concrete trucks, tracker trailers, dump trucks, water trucks, a bulldozer, a grader, backhoes, excavators, small and large cranes, compactors, a roller, an auger, cement trucks, jackhammers, and hand tools. New substation construction could result in vehicle movement, vehicle and equipment noise, human presence, dust generation from

construction activities, temporary vegetation removal, temporary ground disturbance within work areas, permanent vegetation and land cover loss, ground vibration, and temporary and permanent changes to surface hydrology or runoff. This Covered Activity would not be completed under emergency conditions.

Each of the four new transmission substations would have a work area, outside the substation footprint, of approximately 150 feet by 100 feet (an estimated 0.34 acre; 1.36 acres over the 30-year permit term). Permanent effects would total 11 acres per substation (44 acres over the 30-year permit term).

Each of the two new distribution substations covered by this HCP would have a work area of approximately 100 feet by 100 feet (an estimated 0.23 acre; 0.46 acre over the 30-year permit term). Permanent effects would total approximately 0.5 acre per substation (approximately 1 acre over the 30-year permit term). SMUD would access the new construction sites using existing roads; no off-road travel would be needed.

2.3 Natural Gas Transmission Facilities and Covered Activities

SMUD owns and operates 76 miles of natural gas pipelines designed to move approximately 190 million cubic feet of gas per day from Winters, California, in Yolo County to four gas-fired cogeneration power plants in Sacramento County. The pipelines consist of 20- to 24-inch diameter carbon-steel lined pipe buried a minimum of 3 feet (measured from the top of the pipe) below the ground surface. The belowground pipeline includes several aboveground and belowground structures such as valves, remote terminal units, various traps for cleaning, and gas metering and regulating stations. Section 2.3.1 describes these facilities and Section 2.3.2 describes operation and maintenance of these facilities.

Any temporary impacts that are greater than 0.1 acre will be revegetated and recontoured, as needed.

2.3.1 Natural Gas Transmission Facilities

SMUD's natural gas transmission facilities consist of underground natural gas transmission pipelines, and underground and aboveground valve stations and ancillary components, as described in this section.

2.3.1.1 Underground Transmission Pipelines

SMUD owns and operates 76 miles of underground natural gas transmission pipeline (pipeline) within the Permit Area. The majority of the pipeline (an estimated 50 of the total 76 miles) began operation in 1996, and the additional 26 miles began operation in 2005. The pipeline consists of 20- to 24-inch diameter carbon steel pipe buried a minimum of 3 feet (measured to the top of the pipe) below the ground surface.

2.3.1.2 Pipeline Valves, Valve Stations, and Components

SMUD has nine underground and three aboveground mainline valves, which are located along the pipeline within fenced, graveled enclosures (valve stations). Mainline valves are located approximately every 10 to 15 miles on the pipeline and control the flow of natural gas through the pipeline. Aboveground and underground pipeline components are assumed to include the following.

- Aboveground connection to Pacific Gas and Electric's (PG&E's) pipeline in Winters, California.
- Three mainline aboveground isolating valves and stations.
- Nine mainline underground isolating valves and stations.
- Four gas metering and regulating stations (located within valve stations).
- Three aboveground launching and receiving traps for internal inspection devices (located in valve stations).
- 123 cathodic protection test stations.
- 53 anode beds.
- 12 remote terminal units (RTUs), located within the valve stations that monitor the pipeline and collect, consolidate, and transmit pipeline operational information to the Supervisory Control and Data Acquisition (SCADA) system.
- SCADA system consisting of automated metering components that continuously monitor and report system information to SMUD's Energy Management Center located at SMUD's Headquarters Campus in Sacramento. Examples of the type of information and control provided by SCADA and the Gas Leak Detection System include valve positions, pressures, line rupture control, leak detection, gas flow rate, temperature, and gas quality.

2.3.1.3 Pipeline Public Utility Easements

The pipeline easements range from 10 to 35 feet, but the average width is 20 feet. SMUD has permanent easements for most of the pipeline, though 6 of the 12 valve stations are not located on land owned by SMUD. Generally, SMUD has nonexclusive easements without the right to fence the pipeline corridors. SMUD obtains exclusive easements with the right to construct security fencing at valve stations for aboveground facilities. SMUD does not maintain access roads within its easements.

Approximately 86 percent (65 miles) of the 76-mile pipeline and components are accessible by existing roads. SMUD estimates that approximately 14 percent (11 miles) of the 76-mile pipeline and components may require access by off-road travel.

2.3.2 Natural Gas Transmission Facilities O&M and Construction Activities

Natural Gas transmission facilities O&M and construction activities include the following Covered Activities.

- Pipeline Inspections (G1)
- Pipeline Valve Station Inspections (G2)
- Pipeline Cathodic Protection Test Station Inspection (G3)
- Internal Pipeline Inspection (G4)
- Pipeline Maintenance and Repair (G5)
- Pipeline Cathodic Protection Test Station Installation (G6)
- Pipeline Anode Bed Replacement (G7)
- Pipeline Valve Repair or Replacement (G8)
- New Construction for Valve Stations and Pressure-Limiting Stations (G9)
- New Construction for Realigned Pipelines (G10)

Each Covered Activity is identified by a Covered Activity number (e.g., G1). The following sections provide a description of each Covered Activity, frequency, equipment used by SMUD to implement the Covered Activity, and an estimate of the work area, area of temporary disturbance, and/or permanent land cover loss associated with the activity. The descriptions below are intended to summarize typical actions associated with each Covered Activity. These descriptions also provide the basis for assumptions of average effects per activity occurrence, discussed in Chapter 4. The tracking of these activities is described in Chapter 6, *Monitoring, Reporting, and Adaptive Management Program*.

G1 Pipeline Inspections

SMUD would conduct three types of pipeline inspections: abnormal operation conditions inspections, gas leak inspections, and storm-related inspections.

G1a Abnormal Operation Conditions Inspections

Abnormal operation conditions (AOCs) would include indications of leaks, third-party construction and agricultural activity, soil subsidence, ground movement, erosion, and other factors that may affect pipeline safety and operation. SMUD would conduct AOC inspections to observe surface conditions on and adjacent to the easement that would indicate AOCs. Inspections would be conducted by driving along the pipeline easement and visually looking for any AOCs.

SMUD would access the pipeline easement in pickup trucks using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. The AOC inspections could result in vehicle movement, vehicle noise, human presence, and dust generation and lay down of vegetation caused by off-road travel.

AOC inspections would be conducted on a quarterly basis with the exception of railroad and highway crossing inspections, which would be conducted on a biannual basis. No off-road travel would be required for biannual AOC railroad and highway crossing inspections.

An estimated 86 percent (65 miles) of the 76-mile pipeline easement is accessible from existing roads. It is assumed that for the remaining 14 percent (11 miles) a corridor approximately 10 feet wide and 11 miles long would be temporarily crossed by vehicles traveling off-road to access the pipeline for quarterly AOC inspections. SMUD estimates that approximately 13.33 acres would be crossed by vehicles quarterly to access the pipeline (53.32 acres annually, and 1,599.60 acres over the 30-year permit term). To access the pipeline located in non-urban land cover, this Covered Activity would require less than a day of off-road travel in any given location.

G1b Gas Leak Inspections

SMUD would conduct gas leak inspections using portable hydrogen-flame ionization gas detectors and laser methane detectors to sample the air above the pipeline. If leaks are found during a gas leak inspection, combustible gas indication meters would also be used to accurately grade the leak severity. Inspections would be conducted by walking and driving along the pipeline easement with the detectors and collecting air samples.

SMUD would access the pipeline easement in pickup trucks using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. The gas leak inspections could result in vehicle movement, vehicle noise, human presence, and dust generation and lay down of vegetation caused by off-road travel.

Gas leak inspections of the entire 76 miles of pipeline would be conducted once a year and may occur under emergency conditions. An estimated 86 percent (65 miles) of the 76-mile pipeline is accessible from existing roads. It is assumed that for the remaining 14 percent (11 miles) a corridor approximately 10 feet wide and 11 miles long would be temporarily crossed by pickup truck to access the pipeline easement for the gas leak inspections. SMUD estimates that approximately 13.33 acres would be crossed by vehicles annually to access the pipeline (399.90 acres over the 30-year permit term). To access the pipeline located in non-urban land cover, this Covered Activity would require less than a day of off-road travel in any given location.

G1c Storm-Related Inspections

SMUD would conduct pipeline inspections after major storms along segments of pipeline that may have been affected to check for any storm-related damage to facilities, including

fencing and line markers. Only a portion of the pipeline easement would need to be inspected: the areas where the storm was strongest.

SMUD would access the pipeline easement in pickup trucks using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. The storm-related inspections could result in vehicle movement, vehicle noise, human presence, and dust generation and lay down of vegetation caused by off-road travel.

An average year would require eight storm-related inspections and it is assumed that only 2 miles of the pipeline easement would need to be inspected per storm. An estimated 86 percent (65 miles) of the 76-mile pipeline is accessible from existing roads. It is assumed that for the remaining 14 percent (11 miles) a corridor approximately 10 feet wide and 11 miles long would be temporarily crossed by vehicles to access the pipeline for storm-related inspections. Assuming the amount of easement to be inspected following a storm follows the same proportion of easement accessible from existing roads, SMUD estimates that approximately 0.34 acre would be crossed by vehicles per storm event to access the pipeline easement (approximately 2.72 acres annually, and 81.6 acres over the 30-year permit term). To access the pipeline located in non-urban land cover, this Covered Activity would require less than a day of off-road travel in any given location.

G2 Pipeline Valve Station Inspections

SMUD would inspect all 12 pipeline mainline valve stations to test the operation of all of the aboveground components (including the 12 RTUs within the valve stations) and calibrate existing cathodic protection system electronic test station instrumentation. The pipeline valve station inspections would be conducted within the station fencing.

SMUD would access the 12 pipeline valve stations using pickup trucks from existing roads; off-road travel would not be required. The pipeline valve station inspections could result in vehicle movement, vehicle noise, and human presence within the valve station. Each of the 12 valve stations would be inspected five or more times annually (quarterly functional surveys and one annual valve service inspection) and would be completed in less than a day at each station.

G3 Pipeline Cathodic Protection Test Station Inspection

Buried metal, particularly long pieces such as pipelines, attracts electromagnetic waves, or current. An anode is where the current gathers onto and enters the conductor (pipeline), and a cathode is where the current exits the conductor. Damage does not occur from current exiting a conductor, but the anode slowly disintegrates as current enters, which could result in pipeline pitting or corrosion. Pipelines are coated to ensure that they act as a cathode, but the coating can degrade over time. Degradation can occur faster in areas of high moisture content (e.g., resulting from precipitation or irrigation) and where the pipeline is exposed to large amounts of induced AC.

SMUD can test the pipeline coating at cathodic protection test stations. These test stations consist of two to six wires attached to the pipeline that run up to the surface and

are exposed inside 4-foot-tall, 4-inch-diameter plastic tubes or in flush-mounted test stations at various locations along the pipeline. A gas technician would attach a handheld digital meter to the wires to check the voltage between them. The current's direction and consistency determine if the coating has degraded. Cathodic protection test station inspections are conducted on an annual cycle, aboveground with no ground disturbance.

SMUD would access the pipeline's cathodic protection test stations in pickup trucks using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. The pipeline cathodic protection inspections could result in vehicle movement, vehicle noise, human presence, and dust generation and lay down of vegetation caused by off-road travel. This Covered Activity would not be completed under emergency conditions.

An estimated 86 percent (65 miles) of the 76-mile pipeline is accessible from existing roads. It is assumed that for the remaining 14 percent (11 miles) a corridor approximately 10 feet wide by 11 miles long would be crossed by vehicles traveling off-road to access the pipeline for cathodic protection inspections. SMUD estimates that approximately 13.33 acres would be crossed by vehicles annually to access the pipeline (399.90 acres over the 30-year permit term). Each inspection would last no more than half a day. To access the pipeline located in non-urban land cover, this Covered Activity would require less than a day of off-road travel in any given location.

G4 Internal Pipeline Inspection

SMUD would conduct internal pipeline inspections to provide a detailed map of the internal pipeline conditions. Internal pipeline inspection activities would be conducted from the three existing receivers and launchers built into the pipeline to allow for internal inspections. The receivers and launchers are located within valve stations in the Permit Area. One segment launcher is located at the Winters valve station, with the receiver at the Carson Ice valve station. A second segment launcher is located at the Morrison Creek valve station, with the receiver at the Proctor & Gamble valve station. The third segment launcher is located at the Carson Ice valve station, with the receiver at the Cosumnes Power Plant (CPP) valve station.

To complete this activity, a cleaning pig would first be placed in the pipeline by a crane at the launching site; the flow of gas would pull the pig through the pipeline to the receiving site. Hazardous material collection kits would be brought to the receiving site valve stations to collect any hazardous material that may be pushed out of the pipeline. Any hazardous material would be disposed of in accordance with state and federal law. A smart pig would then be placed into the launcher site using a crane. The smart pig is the diameter of the pipeline and between 8 and 12 feet long. Information collected from this inspection would include information on dings or deformities in the pipeline, and the coordinates of any such anomaly.

Additionally, a two-person marking crew would walk the line and place temporary markers on the ground surface to provide a spatial reference (location calibration) for the pig as it moves through the pipeline.

A temporary staging area (50 feet by 50 feet, or 0.06 acre) may be set up outside of the Winters valve station and the Morrison Creek valve station for launching equipment and vehicles that cannot be stored in the fenced valve station. The Carson Ice and Cosumnes Power Plant (CPP) valve stations are large enough for all of the necessary equipment.

SMUD would access the existing receivers and launchers (within valve stations) using pickup trucks from existing roads; off-road travel would not be required. The marking crew would walk the 76-mile pipeline in its entirety.

Equipment used for internal pipeline inspection could include cleaning and smart pigs, a crane, and its associated 20-foot trailer for transporting equipment. The internal pipeline inspections could result in vehicle movement, vehicle noise, human presence, and temporary ground disturbance.

Internal pipeline inspections would be conducted every 5 years (six times over the proposed permit term) and would take approximately 3.5 days to complete. This activity would not need to be completed under emergency conditions and would be scheduled for dry weather and adequate soil conditions.

Possible use of temporary 50- by 50-foot staging areas at two locations would result in an estimated 0.12 acre of temporary disturbance per inspection event (0.72 acre over the 30-year permit term).

G5 Pipeline Maintenance and Repair

This activity would consist of aboveground maintenance and repairs due to damage from weather/storm events or vandalism, or underground maintenance and repairs to evaluate anomalies identified during the internal line inspections as detailed above in Covered Activity G4, *Internal Pipeline Inspection*; soil erosion (i.e., sink holes); and from third parties.

G5a Aboveground Pipeline Maintenance and Repair

Aboveground pipeline maintenance and repair activities would consist of weather or storm damage and vandalism repairs to aboveground facilities such as valve station fences or pipeline markers.

When a pipeline marker is replaced, the old marker would be removed and the concrete footing hauled offsite. The replacement marker would use the same hole as the old marker. New markers may need to be placed in response to changes in land use or changes in regulations.

Repairs to valve station fencing would involve replacing or repairing a metal fence post or restringing a section of fence. All repairs to valve station fencing would be located within the same footprint as the damaged fence.

SMUD would access the pipeline and valve stations on existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used for aboveground pipeline maintenance and repair activities would include pickup trucks, hand tools, and a truck-mounted vacuum excavator. The aboveground pipeline maintenance and repair could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), laydown of vegetation, temporary vegetation removal, temporary ground disturbance, permanent vegetation and land cover loss, and ground vibration.

When multiple line markers need to be installed, SMUD would use a truck-mounted vacuum excavator parked within the easement to remove soil from an approximately 9- to 12-inch-diameter hole over the pipeline. A 2-inch-diameter marker would be placed in the hole and secured with cement. Soil would then be placed over the cement. If only one marker needs to be installed, the hole would be excavated with shovels. Repair or replacement of valve station fencing could result in similar ground disturbance, but would be located within the same footprint as the damaged fence.

This activity could be completed under emergency conditions, and the pipeline would remain in operation during these activities. SMUD could replace or install between 10 and 25 line markers annually, and repair one valve station fence annually.

Each line marker replacement or installation would require a work area of approximately 10 feet by 20 feet (0.005 acre each, 0.13 acre annually, and 3.90 acres over the 30-year permit term). The work area for valve station fencing repair would be inside the existing valve stations.

Assuming each marker is installed in a 12-inch-diameter cement casing, an estimated approximately 0.87 square feet would be permanently lost. Assuming 25 markers are installed each year, an estimated 22 square feet would be permanently lost (an estimated 0.02 acre over the 30-year permit term). No temporary disturbance or permanent loss of land cover would occur as part of the valve station fence repairs as the fences are located in the previously disturbed area associated within the valve stations.

Approximately 86 percent of pipeline facilities are accessible by existing roads. With exception of the valve station fencing, the exact location of the aboveground pipeline maintenance and repair cannot be predicted. Given the percentage of the pipeline that is located off-road, SMUD estimates that 14 percent of the line marker repairs (4 of the 25 repairs) would require off-road access. SMUD assumes a corridor 10 feet by 1,000 feet (0.23 acre) would be crossed by vehicles traveling off-road. SMUD estimates that approximately 0.23 acre would be crossed by vehicles for each of the four line markers (0.92 acre annually, and 27.6 acres over the 30-year permit term). This Covered Activity could be completed in less than one day. To access the pipeline located in non-urban land cover, this Covered Activity would require less than a day of off-road travel in any given location.

G5b Underground Pipeline Maintenance and Repair

Underground pipeline maintenance and repair consists of excavations to evaluate anomalies identified during the Covered Activity G4, *Internal Pipeline Inspections*; soil erosion (i.e., sinkholes); and third-party pipeline damage.

Repair of soil erosion over the pipeline would be the worst-case scenario for underground maintenance and repair activities in terms of both size of disturbance and frequency. Therefore, the disturbance estimates for this section use soil erosion repair for disturbance calculations.

SMUD anticipates conducting an average of five pipeline maintenance and repair events annually (150 over the 30-year permit term). In cases where soil erosion has occurred or a repair is needed, SMUD would excavate a hole to expose the pipeline and inspect it for damage. A work area of approximately 150 feet by 150 feet (0.52 acre) would encompass the excavation, soil stockpiles, and areas where equipment would be working. To expose the pipeline, an area approximately 15 feet wide, 15 feet long (0.005 acre), and up to 10 feet deep would be excavated. Soil would be stockpiled in a 50- by 50-foot area (0.06 acre). Including the excavation and stockpile areas, underground pipeline maintenance and repair would temporarily disturb an estimated 0.07 acre per activity (0.35 acre annually, and 10.5 acres over the 30-year permit term), which includes both the trenching/excavation and the soil stockpiles.

Maintenance materials used for site-specific erosion problems may include riprap or coconut fiber or straw erosion control blankets. SMUD assumes that one soil erosion repair each year would require the use of riprap. Therefore, this Covered Activity may result in a permanent loss of land cover of an estimated 150 square feet (0.003 acre) annually; 0.09 acre over the 30-year permit term.

SMUD would access the pipeline on existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary.

Equipment used for this Covered Activity would include pickup trucks, a backhoe, an equipment trailer, and a water truck. Equipment used for this activity in roadways could include the equipment listed above and a jackhammer, compressor, compactor, and repaving equipment. The underground pipeline maintenance and repair could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), laydown of vegetation, temporary vegetation removal, temporary ground disturbance, permanent vegetation and land cover loss, and ground vibration. This Covered Activity could be completed under emergency conditions.

The exact locations for the underground pipeline maintenance and repairs are unknown. Approximately 86 percent (65 miles) of pipeline facilities are accessible by existing roads. SMUD assumes that one of five maintenance and repair events would require off-road access each year. SMUD assumes a corridor approximately 10 feet by 1,000 feet (0.23 acre) would be crossed by vehicles traveling off-road. SMUD estimates that approximately 0.23 acre would be crossed by vehicles annually (6.90 acres over the 30-

year permit term). Each event would take about 1.5 days to complete, and the pipeline would remain in operation during these activities.

G6 Pipeline Cathodic Protection Test Station Installation

SMUD would install new cathodic protection test stations in response to a third-party utility crossing that has the potential to interfere with SMUD's existing cathodic protection. As discussed in Activity G3, *Pipeline Cathodic Test Station Protection Inspection*, these test stations determine pipe corrosion. This technology avoids the need to excavate soil along the entire length of the pipeline to examine it for signs of external corrosion.

Installation of a new or replacement cathodic protection test station would require soil excavation to expose a section of pipeline, attaching the wires to the outside of the pipe with liquid weld, and backfilling soil to cover the pipeline.

SMUD would access the pipeline easement using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used in rural areas could include a backhoe transported by a truck and trailer, a water truck, and pickup trucks. Equipment used in urban areas could include the equipment listed above plus a jackhammer, a compressor, a compactor, and repaving equipment. The activities associated with this Covered Activity could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), laydown of vegetation, temporary vegetation removal, temporary ground disturbance, permanent vegetation and land cover loss, and ground vibration. This activity would not need to be completed under emergency conditions and would be scheduled for dry weather and adequate soil conditions.

SMUD estimates that seven new cathodic protection test stations would be installed and up to three would be replaced in the same location as the existing station over the 30-year permit term.

Each new or replaced cathodic protection test station installation would require a work area of approximately 100 feet by 100 feet (0.23 acre), including an excavation area and soil stockpile area.

The excavation to install a test station would measure approximately 4 feet long by 3 feet wide (approximately 3 to 15 feet deep depending on the depth of the pipeline) and would use a soil stockpile area of 20 feet by 20 feet (0.009 acre). After installation, a test station would consist of a 4-foot-tall, 4-inch-diameter plastic tube test station or, in selected urban areas, a box test station, flush with the ground surface. Excavation for each cathodic protection test station installation or replacement would temporarily disturb 0.009 acre (approximately 0.09 acre over the 30-year permit term). Installation of one 4-inch-diameter tube for a new test station would permanently remove approximately 0.087 square feet of land cover (0.00002 acre over the 30-year permit term).

SMUD estimates that installation of 14 percent (two test stations) of the 10 cathodic protection test stations could require off-road travel. SMUD assumes a corridor

approximately 10 feet by 1,000 feet would be crossed by vehicles traveling off-road. SMUD estimates that approximately 0.23 acre would be crossed by vehicles for each of the two cathodic protection test stations (0.46 acre over the 30-year permit term). Cathodic protection test station installation would take less than 2 days.

G7 Pipeline Anode Bed Replacement

As described in Covered Activity G3, *Cathodic Protection Station Inspection*, anode beds are used to serve as the attraction point for electromagnetic waves, or current, that would otherwise collect on and degrade the pipeline. SMUD has 53 anode beds buried along the pipeline, consisting of bagged material of zinc, magnesium bars, potential gradient mats, polarization cells, or zinc ribbon. Zinc and magnesium are used as anodes because the electrons in an electromagnetic wave can pass from the earth to zinc easier than they can pass to steel.

Anode beds degrade over time (faster in areas of high moisture content) and generally have a 30-year life span. Anode beds must be replaced periodically. If an existing anode bed needed to be replaced, a new bed would be buried 10 to 15 feet deep along portions of the existing pipeline in a vertical configuration (slight offset from the pipeline). Wires would connect the new anode bed to the pipeline, and the old anode bed would be left in place.

SMUD would access the pipeline easement on existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. This Covered Activity would not be completed under emergency conditions.

Equipment used for this activity could include an auger, a backhoe transported by a truck with a trailer, a water truck, and pickup trucks. Equipment used for this activity in roadways could include the equipment listed above and a jackhammer, a compressor, a compactor, and repaving equipment. Covered Activity G7 could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), laydown of vegetation, temporary vegetation removal, temporary ground disturbance, and ground vibration. The anode bed would be buried and the ground surface recontoured to preconstruction contours.

SMUD estimates that each of the 53 anode beds would need to be replaced once over the 30-year permit term.

The activity would be performed in a work area of approximately 100 feet by 100 feet (0.23 acre) that encompasses the excavation area, soil stockpile area, and areas where equipment would be working.

Construction to bury and connect the new anode bed would require the excavation of a hole approximately 10 feet by 10 feet (100 square feet, or 0.002 acre) and 10 to 15 feet deep. Soil would be stockpiled in an area 50 feet by 50 feet (2,500 square feet, or 0.06 acre) adjacent to the hole. A total of approximately 0.06 acre per anode replacement

would be temporarily disturbed (up to 3.18 acres over the 30-year permit term). This Covered Activity would not permanently remove land cover.

SMUD estimates 10 anode bed replacements could require off-road travel. SMUD assumes a corridor approximately 10 feet by 1,000 feet (0.23 acre) would be crossed by vehicles traveling off-road. SMUD estimates that approximately 0.23 acre would be crossed by vehicles for each of the 10 anode bed replacements (2.3 acres over the 30-year permit term). Replacement of an anode bed located in non-urban land cover would require less than 2 days of off-road travel.

G8 Pipeline Valve Repair or Replacement

SMUD has nine underground and three aboveground mainline valves, which are located along the pipeline within fenced, graveled enclosures (valve stations). Valves on the pipeline occasionally malfunction or wear out, causing leaks and would need to be repaired or replaced.

Prior to valve repair or replacement, a portion of the pipeline would be blown down (i.e., natural gas would be removed from the affected section of pipeline at a control point). Next, a terraced hole (approximately 15 feet deep) would be excavated within the fenced valve station around and under the existing valve. The excavation and soil stockpile area may be up to 50 feet by 50 feet (0.06 acre). The majority of the excavated area would be encompassed in the valve station, but the fencing may be removed to allow for easier access, and the hole may exceed the boundaries of the fenced area. Additionally, a staging area outside the valve station (approximately 100 feet by 100 feet, or 0.23 acre) may be required. If the old valve is to be replaced, it would be cut from the pipeline and replaced with a new valve. Once the new valve is installed, the valve welds would be x-rayed and the hole would be backfilled.

Equipment used for this activity could include a rough terrain crane, a truck and trailer, a backhoe, an excavator, a welding rig, flatbed trucks, a water truck, and pickup trucks. The activities associated with pipeline valve repair or replacement could result in vehicle movement, vehicle and equipment noise, human presence, dust generation from construction activities, laydown of vegetation, temporary vegetation removal, temporary ground disturbance, and ground vibration.

SMUD would repair or replace two mainline valves over the 30-year permit term. Each pipeline valve repair or replacement would require a work area of approximately 0.29 acre, including excavation and soil stockpile in the existing valve station and a staging area (0.58 acre over the 30-year permit term). Because the portion of the work area within the valve station is already developed, this Covered Activity could temporarily disturb 0.23 acre per event, associated with the staging area outside of the valve station (0.46 acre over the 30-year permit term).

No permanent loss of land cover would occur because of this Covered Activity. SMUD would access the valve stations using existing roads; off-road travel would not be required. Valve repair or replacement could occur any time depending on weather and

operational restrictions related to the need to shut down the pipeline temporarily and would last approximately 4 weeks.

G9 New Construction for Valve Stations and Pressure-Limiting Stations

In response to potential changes in the gas pipeline regulatory environment or commercial changes to gas pipelines, new mainline valves, associated valve stations, and gas pressure-limiting stations[3] may be constructed over the 30-year permit term. Construction of a new pipeline valve station would consist of mowing or grading the new station location, excavating both sides of the existing pipeline to install new valve or pressure-limiting components, installing the new components, and establishing a new permanent fenced, graveled enclosure (the new valve or new pressure-limiting station).

The locations of these new stations cannot be determined at this time, but as described in Chapter 4, SMUD applied impact assumptions based on knowledge of existing facilities. Installation of new stations can take place at any time of year, depending on weather and operational restrictions related to the need to shut down the pipeline temporarily.

Equipment used for this activity could include a rough terrain crane, a truck with trailer, an excavator, a backhoe, a flatbed truck, a water truck, welding rigs, and compressors. The installation of new stations could result in vehicle movement, vehicle and equipment noise, human presence, dust generation from construction activities, temporary vegetation removal, temporary ground disturbance within work areas, permanent vegetation and land cover loss, ground vibration, and temporary and permanent changes in hydrology or runoff.

SMUD would install two new valve stations and one gas pressure-limiting station over the 30-year permit term.

Construction activities would require a temporary work area of approximately 0.5 acre, all of which would be temporarily disturbed. Within the work area, SMUD would use an excavator or a backhoe to excavate a terraced hole 50 feet by 50 feet (0.06 acre) and 15 feet deep, and an area approximately 100 feet by 100 feet (0.23 acre) would be required immediately adjacent to the excavation for soil stockpile and equipment and vehicle staging. Prior to installing the new valve or pressure-limiting components, a portion of the pipeline would be blown down (described under Covered Activity G8, *Pipeline Valve Repair or Replacement*). Once the new valve or pressure-limiting components are installed on the existing pipeline, the valve welds would be x-rayed and the trench backfilled. Lastly, a permanent station would be constructed.

[3] A gas pressure-limiting station consists of equipment that under abnormal conditions will act to reduce, restrict, or shut off the supply of gas flowing into a system to prevent the gas pressure from exceeding a predetermined value. SMUD does not currently need or have any gas pressure-limiting stations but may need to add one in the future in response to changes in the regulatory environment.

The new station would be fenced and graveled, and would measure approximately 40 feet by 40 feet (0.04 acre). Construction of each new valve station or pressure-limiting station would temporarily disturb an estimated 0.5 acre (1.5 acres over the 30-year permit term). Each new valve station or pressure-limiting station would permanently remove an estimated 0.04 acre of land cover (0.12 acre over the 30-year permit term). Construction for this activity would take approximately 1 to 2 months to complete. SMUD assumes that the new stations would be constructed in locations accessible from existing roads; no off-road travel would be required.

G10 New Construction for Realigned Pipelines

SMUD may realign a section of pipeline in response to a request from another entity due to a pipeline section that may be in conflict with a proposed project. Most pipeline realignments are included in the environmental analysis and permitting completed by the project proponent. However, there are rare occasions when the project is in development when they realize the pipeline conflicts with the project, and the project proponent is unable to amend their environmental documents and permits. SMUD estimates that one pipeline segment no longer than 3,000 feet long and 5 feet wide may need to be realigned approximately every 5 years (six over the 30-year permit term). Realigning an existing pipeline would require one or a combination of three construction methods—trenching, horizontal directional drilling, or directional boring—depending on site-specific circumstances. In addition, new construction for realigned pipelines would involve hydrostatic testing of the new pipeline as described below in G10d, *Hydrostatic Testing*.

G10a Trenching

The trenching method would involve excavating a trench; installing the new pipeline segment (including field coating, welding, inspection of welds, and backfilling); hydrostatic testing; adding corrosion protection; installing pipeline markers over the centerline of the pipeline to show its location, identifying the owner of the land where the pipeline easement is located, and conveying emergency information; erosion control; and cleanup. Trenching associated with realigned pipelines could occur outside existing SMUD easements. SMUD would establish a new easement if needed for the realigned segment. The width of the new pipeline easement would generally range from 10 to 35 feet.

The trench itself would be approximately 5 feet wide (the bottom of the trench would be approximately 12 inches wider than the new pipeline), and excavated at least 5 to 15 feet deep depending on the minimum cover required for the conditions. The soil would be stockpiled directly adjacent to the excavation. If trench dewatering were necessary, SMUD would use a pump to transfer the water and dispose of it in accordance with state and federal law. See Chapter 5 for measures SMUD will implement to avoid effects on Covered Species.

Sections of new pipe would be assembled within the approximately 100-foot-wide work area so that the pipe conforms to the contours of the terrain. The pipe joints would be welded, x-rayed, inspected, and field-coated or fiber wrapped to prevent corrosion within the work area. Once the field-coating process or fiber wrapping of the weld is completed

and inspected for defects, the pipeline would be lowered into the trench using a rubber-tire or track-mounted side boom.

Next, the realigned pipeline segment would be hydrostatically tested (discussed below in Covered Activity G10d, *Hydrostatic Testing*) by SMUD prior to tie-in to the existing pipeline. The new pipeline would be tied in (welded) to the existing pipeline in the trench. These welds would not be hydrostatically tested, but would be entirely x-rayed in the trench.

After pipeline testing is completed, the trench would be backfilled with the excavated material. The site would be cleaned up and recontoured to preconstruction conditions. If a Covered Activity temporarily disturbs 0.1 acre or more of Modeled Habitat that contains herbaceous vegetation, SMUD field crews would reseed the area with a commercial native seed mix, when restoration is necessary in Modeled Habitat. Pipeline markers would be installed over the centerline of the pipeline to show its location, identify the owner of the pipeline, and convey emergency information.

Equipment used could include backhoes, excavators, welding equipment, water trucks, pickup trucks, side booms, bulldozers, and a construction trailer. Equipment used for this activity in roadways could include the equipment listed above and a jackhammer, a compressor, a compactor, and repaving equipment. Covered Activity G10a could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), laydown of vegetation, temporary vegetation removal, temporary ground disturbance within work areas, ground vibration, and temporary or permanent changes in hydrology or runoff.

Trenching would be the most commonly used method to construct realigned pipelines. Past realignment activities have ranged from approximately 150 to 3,000 feet in length. Trenching to install realigned pipelines would occur at any time of year, depending on weather (most likely during the dry season); restrictions related to the need to shut down the pipeline temporarily; and coordination with the third-party project schedules, which may be necessitating the realignment. This Covered Activity would not be completed under emergency conditions.

SMUD assumes trenching activities would require a work area approximately 100 feet by 3,000 feet (6.89 acres). Additionally, a staging area, approximately 50 feet by 100 feet (0.11 acre) may be needed to store equipment and other vehicles. The work area would be approximately 7 acres, and the entire work area would be temporarily disturbed.

SMUD assumes trenching would be used for each of the six realigned pipelines over the 30-year permit term. Construction for each realigned pipeline would temporarily disturb an estimated 7 acres. Assuming six realigned pipelines, this activity would temporarily disturb 42.0 acres over the 30-year permit term. Installation of each pipeline marker over the centerline of the pipeline would result in the permanent loss of 0.087 square feet, and it is assumed four new pipeline markers would be installed for each of the six realigned pipeline segments (an estimated 4 square feet per segment, and 24 square feet over the 30 year permit term).

SMUD would access the realigned pipeline location from existing roads. It is assumed that no off-road travel would be required for this project outside the work area required for construction activities. SMUD estimates that a project with 3,000 linear feet of trenching, would take approximately 2 months to complete.

G10b Horizontal Directional Drilling

HDD is a construction method for installing a pipeline in a shallow arc along a prescribed underground bore path by using a surfaced-launched drilling rig, with minimal disturbance to the surrounding area.

The HDD process would start with the transportation of a drilling rig to the site and excavation of a receiving pit and a launching pit (both approximately 5 feet by 15 feet, or 0.002 acre). The drilling rig would drill a small pilot hole from the launching pit to the receiving pit along the designated underground path. The drilling rig would use a second stage drill bit to enlarge the pilot hole by passing a larger cutting tool known as a back reamer. In the third stage, the pipeline would be pulled through the enlarged hole behind the reamer to allow centering of the pipeline in the bore path.

HDD is done with the help of a drilling fluid, a mixture of water and usually bentonite or polymer continuously pumped to the drill bit or reamer to facilitate the removal of soil cuttings, stabilize the bore path hole, cool the cutting head, and lubricate the passage of the drill bit and pipe. Drilling fluids hold the soil cuttings in suspension to prevent them from clogging the bore path. The drilling fluid accumulates in the launching pit until it is vacuumed out and disposed of in accordance with state and federal law.

The entire pipeline segment to be installed via HDD would be welded at the surface before being pulled through the drill hole. After it is installed, the pipeline would be hydrostatically tested (discussed in Covered Activity G10d, *Hydrostatic Testing*) by SMUD prior to tie-in to the existing pipeline. The new pipeline would be tied in to the existing pipeline in the receiving and launching pits. These welds would not be hydrostatically tested, but would be entirely x-rayed in the pits.

After pipeline testing is completed, the receiving and launching pits would be backfilled with the excavated material. The site would be cleaned up and recontoured to preconstruction conditions. If a Covered Activity temporarily disturbs 0.1 acre or more of Modeled Habitat that contains herbaceous vegetation, SMUD field crews would reseed the area with a commercial seed mix that does not contain invasive species, as described in Chapter 4. Pipeline markers would be installed over the centerline of the pipeline to show its location, identify the owner of the pipeline, and convey emergency information.

Equipment used for this methodology could include a drilling rig, backhoes, excavators, welding equipment, water trucks, pickup trucks, side booms, and a bulldozer.

Activities associated with HDD could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities),

laydown of vegetation, temporary vegetation removal, temporary ground disturbance within work areas, and temporary ground vibration.

HDD to install realigned pipelines would occur at any time of year, depending on weather (most likely during the dry season); restrictions related to the need to shut down the pipeline temporarily; and coordination with the third-party project schedules, which may be necessitating the realignment. This Covered Activity would not be completed under emergency conditions.

HDD would require two work areas of approximately 100 feet by 100 feet (an estimated 0.46 acre total) located at each end and would include soil stockpile, excavation, material laydown, and areas where equipment is working.

The HDD method would require two excavations approximately 5 feet by 15 feet (0.004 acre total) and two soil stockpile areas of 25 feet by 25 feet (0.02 acre total) for the launching and receiving pits. HDD would temporarily disturb 0.46 acre per activity. Assuming three 1,000-linear-foot HDD activities, 1.38 acres would be temporary disturbed over the 30-year permit term. Installation of each pipeline marker over the centerline of the pipeline would result in the permanent loss of 0.09 square feet, and it is assumed two markers would be needed for 1,000 feet of realigned pipeline, resulting in 0.17 square feet (0.44 square feet over the 30-year permit term). Installation of 1,000 feet of pipeline using the HDD method would take approximately 3 weeks.

SMUD would access the realigned pipeline location from existing roads. It is assumed no off-road travel would be required for this activity outside the work area required for construction activities.

G10c Directional Boring

The directional bore technique can be used to cross under existing roadways and streams or other environmentally sensitive areas to minimize surface disturbance. This technique involves the use of a pneumatic pipe ramming system, where a percussive hammer drives in pipe segments. For this construction method, pits approximately 15 feet by 50 feet (0.02 acre) would be dug on both the entry and exit points. The pneumatic ramming tool and pipe would be lowered into the pit using a truck-mounted crane and aligned at the appropriate depth and angle to achieve the desired exit location. A compressor would supply air to the pneumatic ramming tool to thrust the pipe forward. A cutting shoe may be welded to the front of the pipe segment to help reduce friction and cut through the soil.

Several options are available for ramming various lengths of pipe. An entire length of pipe can be installed at once, or for longer runs, one section at a time can be installed. In the case of longer runs, the ramming tool would be removed from the entry pit after each pipe segment is in place and a new segment would be welded onto the end of the newly installed segment. The pneumatic ramming tool would be lowered into the entry pit and connected to the new segment and ramming would continue. In certain installations, a winch lowered into the exit pit may be connected to the lead end of the pipe to assist in pulling it out. This would require installation of a connection via a pilot

hole. Depending on the size of the installation, spoil from inside the pipe would be removed with compressed air, water, a pig system, or a combination of techniques. A seal cap would be installed in the starter pit side of the installation and spoil would be discharged into the 15- by 50-foot receiver pit.

Equipment used for this method could include a side boom, a 5-ton truck, an excavator, a backhoe, a flatbed truck, a compressor, a pneumatic ramming tool, a welding rig, a water truck, and pickup trucks. This Covered Activity could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), laydown of vegetation, temporary vegetation removal, temporary ground disturbance within work areas, and temporary ground vibration.

Directional boring to install realigned pipelines would occur at any time of year, depending on weather (most likely during the dry season); restrictions related to the need to shut down the pipeline temporarily; and coordination with third-party project schedules, which may be necessitating the realignment. This Covered Activity would not be completed under emergency conditions.

Directional boring would require two work areas approximately 100 feet by 100 feet (0.46 acre total) located at each end and would include soil stockpile, excavation, material laydown, and areas where equipment is working.

The directional bore method would require a pit dug on both the entry and exit points, each approximately 15 feet wide and up to 50 feet long (0.04 acre total). The depth would depend on soil conditions and the features being crossed. The minimum length of pipeline replacement is 40 feet (one joint of pipe), although up to 500 feet of pipeline could be replaced. Soil would be stockpiled in an area 40 feet by 50 feet adjacent to each trench (estimated 0.05 acre each; 0.1 acre total).

Each 500-foot-long directional bore would temporarily disturb an estimated 0.46 acre. Assuming three 500-linear-foot directional bore events, 1.38 acres would be temporary affected over the 30-year permit term. Installation of each pipeline marker over the centerline of the pipeline would result in the permanent loss of 0.09 square feet for each realigned pipeline. It is assumed two pipeline markers would be needed for each directional bore activity, resulting in 0.17 square feet and 0.44 square feet over the 30-year permit term. Installing 100 feet of pipeline using the directional bore method would take approximately 5 days.

SMUD would access the realigned pipeline location from existing roads. It is assumed no off-road travel would be required for this activity outside the work area required for construction activities.

G10d Hydrostatic Testing

Hydrostatic testing would be performed on all new pipeline segments before SMUD connects the new segment. Water would be the most commonly used test medium, but compressed air or compressed nitrogen gas would also be occasionally used. Testing

pressure and duration would be determined by pipe diameter, pipe specifications, pipe wall thickness, and elevation. Prefabricated test heads would be installed on the section of new pipeline to be tested once the pipe is within the new trench or bore path. The section would be then filled with water or alternative medium from an available source (such as a fire hydrant), transported to the site by water trucks, or transported through temporary aboveground water lines.

Once the test pipeline is filled, a hydrostatic pump would be used to increase the internal pressure to the designed test pressure, typically 1.5 times the pipeline's maximum operating pressure. The amount of water used in a hydrostatic test varies depending on the size of the pipe and length of pipe tested. Upon successful completion of the hydrostatic test, pressure would be reduced, and the water would be expelled from the pipeline using air compressors and cylindrical foam pigs. Hydrostatic test water would be discharged into percolation areas, into existing trenches for percolation, into existing canals, back to water trucks, or overland if suitable conditions are present. If needed, SMUD would construct temporary settling ponds with straw bales, plastic, and silt fencing (no excavation would be involved). Percolation is the most common disposal method.

SMUD assumes hydrostatic testing would be performed six times for new construction of realigned pipelines.

In most cases, the area temporarily saturated for the hydrostatic testing would be located within a staging area approximately 50 feet by 100 feet (0.11 acre) associated with the realigned pipeline. An additional area approximately 100 feet by 100 feet (0.23 acre) located directly next to the new pipeline trench may be required for the hydrostatic discharge water. A total estimated 0.34-acre area could be used for discharge or hydrostatic test water. SMUD would expel and dispose of test water in a manner consistent with local water quality considerations and obtain any necessary water quality permits when disposing of test water. SMUD would discharge only clean water, and the water would not be released under pressure.

Equipment used for this activity could include a hydrostatic pump, a flatbed truck, a water truck, and two pickup trucks. If nitrogen is used, then required equipment could also include nitrogen bottles and a compressor. This Covered Activity could result in vehicle movement, vehicle and equipment noise, human presence, dust generation from off-road travel, laydown of vegetation, temporary vegetation removal, temporary ground disturbance within work areas, and temporary changes in hydrology or runoff.

Hydrostatic testing would not disturb additional acreage because the equipment and area needed for hydrostatic discharge water would be within the existing work area. Hydrostatic testing would occur as an integral portion of all realigned pipeline construction activities (six over the 30-year permit term) and would take approximately 3 days.

2.4 Vegetation Management Activities

SMUD performs vegetation management activities to maintain compliance with state and federal regulations. Vegetation management would include the following activities.

- Electrical Subtransmission and Distribution Easement Vegetation Management Inspections (V1)
- Electrical Subtransmission and Distribution Easement Vegetation Management (V2)
- Transmission Easement Vegetation Management (V3)
- Tree Removal Projects (V4)
- Elderberry Shrub Trimming and Removal (V5)
- Pole Vegetation Clearing (V6)
- Vegetation Management on Pipeline Easement (V7)

Each Covered Activity is identified by an activity number (e.g., V1). For each Covered Activity, the following sections provide a description of the activity, frequency, equipment used, and an estimate of the temporary and permanent ground disturbance.

Any temporary impacts that are greater than 0.1 acre will be revegetated and recontoured, as needed.

V1 Electrical Subtransmission and Distribution Easement Vegetation Management Inspections

SMUD would inspect each line segment and tree within or adjacent to the overhead subtransmission and distribution lines annually and record the location of all vegetation that could potentially come in contact with these lines. In addition to the location, the number of trees, tree species, prescription for vegetation management, customer/location, and special instructions, such as access issues, would also be recorded. The inspections would also identify hazard trees that have the potential to fall into the subtransmission and distribution lines. Based on these inspections, SMUD planners would schedule vegetation management activities.

Visual inspections would be performed from the ground and consist of a brief (less than a day) drive-by. SMUD would access the easements in pickup trucks or service trucks using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Inspections would be completed year-round and not under emergency conditions.

Electrical subtransmission and distribution easement vegetation management inspections could result in vehicle movement, vehicle noise, human presence, and dust generation and lay down of vegetation caused by off-road travel.

An estimated 17.3 percent (648 miles) of the 3,748 miles of existing subtransmission and distribution overhead easement is located in non-urban areas that could require off-road travel for access. It is assumed that a corridor approximately 10 feet wide and 648 miles long would be temporarily crossed by vehicles. SMUD estimates that approximately 785.5 acres would be crossed by vehicles annually for inspections of the subtransmission and distribution easement (23,565 acres over the 30-year permit term). To access existing subtransmission and distribution facilities, this Covered Activity would require less than a day of off-road travel in any given location.

V2 Electrical Subtransmission and Distribution Easement Vegetation Management

SMUD would conduct routine vegetation management actions to maintain compliance with Public Res. Code Sections 4292 and 4293, NERC standard FAC-003-1, and California Public Utilities Commission General Order 95, Rule 35. These regulations identify by voltage, specific clearance distances that must be maintained between vegetation and conductors. SMUD would maintain a database of all trees to be trimmed to track the activities and assist in scheduling.

SMUD would group its vegetation management activities on subtransmission and distribution lines into two types of clearance: Clearance 1 and Clearance 2. Clearance 1 would pertain to pruning cycles based on 3 years of growth (in-cycle pruning), according to tree species and soil conditions. Some trees, such as heritage trees or elderberry shrubs, require specific conditions to be met before pruning; therefore, they may not be compatible with a 3-year management cycle. In those cases, SMUD may shorten the pruning cycle (perform out-of-cycle pruning) in accordance with the tree's growth rate to achieve the proper clearance. Elderberry shrub maintenance is described below under Covered Activity V5, *Elderberry Shrub Trimming and Removal*.

Clearance 2 would pertain to maintaining the minimum acceptable clearance to ensure that electricity does not jump from a conductor to adjacent vegetation, according to industry standard clearances for subtransmission and distribution line voltage. The area of pruning or trimming would be based on width and length of different conductors in woody vegetation. Clearance distances around conductors would range from 18 inches to 12 feet depending on the voltage.

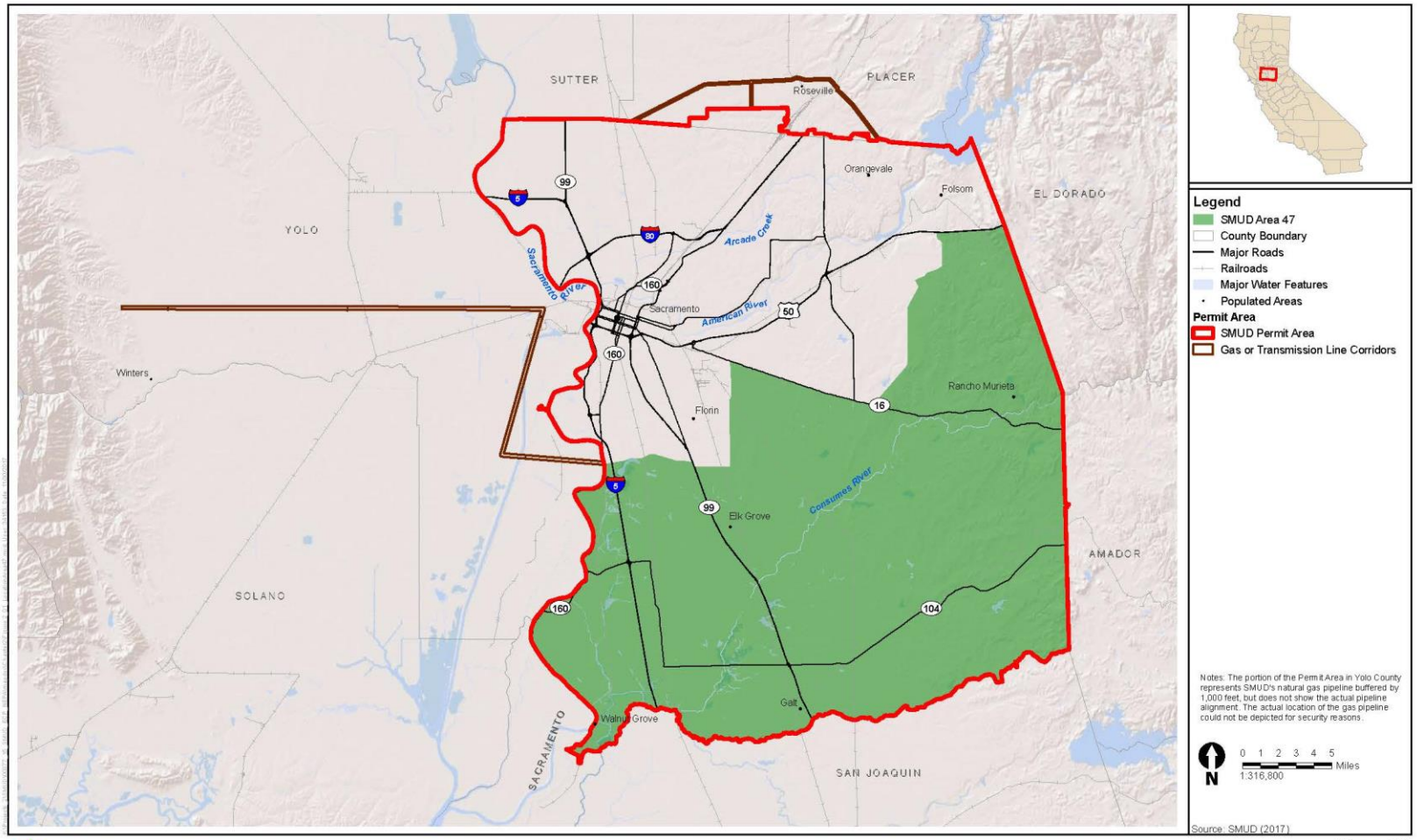
Routine maintenance work for line clearance is based on a 3-year return cycle in all areas with the exception of the 334,607-acre Area 47 (Figure 2-1), located in the rural south part of Sacramento County. Approximately 35 percent of SMUD's overhead facilities are located in this area, which is cleared on a 1-year return cycle. Pruning is performed to maintain clearances in accordance with all regulatory requirements and SMUD standards for a period of 3 years.

Due to growth characteristics and other factors, after routine cycle pruning, a small percentage of trees within the Permit Area will not maintain adequate clearances for a 3-year period. The SMUD Cycle Buster program is scheduled 18 months after routine maintenance cycle work. Requested Cycle Buster work includes line clearance tree

pruning, tree and brush removal, and related work necessary to maintain vegetation clearances around distribution electric lines.

Tree trimming would be performed by crews climbing the tree or using an aerial lift on a service truck or line truck. Crews would use manual and mechanical hand tools for trimming. The trimmed branches would be chipped onsite and the material hauled back to SMUD's yard at the end of the day (no additional trips would be required). At the request of the landowner, chipped material may be left in the easement; however, SMUD would not place it in or within 100 feet of aquatic land cover types.

SMUD would access the vegetation for this Covered Activity using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used during vegetation management activities could include pickup trucks, service trucks, a dump truck (to haul chipped vegetation from the site), a chipper, and hand tools such as chainsaws and pole pruners. This activity could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), laydown of vegetation, and temporary vegetation removal.



ICF

Figure 2-1
Location of Area 47
SMUD HCP

This Covered Activity only addresses disturbance associated with tree trimming along subtransmission and distribution lines; disturbance associated with tree removal is discussed under Covered Activity V4, *Tree Removal Projects*.

SMUD would perform approximately 25,200 routine vegetation management activities and 1,100 emergency (nonroutine) vegetation management activities annually that would trim 61,000 units of vegetation (1 unit equals any type of vegetation that is trimmed) along 3,748 miles of overhead subtransmission and distribution easement. These activities occur year-round.

The work area needed for each vegetation management activity is approximately 50 feet by 50 feet (0.06 acre each, 1,578 acres annually, and 447,340 acres over the 30-year permit term). The work area would be used for parking vehicles and staging equipment.

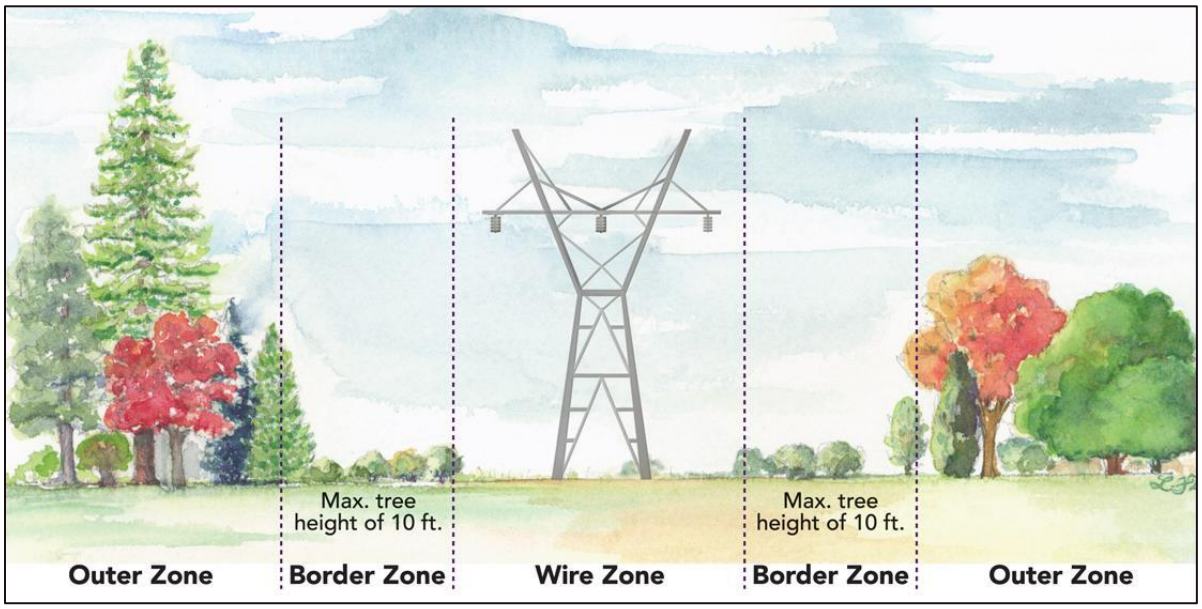
Approximately 17.3 percent (648 miles) of the subtransmission and distribution lines is located in non-urban areas and could require off-road travel for access. SMUD assumes that a corridor approximately 10 feet wide and 648 miles long would be temporarily crossed by trucks each year. SMUD estimates that approximately 785.5 acres would be crossed by vehicles annually for access to the subtransmission and distribution easement (23,565 acres over the 30-year permit term). To access existing subtransmission and distribution facilities located in non-urban land cover, this Covered Activity would require less than a day of off-road travel in any given location.

V3 Transmission Easement Vegetation Management

SMUD implements an Integrated Vegetation Management (IVM) program inside transmission line easements. The long-term goal of the IVM program is to convert tall-growing plant communities inside a transmission easement to low-growing plant communities and to control invasive weeds. SMUD has accomplished such conversions by selectively removing tall-growing plants while preserving low-growing grasses, herbs, and woody shrubs over a period of many years. With proper management, the low-growing vegetation can eventually dominate the easement and suppress the growth of the tall-growing vegetation, thereby reducing the need for future tree removal.

The *wire zone*, which comprises the portion of the transmission easement directly beneath the transmission conductors plus 10 feet on either side, would be managed only for low-growing shrub-forb-grass plant communities (early successional), usually to establish a vegetation height of 1 foot (Figure 2-2). The border zone, which extends from the edge of the wire zone to the edge of the easement, would be managed for taller shrubs and brush communities (transition communities). Vegetation may reach a height around 10 feet depending on site topography and plant species composition. Tree species would be removed from wire zones and border zones. SMUD has established the vegetation zones in the Permit Area and would need to perform actions to maintain the zones.

Figure 2-2 Integrated Vegetation Management Zone Concept for Transmission Easements



V3a Inspections

Inspections of transmission lines for potential vegetation issues are completed annually. During ground patrol inspections, the transmission vegetation patrol person inspects each span of wire and tree within or adjacent to the transmission line corridor. A list is created of all vegetation that potentially could come into contact with transmission facilities for removal, pruning, or mitigation. Special care is taken to identify hazard trees that have died or that have suffered damage and could fall into the transmission easement. This includes trees inside and outside of the actual transmission easement. Information recorded at each property for locations requiring maintenance includes the number of trees, tree species, prescription for vegetation management, and customer/location and special instructions such as access issues.

Visual inspections would be performed from the ground and would consist of a brief (less than a day) drive-by. SMUD would access the easements in pickup trucks or service trucks using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Inspections would be completed year-round and not under emergency conditions.

Electrical transmission easement vegetation management inspections could result in vehicle movement, vehicle noise, human presence, and dust generation and lay down of vegetation caused by off-road travel.

Surveys occur via helicopter in the rural west and south. The helicopter would fly generally over the easement and may hover over SMUD facilities for focused inspection. The helicopter may fly as low as 100 feet off the ground. No ground or vegetation

disturbance would occur because of the helicopter flying over SMUD facilities. Take-off and landing locations would include licensed airports or other licensed facilities located inside or outside the Permit Area. Air-based overhead facility inspections could result in temporary helicopter noise. For any given overhead facilities located in rural non-urban areas, this Covered Activity would require less than a day of off-road travel in any given location.

An estimated 56.5 percent (80.03 miles) of the 141.60 miles of existing overhead transmission lines is located in non-urban areas and could require off-road travel for access. It is assumed that a corridor approximately 10 feet wide and 80.03 miles long would be crossed by vehicles. SMUD estimates that approximately 97.01 acres would be crossed by vehicles annually for access to the transmission easement (2,910.3 acres over the 30-year permit term). To access existing transmission and facilities located in non-urban areas, this Covered Activity would require off-road travel for less than a day.

V3b Transmission Vegetation Management—Tree Trimming

SMUD would group its vegetation management activities on transmission lines into two types of clearance: Line Clearance Routine Maintenance Work and Line Clearance Cycle Buster Work. Line Clearance Routine Maintenance Work would pertain to pruning cycles based on 3 years of growth (in-cycle pruning), according to tree species and soil conditions. Some trees, such as heritage trees or elderberry shrubs, require specific conditions to be met before pruning and therefore, may not be compatible with a 3-year management cycle. In those cases, SMUD may shorten the pruning cycle (out-of-cycle pruning) in accordance with the tree's growth rate to achieve the proper clearance. Elderberry shrub management is described below under Covered Activity V5, *Elderberry Shrub Trimming and Removal*.

Line Clearance Cycle Buster Work would pertain to the minimum acceptable clearance to ensure that electricity does not jump from a conductor to adjacent vegetation, according to industry standard clearances for transmission line voltage. Approximately 15 percent of each tree would be trimmed during this activity.

SMUD would access the transmission easement for vegetation management activities in pickup trucks or service trucks using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used during transmission line vegetation management would include pickup trucks or service trucks, a dump truck, and a chipper. Tree trimming would be performed by climbing the tree or from an aerial lift on the service truck. Large diameter woody vegetation would be removed with chainsaws. Woody vegetation would generally be chipped and distributed onsite; however, SMUD would not place it in or within 100 feet of aquatic land cover types.

Tree trimming activities could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), laydown of vegetation, and temporary vegetation removal. This Covered Activity could occur year-round and may be completed under emergency conditions.

SMUD would conduct 140 transmission line easement vegetation management actions each year that trim and remove approximately 400 units of vegetation.

The work area needed for each vegetation management activity is approximately 50 feet by 50 feet (0.06 acre each, 8.4 acres annually, and 252 acres over the 30-year permit term). The work area would be used for parking vehicles and staging equipment.

An estimated 56.5 percent (80.03 miles) of the 141.60 miles of existing transmission easement is located in non-urban areas and could require off-road travel for access. SMUD assumes off-road travel for vegetation management actions based on a 3-year return cycle. SMUD assumes that a corridor approximately 10 feet wide and 26.67 miles long would be crossed by vehicles. SMUD estimates that approximately 32.33 acres would be crossed by vehicles annually for access to the transmission easement (969.9 acres over the 30-year permit term). To access the area of pruning or trimming along transmission facilities located in non-urban land cover, this Covered Activity would require less than a day of off-road travel in any given location.

V3c Transmission Vegetation Management—Brushy Vegetation

SMUD regularly maintains areas with brushy vegetation growing in the wire and border zones. First, crews would remove incompatible tree species, such as privet, oak spp., eucalyptus spp., cottonwood, and conifer trees that are 4 inches or less in diameter at breast height. Crews would then use mowers or other equipment to remove the brushy vegetation. Areas with only an herbaceous layer would not be mowed (SMUD would not mow areas of annual grassland habitat).

SMUD would access the transmission easements for brushy vegetation management activities using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used during brushy vegetation management would include two to three pickup trucks or service trucks, a dump truck, and a chipper. Other equipment used could include cutters, mowers, brush hogs, hydro-axes, Brontosauruses, Slashbusters, brush rakes, and hand tools. Woody vegetation is generally chipped and distributed onsite; however, SMUD would not place it in or within 100 feet of aquatic land cover types.

Brush removal activities could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), laydown of vegetation, and temporary vegetation removal. This Covered Activity would not be completed under emergency conditions.

Six sites with brushy vegetation could be cleared over the permit term. SMUD assumes that each work area could be up to 7 acres (42 acres over the 30-year permit term).

Approximately 50 to 75 percent of the vegetation would be cleared at each site. Using these assumptions, up to approximately 5.25 acres of brushy vegetation would be mowed during each event, corresponding to 31.5 acres over the 30-year permit term. Mowing of brushy vegetation would take approximately 2 weeks.

To access the sites where brushy vegetation would be cleared, it is assumed that a corridor approximately 10 feet by 1,000 feet would be crossed by vehicles. SMUD estimates that approximately 0.23 acre would be crossed by vehicles for each event to access to the transmission easement (1.38 acres over the 30-year permit term). This Covered Activity may require up to 2 weeks of travel over vegetated habitat.

V4 Tree Removal Projects

SMUD crews would remove select trees near overhead transmission, subtransmission, and distribution facilities in conjunction with routine vegetation management activities. Trees would be removed in accordance with local tree protection ordinances, and only with landowner permission. Trees that pose an imminent threat to SMUD facilities (hazard trees) would also be removed.

Several factors would be evaluated before tree removal, including line voltage, location of the tree in relation to conductors, height of the tree, history of the tree being problematic, tree species, prescription for tree removal, customer and location, and special conditions such as access issues. Examples of species considered for removal include palms and redwoods, in part because they cannot be directionally trimmed. SMUD would also target the removal of small, fast-growing trees growing directly under the conductors that would become a hazard in the future. This prevents the addition of fast-growing trees to SMUD's trimming inventory, which would add to maintenance costs. Crews would use manual and mechanical hand tools for removal of branches and cutting of the trunk. Stump profiles of cleared trees would be kept as low as possible, but stumps and tree roots would not be removed from the ground (no ground disturbance would occur). The trimmed branches would be chipped onsite and the material hauled back to SMUD's yard in the chipper. At the request of the landowner, chipped material may be left in the easement; however, SMUD would not place it in or within 100 feet of aquatic land cover types.

SMUD would access the easement for vegetation management activities using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used during tree removal projects could include pickup trucks or service trucks, a dump truck, and a chipper. Tree trimming could be performed by climbing the tree or using an aerial lift on a service truck. Trees could be removed with chainsaws and other mechanical tools as well as hand tools.

This Covered Activity could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), laydown of vegetation, and permanent vegetation removal. No permanent ground disturbance would occur. Tree removal projects would occur year-round and may be completed under emergency conditions.

SMUD would perform approximately 360 tree removals each year in transmission easements and approximately 10,830 tree removals (for multi-stemmed trees, each stem is counted as a separate tree) each year in subtransmission and distribution easements

in the Permit Area. Depending on the size of the tree, each tree removal would take approximately 4 hours, but could range from 1 hour to 2 days.

The work area needed for each tree removal is approximately 50 feet by 50 feet (an estimated 0.06 acre each, 671.4 acres annually, and 20,142 acres over the 30-year permit term). The work area would be used for parking vehicles and staging equipment.

An estimated 18.6 percent (726.12 miles) of the transmission, subtransmission, and distribution lines is located in non-urban areas that could require off-road travel for access. It is assumed that a corridor approximately 10 feet by 200 feet (0.05 acre) would be temporarily crossed by vehicles on an estimated 18.6 percent of tree removals (2,081). SMUD estimates that approximately 104.05 acres would be crossed by vehicles annually for access to the transmission, subtransmission, and distribution easement (3,121.5 acres over the 30-year permit term). This Covered Activity would require less than 2 days of off-road travel in any given location.

V5 Elderberry Shrub Trimming and Removal

SMUD currently has approximately 135 elderberry shrubs growing within its easement and into existing conductors. Additionally, one shrub is growing over the gas pipeline in Yolo County. SMUD anticipates that additional shrubs will be found within SMUD's easements over the next 30 years, for an estimated total of 300 shrubs.

SMUD has not been able to maintain adequate clearance from its overhead lines by only trimming elderberry stems less than 1 inch in diameter.

V5a Trimming Elderberry Stems

SMUD would conduct elderberry trimming to maintain compliance with Public Res. Code Sections 4292 and 4293, NERC standard FAC-003-1, and California Public Utilities Commission General Order 95, Rule 35. These regulations identify, by voltage, specific clearance distances that must be maintained between vegetation and conductors. SMUD would maintain a database of all elderberry shrubs to be trimmed to track the activities and assist in scheduling. Where trimming of elderberry shrubs is required, it is anticipated that the shrubs would be pruned down to a height of 12 feet (measured from ground height) unless site specific safety conditions warrant pruning below 12 feet. Elderberry trimming would be performed by SMUD from the ground or using an aerial lift on a service truck or line truck. Crews would use manual and mechanical hand tools for trimming. The trimmed branches would be chipped onsite and the material hauled back to SMUD's yard with no additional trips required.

SMUD would access the elderberry shrubs using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used during vegetation management activities could include pickup trucks, service trucks, a chipper, and hand tools such as chainsaws and pole pruners. This activity could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-

road travel and construction activities), laydown of vegetation, and temporary vegetation removal.

SMUD estimates that approximately 20 shrubs with branches greater than 1 inch would be trimmed annually (600 shrubs over the 30-year permit term, though this includes repeated trimming of the same shrubs).

The work area needed for each elderberry trimming activity is approximately 50 feet by 50 feet (0.06 acre each, 1.38 acres annually, and 41.4 acres over the 30-year permit term). The work area would be used for parking vehicles and staging equipment.

Approximately 20 percent (27 shrubs) of the 135 elderberry shrubs trimmed is accessible from existing roads. For the remaining 80 percent (108 shrubs), SMUD assumes that a corridor approximately 10 feet by 500 feet (an estimated 0.12 acre) would be temporarily crossed by vehicles. To access elderberry shrubs located in non-urban land cover, this Covered Activity would require less than a day of off-road travel in any given location.

V5b Removal and Transplantation of Elderberry Shrubs

SMUD would transplant up to 10 of the 135 identified elderberry shrubs in accordance with the transplanting procedure in the Service Guidelines as described in Chapter 4. The shrubs would be moved to a conservation bank (upon approval by bank signatories) or other location as approved by USFWS.

SMUD would access the elderberry shrubs using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used during shrub removal activities could include pickup trucks, service trucks, a backhoe, a dump truck, and a front-end loader. This activity could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), laydown of vegetation, temporary vegetation removal, temporary ground disturbance, temporary changes in hydrology or runoff, and spread of invasive or exotic plants. This Covered Activity would not be completed under emergency conditions.

The work area needed for each elderberry transplant activity is approximately 75 feet by 75 feet (an estimated 0.13 acre each, 1.3 acres over the 30-year permit term). The work area would be used for parking vehicles and staging equipment.

Removal of each elderberry shrub would temporarily disturb an estimated 0.004 acre each (0.04 acre over the 30-year permit term). Each elderberry shrub removal would take less than a day.

SMUD would transplant up to 10 of the 135 elderberry shrubs. Approximately 20 percent (27 shrubs) of the elderberry shrubs SMUD manages is accessible from existing roads. Using this same percentage, SMUD assumes eight of the shrubs to be transplanted would require temporary off-road travel, using a corridor approximately 10 feet by 500 feet long (an estimated 0.12 acre; 0.96 acre over the 30-year permit term). To access elderberry shrubs located in non-urban land cover, this Covered Activity would require less than a

day of off-road travel in any given location. Once the shrubs are removed and the work area is backfilled and recontoured, SMUD would not need to revisit the removal site.

V5c Removal of Elderberry Shrubs by Cutting

SMUD would remove by cutting an estimated 100 elderberry shrubs. These shrubs will not be transplanted because of difficult logistics due to the shrub's location or because the shrub would not be likely to survive transplantation.

SMUD would access the elderberry shrubs using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used during shrub removal activities could include pickup trucks, service trucks, a backhoe, a dump truck, a front-end loader, and hand tools such as chainsaws and pole pruners. This activity could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), laydown of vegetation, temporary ground disturbance, permanent vegetation loss, and temporary changes in hydrology or runoff. This Covered Activity would not be completed under emergency conditions.

The work area needed for each elderberry shrub removal by cutting is approximately 50 feet by 50 feet (0.057 acre each, 5.13 acres over the 30-year permit term). The work area would be used for parking vehicles and staging equipment.

SMUD would remove 100 elderberry shrubs by cutting. Approximately 20 percent (27 shrubs) of the elderberry shrubs managed by SMUD is accessible from existing roads. Using this same percentage, SMUD assumes eighteen of the shrubs to be removed would require temporary off-road travel, using a corridor approximately 10 feet by 500 feet (an estimated 0.12 acre; 2.07 acres over the 30-year permit term). To access elderberry shrubs located in non-urban land cover, this Covered Activity would require less than a day of off-road travel in any given location. Once the shrubs are removed, SMUD would not need to revisit the removal site.

V6 Pole Vegetation Clearing

As previously mentioned in the descriptions of Covered Activities E8, *Pole Replacement*, and E13, *New and Relocated Overhead Subtransmission and Distribution Line Construction*, Public Res. Code Section 4292 requires firebreak clearances in California Department of Forestry and Fire SRA, around poles or towers on which a switch, fuse, transformer, or lightning arrester is attached. SMUD would maintain vegetation-clear zones around 927 poles each year in compliance with Public Res. Code Section 4292, all of which are located within the eastern portion of the Permit Area and south of Highway 50. SMUD maintains a map and database to track this activity.

All woody or herbaceous vegetation within a radial distance of 10 feet from the pole/tower must be cleared up to the height of the conductor in accordance with Public Res. Code Section 4292 (376.8 square feet, or 0.009 acre cleared around each pole). SMUD would clear vegetation around each pole using small mowers and manual and mechanical hand

tools. Mowed and cut vegetation would be hauled offsite. In some cases, due to regrowth, vegetation would be cleared more than once during a season.

SMUD would access the poles in the SRA using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. A service truck and trailer, small mowers, and manual and mechanical hand tools would be used for this Covered Activity.

The Pole Vegetation Clearing activity could result in vehicle movement, vehicle and equipment noise, human presence, dust generation and lay down of vegetation caused by off-road travel, and permanent vegetation loss. This Covered Activity would not be completed under emergency conditions.

There are an average of 927 poles cleared by SMUD annually within the SRA. This would result in the permanent loss of an estimated 8.34 acres of habitat because vegetation would be removed annually. SMUD anticipates that 20 new poles would be added annually in the SRA; however, the loss of habitat from new poles was addressed in Covered Activities E8, *Pole Replacement*, and E13, *New and Relocated Overhead Subtransmission and Distribution Line Construction*.

The work area needed for each Pole Vegetation Clearing described in this Covered Activity is approximately 15 feet by 25 feet (an estimated 0.009 acre each, 8.34 acres annually, and 250.2 acres over the 30-year permit term). The work area would be used for parking vehicles and staging equipment.

An estimated 66 percent of the poles within the SRA is located in non-urban areas and could require off-road travel for access. It is assumed that off-road travel would be required to access 610 towers and poles each year and a corridor approximately 10 feet by 200 feet would be temporarily crossed by vehicles. SMUD estimates that approximately 28.01 acres would be crossed by vehicles annually for access to poles and towers within the SRA (an estimated 621 acres over the 30-year permit term). This Covered Activity would take less than a day. To access towers and poles in the SRA located in non-urban land cover, this Covered Activity would require less than a day of off-road travel in any given location.

V7 Vegetation Management on Pipeline Easement

SMUD would manage grasses, brush, and trees along its natural gas pipeline easement to prevent damage to the natural gas facilities, facilitate inspections, and comply with all pertinent state and federal regulations. SMUD would manage vegetation over approximately 14 percent (11 miles) of its 76-mile pipeline; the remaining portion is under agricultural cultivation, or in urban areas. SMUD would identify areas within the easement requiring vegetation removal during their routine pipeline inspections (see Covered Activity G1, *Pipeline Inspections*). Vegetation management activities over the pipeline would typically occur in a corridor 8 to 12 feet wide. SMUD would remove any large diameter (over 4 inches) woody vegetation with chainsaws. Other vegetation within the easement boundary would be mechanically removed to ground level (2 to 3 inches in

height) using masticators, flail mowers, and hand-operated brush clearing equipment. Vegetation management required where the pipeline crosses under drainages or waterways would be completed using hand-operated brush clearing equipment. The activities would occur once every 5 years, prior to Covered Activity G4, *Internal Pipeline Inspection,* in the late summer/early fall and take approximately 3 weeks. The removed vegetation would be chipped onsite and hauled offsite. At the request of the landowner, chipped material may be left in the easement; however, SMUD would not place it in or within 100 feet of aquatic land cover types.

The work area needed for vegetation management activities along the pipeline easement would be approximately 12 feet wide and 11 miles long (16 acres annually, and 96 acres over the 30-year permit term). SMUD estimates that a corridor approximately 10 feet wide (within a 12-foot wide easement) and 11 miles long would be temporarily disturbed every 5 years along the pipeline easement, resulting in a total of an estimated 13.33 acres of temporarily disturbed habitat (79.98 acres over the 30-year permit period).

SMUD would access the portions of the pipeline requiring vegetation management activities using existing roads. SMUD assumes that no off-road travel, beyond what would occur in the work area, would be needed for the Covered Activity. Equipment used to manage vegetation could include pickup trucks, service trucks, masticators, flail mowers, and hand-operated brush clearing equipment. Vegetation management activities along the pipeline easement could result in vehicle movement, vehicle and equipment noise, human presence, dust generation and lay down of vegetation, and temporary loss of vegetation. This Covered Activity would not be completed under emergency conditions.

2.5 Telecommunications

SMUD owns and operates a telecommunication system that includes fiber optics, microwave radio, two-way radio, power line carrier, infrared transmission, metallic cables, and leased services/circuits. The fiber-optic cable associated with the telecommunication system is approximately 200 miles in length and located on existing electric transmission, subtransmission, and distribution line poles and towers. SMUD has nine telecommunication towers that house microwave dishes for communication between SMUD's power operations and its hydroelectric powerhouses and thermal power plants. The towers are also used to house radio communications antennae.

The nine existing telecommunication towers are located in existing larger SMUD facilities.

The following telecommunications activities are covered under the HCP.

- Telecommunication Tower Maintenance (T1)
- New Construction of Telecommunication Towers (T2)
- Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation (T3)

- Electrical Telecommunications Underground Fiber-optic Replacement and New Installation (T4)

Any temporary impacts that are greater than 0.1 acre will be revegetated and recontoured, as needed.

T1 Telecommunication Tower Maintenance

SMUD has nine telecommunication towers in the Permit Area that house microwave dishes for communication between SMUD's power operations and its hydroelectric powerhouses and thermal power plants. The towers are also used to house radio communications antennae. The nine existing telecommunication towers are located in larger SMUD facilities, for example, the Energy Management Center and the Elverta transmission substation. Annual visual inspections would be performed and maintenance activities may be undertaken if warranted. This activity would occur in either a transmission substation or a SMUD facility on a paved or graveled lot. This activity may be performed at any time during the year and could occur under routine or emergency conditions.

The maintenance would be primarily completed by a worker climbing the tower; however, a crane may be used if work is required on a major telecommunication component. Equipment used for this Covered Activity would include pickup trucks, service trucks, a crane, and hand tools. The activities associated with telecommunication repairs could result in vehicle movement, vehicle and equipment noise, and human presence.

SMUD anticipates approximately 7 repairs annually and 210 repairs over the 30-year permit term. One repair every 5 years may require the use of a crane, because a large component would either be removed or added to an existing tower. The crane would likely be staged inside of the substation in an area 10 feet by 40 feet, and the activity would require a work area of approximately 25 feet by 100 feet, totaling approximately 0.07 acre inside the already disturbed SMUD facility (0.42 acre over the 30-year permit term).

All telecommunication towers are located in existing SMUD facilities, and no temporary disturbance or permanent loss of land cover would occur because of telecommunication tower maintenance. SMUD would access the telecommunication towers for maintenance in pickup trucks and service trucks using existing roads; no off-road travel would be required. Telecommunication tower maintenance activities may take up to 2 days.

T2 New Construction of Telecommunication Towers

SMUD may have the need to construct two new telecommunication towers in the next 30 years for microwave and radio communications. New tower facilities would be within the footprint of one of the 18 existing SMUD electrical transmission substations, or in a new transmission substation when it is constructed (see Covered Activity E16, *New Substation Construction*). A self-supporting steel lattice tower approximately 15 feet by 15 feet by 185 feet would be constructed with four footings. Each footing would be approximately 3

feet in diameter. A 3-foot diameter hole would be drilled approximately 10 feet deep and filled with a steel reinforcing bar bundle and concrete to encase the bundle. The steel bar would be threaded on the aboveground end, and the base of the tower would be bolted to the four footings. Sections of the tower would be hoisted in place by a crane and then workers would bolt the new section to the lower section. Once the tower is erected, the communications components would be added. A communications shed or building approximately 10 feet by 20 feet would also be constructed within the substation. Telecommunications cable would be routed from the building to the tower and up to the components on the tower.

Equipment used for this activity would include pickup trucks, service trucks, a truck-mounted machine auger, a crane, and a flatbed truck. The activities associated with new telecommunication tower construction could result in vehicle movement, vehicle and equipment noise, human presence, dust generated from construction activities, temporary ground disturbance, and ground vibration.

The work area needed to construct new telecommunication towers is approximately 150 feet by 150 feet, including the area for staging a crane (0.52 acre each, and 1.04 acres over the 30-year permit term).

Most of the work area would be within the existing substation; however, a crane would likely be staged outside the substation and would temporarily disturb an area approximately 25 feet by 100 feet (an estimated 0.06 acre each and 0.12 acre over the 30-year permit term) from the crane footprint. The tower and communications shed would be constructed in the already disturbed substation; therefore, no permanent loss of land cover would occur because of new telecommunication tower construction. Erecting the new tower and communications building would take approximately 30 to 45 days to complete. New tower construction could occur at any time of the year, weather permitting, but would not be completed under emergency conditions. SMUD would access the telecommunication tower sites using existing roads; no off-road travel would be required.

T3 Electrical Telecommunications Overhead Fiber-Optic Replacement and New Installation

SMUD has approximately 200 miles of existing fiber-optic cable installed on existing transmission, subtransmission, and distribution line poles and towers in the Permit Area. SMUD expects to add or replace an additional 0.5 mile of new cable every year (maximum 15 miles of new fiber-optic cable over the permit term). To install new or replacement fiber-optic cable, travelers would be installed on each existing pole or tower using an aerial lift on a service truck or line truck. Installing the travelers would require a work area of approximately 10 feet by 25 feet (250 square feet, or 0.006 acre) per pole within the existing electrical-line easement. Where an aerial lift cannot be used, a winch would be used to install the travelers. A helicopter could be used to install travelers in sensitive habitat areas that preclude the use of a service or line truck.

Two temporary pull sites and tension sites would be needed for each fiber-optic cable replacement and new installation project. Additional pull and tension sites may be needed

if the project is more than 0.5 mile in length or if it will cross major roadways. At the pull sites, a truck- or trailer-mounted bull-wheel puller, a small truck- or trailer-mounted crane, and rewinders with collapsible reels would be used to pull the conductors through the travelers. Truck-mounted tensioners, conductor reel trailers, a crane, and conductor reels would be used to tension the conductors. The temporary tensioning and pull sites would each require approximately 100 feet by 100 feet (10,000 square feet, or 0.23 acre) within the existing electrical-line easement.

Before pulling the fiber-optic cable, shoo-fly structures may be installed at road crossings and other locations where necessary to prevent the fiber-optic cable from contacting existing electric or communication facilities or passing vehicles. Shoo-flies consist of wood poles and anchors temporarily installed to support the fiber-optic cable. Pole setting depths range from 5 to 14 feet. Equipment to construct the shoo-fly includes hand tools to attach components to the temporary pole, a truck-mounted auger, a truck-mounted pole setter, and a line truck. These temporary shoo-fly structures occasionally support a net stretched beneath the conductors. In most cases, only one shoo-fly would be needed to support the fiber-optic cable. The work area for each temporary pole (shoo-fly) would be approximately 100 feet by 100 feet (10,000 square feet, or 0.23 acre) including the temporary disturbance area of approximately 10 feet by 10 feet for soil storage (100 square feet, or 0.002 acre) and 3.14 square feet for the temporary pole.

After the fiber-optic cable is pulled into place, it would be tensioned by pulling it to a predetermined sag and tension. The new fiber-optic cable is then permanently attached to clamps on the poles or towers.

SMUD would access the existing electrical easement and fiber-optic cable routes using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used for this activity could include pickup trucks, service trucks, line trucks, a flatbed delivery truck, a truck- or trailer-mounted bull-wheel puller, rewinders with collapsible reels, truck-mounted tensioners, conductor reel trailers, and conductor reels. The activities associated with fiber-optic cable replacement and new installation could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, and temporary ground disturbance.

The work area needed to install new fiber-optic cable is a corridor 15 feet wide and as long as the project. SMUD assumes for this analysis that two projects would be completed each year, each approximately 1,300 feet long (the work area would be 0.45 acre). The temporary disturbance area corresponding to installing new or replacing fiber-optic cable 1,300 feet long would be an estimated 0.73 acre and includes the following elements.

- 0.04 acre for the travelers placed at poles (assuming seven poles).
- 0.46 acre for two pull sites (one at each end).
- 0.23 acre for one shoo-fly.

Cable installation would temporarily disturb 43.8 acres during the 30-year permit term, assuming two projects every year. Installation of new or replacement overhead electrical telecommunications fiber-optic would be performed in a week. This Covered Activity could occur at any time of the year, weather permitting, but would not be completed under emergency conditions.

Approximately 33.24 percent of the overhead fiber-optic cable is located in non-urban areas that could require off-road travel. It is assumed that a corridor approximately 10 feet wide and 250 feet long (0.06 acre) would be temporarily crossed by vehicles to access the work area for this Covered Activity. SMUD estimates that approximately 0.12 acre would be crossed by vehicles every year for replacement and new installation of fiber-optic cable (3.6 acres over the 30-year permit term).

T4 Electrical Telecommunications Underground Fiber-optic Replacement and New Installation

SMUD has approximately 36.8 miles of existing underground fiber-optic cable installed in conduit that follows either underground electrical lines or the gas pipeline. Replacement of fiber-optic cable in conduit would entail driving to the vault or pull box in a pickup truck and completing any activities in the vault or pull box. The damaged fiber-optic cable would be pulled out through the vault or pull box, and the new segment would be put in and then pulled through the conduit.

SMUD would access the vaults and pull boxes using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used could include pickup trucks, service trucks, a truck- or trailer-mounted bull-wheel puller, rewinders with collapsible reels, truck-mounted tensioners, conductor reel trailers, and conductor reels.

SMUD assumes replacement of fiber-optic cable in conduit would occur once a year. A work area of approximately 100 feet by 100 feet at both ends (0.46 acre total), adjacent to existing vaults/pull boxes, would be used to complete this Covered Activity (0.46 acre annually, 13.8 acres over the 30-year permit term). SMUD would park any vehicles and equipment within this area. This Covered Activity would occur in vaults or pull boxes, but could result in vehicle movement, vehicle and equipment noise, human presence, and dust generation and lay down of vegetation caused by off-road travel. Land cover would not be disturbed during the fiber replacement in vaults or pull boxes.

The underground fiber-optic cable is primarily located in non-urban areas, with the exception of the fiber in downtown Sacramento and Carmichael/Fair Oaks, and would require off-road travel for access. It is assumed that the one fiber-optic cable replacement activity performed each year would require off-road travel. For replacement of fiber-optic cable in conduit requiring off-road access, it is assumed that a corridor 10 feet wide and 250 feet long would be crossed by vehicles traveling off-road. SMUD estimates that approximately 0.06 acre would be crossed by vehicles annually for fiber-optic cable replacement in vaults or pull boxes (1.8 acres over the 30-year permit term).

A typical underground fiber-optic cable replacement in conduit would take a week. This Covered Activity could occur at any time of the year, weather permitting, but would not be completed under emergency conditions.

2.6 Conservation and Enhancement Activities

Covered Activities related to habitat enhancement activities or implementation of the SMUD HCP conservation strategy include the following.

- SMUD Nature Preserve Mitigation Bank (SMUD Bank) Oak Tree Planting (C1)
- SMUD Bank Management (C2)

C1 SMUD Bank Oak Tree Planting

SMUD plans to diversify the native habitat and enhance raptor habitat on the SMUD Bank by restoring oak savannah within approximately 282 acres located primarily in the northern portion of the SMUD Bank, where there are few aquatic habitat features (Figure 2-3).

This activity was discussed in the Bank Enabling Instrument for the SMUD Bank, with the caveat that state and federal Endangered Species Act compliance would be required prior to the activity being completed.

Oak tree planting densities on 282 acres of the SMUD Bank would mimic the species and densities of trees within the blue oak woodland found on the adjacent Howard Ranch property. Tree species that would be planted include blue oak (*Quercus douglasii*), valley oak (*Quercus lobata*), and possibly some interior live oak (*Quercus wislizeni*) depending on the soil, slope, and availability of water. The ultimate goal would be to achieve an average density of 14 established trees per acre (totaling up to 3,920 trees). An established tree is one that does not require further care to grow in a healthy manner. To achieve the desired stocking rate, approximately 11,760 acorns would be planted over several years, as mortality is often very high for this type of restoration. Plantings would be clustered and fenced to reduce cattle and deer browsing. Raptor perch poles would be installed near the clusters and within the 280-acre oak tree planting area to reduce the amount of rodent activity in the fenced areas.

Tree saplings may be planted to replace trees that do not survive. Tree sapling planting holes and perch pole holes would be excavated approximately 3 to 4 feet deep and 1 foot wide. Saplings would be planted when the planting area soils are moist or dry. Exposed soils would be covered with erosion control materials (i.e., straw). The clustered-tree areas would be mowed annually for maintenance for a minimum of 5 years; this may extend up to 10 years following planting of individual tree clusters. Once tree clusters are established and able to withstand cattle grazing, temporary fencing around each tree would be removed.

An aboveground irrigation system would be installed to provide for interim watering of the acorns and/or trees for 2 of years. The irrigation pipeline would be constructed of plastic measuring approximately 1.25 to 2 inches in diameter. Water would come from onsite ground water wells or other sources to the tree clusters. If needed for supplement of tree irrigation, one well may be installed in SMUD-owned property adjacent to the SMUD Bank. Once tree clusters are established, the irrigation pipes would be removed.

Construction of a water well, if needed, would require a work area of 50 feet by 50 feet (2,500 square feet, or 0.06 acre). The well, pumps, and a 2,500-gallon tank would be constructed on a 20- by 20-foot pad (400 square feet, or 0.009 acre).

SMUD would access the tree planting area using quad runners, pickup trucks, and suburban utility vehicles, using existing roads, dirt roads, or on foot. Equipment used for tree planting and tree maintenance could include a hand auger, a post hole digger, a mower, and shovels. If a well must be installed, then a well drilling rig would be used.

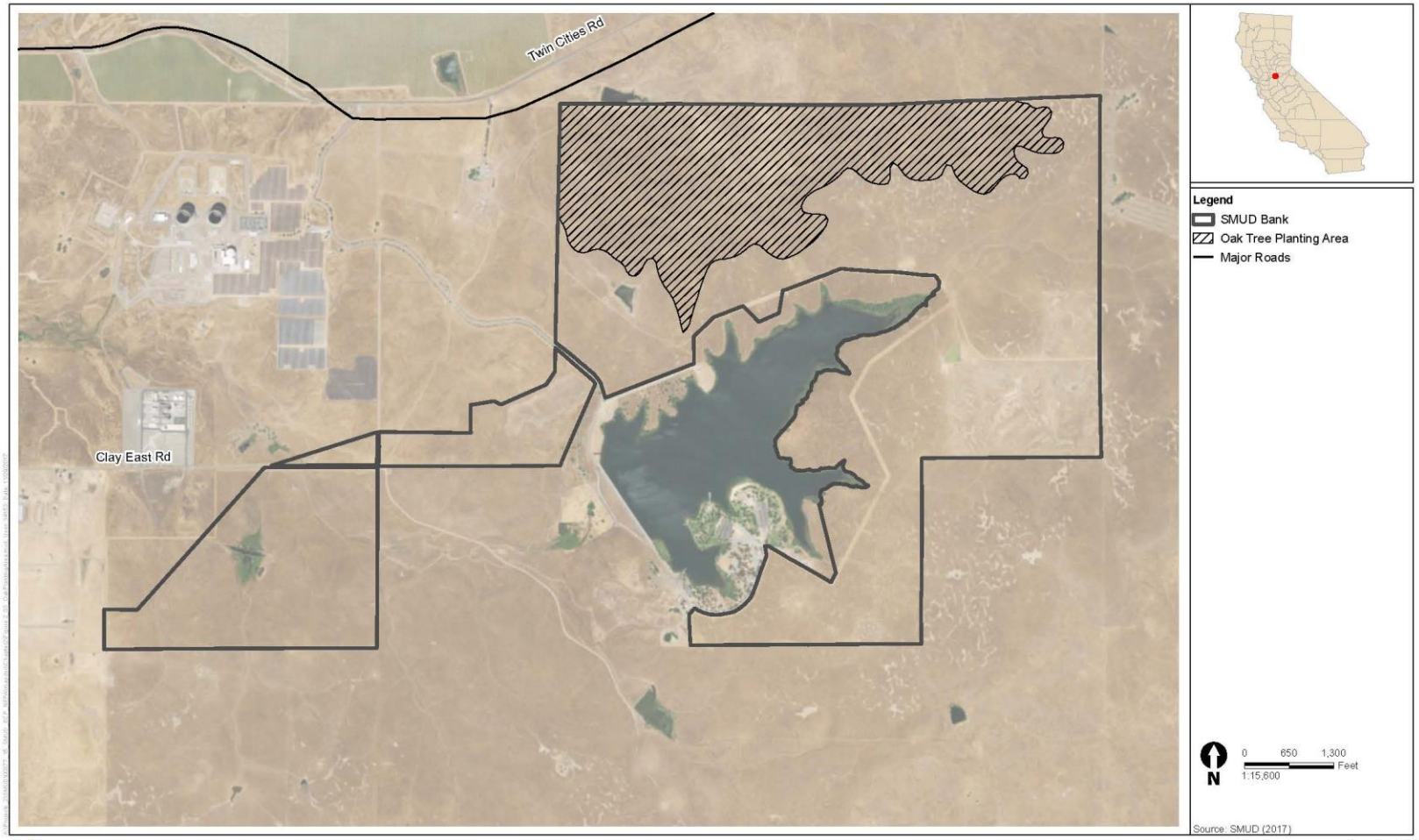


Figure 2-3
Proposed Mitigation Bank Oak Tree Plantings
SMUD HCP

C2 SMUD Bank Management and Monitoring

Take authorization of listed species on the SMUD Bank during management and monitoring activities described in the Bank Enabling Instrument was authorized under a Nationwide Permit that expired. Therefore, the federal 10(a)(1)(B) permit issued for this HCP would authorize take for the following activities for Covered Species at the SMUD Bank. SMUD Bank management and monitoring activities include the following.

- Wet-season sampling of vernal pools for vernal pool invertebrates and California tiger salamanders, and monitoring other Covered Species.
- Removing invasive plant species.
- Grazing.
- Draining perennial aquatic habitat for the benefit of California tiger salamander and removing invasive fish and bullfrogs.
- Maintaining fences and gates.
- Erosion control.

2.7 Miscellaneous Covered Activities

Miscellaneous Covered Activities include those completed by SMUD that do not fit into the categories described above.

The following miscellaneous activities are covered under the HCP.

- Operation of the Cosumnes Power Plant (M1)
- Cosumnes Power Plant Water Pipeline Management (M2)
- Rancho Seco Property Operation and Maintenance (M3)

Each Covered Activity is identified by an activity number (e.g., M1). For each Covered Activity, the following sections provide a description of the activity, frequency, equipment used, and an estimate of the temporary ground disturbance and permanent removal.

M1 Operation of the Cosumnes Power Plant

The SMUD CPP, a 500-megawatt power plant, is located on a 30-acre site approximately 0.5 mile south of the decommissioned Rancho Seco Nuclear Generating Station and north of the SMUD Bank. The CPP went online on February 24, 2006, and is considered a state-of-the-art facility that uses combined-cycle technology to capture heat normally lost in the production of electricity from natural gas, making it highly fuel efficient and clean. The CPP operates 24 hours a day, 7 days a week except for scheduled and unscheduled outages. Activities included in the operation of the CCP include staff driving to and from the site, staff parking in the parking lot, deliveries to the site, scheduled and

unscheduled power plant maintenance activities, and warehousing activities including the use of forklifts. Scheduled and unscheduled maintenance activities could involve vehicle movement around the site and movement of material, equipment, and staff.

M2 Cosumnes Power Plant Water Pipeline Management

SMUD operates and maintains an underground water pipeline approximately 5 miles long that conveys water from the Folsom South Canal to Rancho Seco Lake. The water had originally been required for the now decommissioned Rancho Seco Nuclear Generation Station, and agreements were made with the Department of Water Resources, through a Davis-Grunsky contract, to maintain Rancho Seco Lake levels. Water from this pipeline is also used as a source for the CPP. Typically, water is pumped through the pipeline into Rancho Seco Lake at night (when energy costs are low) and gravity flows out of the lake during the day to serve the CPP. Approximately 3,300 feet of pipeline are located within the SMUD Bank.

M2a Cathodic Protection Installation

SMUD would install 17 cathodic protection test stations on the water pipeline, which would allow SMUD to test its integrity. Of these, 12 would be installed in existing vaults, and 5 would require excavation to the pipeline. The test stations consist of two to six wires attached to the pipeline a distance apart from each other. The wires run up to the surface and are exposed at the soil surface inside 4-foot-tall, 4-inch-diameter plastic tubes or in flush-mounted test stations at various locations along the pipeline.

Installation of new cathodic protection test stations would require soil excavation to locate the pipe joint where the test station would be installed. The initial hole would be approximately 2 feet long and 4 feet wide, but depending on the pipe joint location (pipe segments are 20 feet long), the trench would be extended until a joint is located. Therefore, the hole may be 2 to 18 feet long, approximately 4 feet wide, and to the depth of the pipe (which varies). For this evaluation, a maximum hole size of 4 by 18 feet (72 square feet, or 0.002 acre) is assumed at each location. The excavated dirt would be piled immediately adjacent to each hole, and would occupy an area of equal size. To reduce the risk of damaging the pipe, most holes will be dug using hand tools (augers, shovels, etc.), but in some instances a backhoe may be used.

SMUD would access the water pipeline easement using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used could include hand tools, a backhoe transported by a truck and trailer, a water truck, and three pickup trucks. The activities associated with this Covered Activity could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, temporary ground disturbance, and permanent vegetation and land cover loss. This activity would not need to be completed under emergency conditions and would be scheduled for dry weather and adequate soil conditions.

Each new cathodic protection test station installation would require a work area approximately 100 feet by 100 feet (0.23 acre), including an excavation area and soil stockpile area.

After installation, a test station would consist of a 4-foot-tall, 4-inch-diameter plastic tube test station or, in selected areas, a box test station flush with the ground surface. Excavation for each cathodic protection test station installation would temporarily disturb an estimated 0.002 acre (an estimated 0.01 acre over the 30-year permit term). Installation of one 4-inch-diameter tube for a new test station would permanently remove an estimated 0.87 square feet (4.36 square feet over the 30-year permit term) of land cover.

SMUD estimates that installation of one of the five cathodic protection test stations would require off-road travel. SMUD assumes a corridor 10 feet by 1,100 feet (0.25 acre) would be crossed by vehicles traveling off-road. SMUD estimates that approximately 0.25 acre would be crossed by vehicles for the one cathodic protection test station over the 30-year permit term. Each cathodic protection test station installation would take less than 2 days.

M2b Water Pipeline Valve Installation

SMUD anticipates installing a valve on the existing water pipeline that would increase reliability; should a portion of the pipeline need to be repaired, the valve would allow for disconnection of that section while still maintaining water flow for CPP operations (the waterline makes a Y at the valve location, allowing one pipeline to be turned off and the other to continue flowing). The new valve would be located along the existing pipeline just north of CPP. Construction of a new pipeline valve would consist of constructing a temporary access road from Clay East Road to the work area, mowing and/or grading the work area, excavating both sides of the existing water pipeline to install the new valve components, installing the new components, and establishing a new permanent fenced, graveled enclosure.

Installation of the new valve could take place at any time of year, depending on weather and operational restrictions related to the need to shut down the pipeline temporarily. Construction of one valve is proposed for the 30-year permit term.

Equipment used for this activity could include a rough terrain crane, a truck with trailer, an excavator, a backhoe, a flatbed truck, a water truck, and a truck and trailer rig. The installation of the new valve could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, temporary ground disturbance, and permanent vegetation and land cover loss.

The temporary access road would be approximately 10 feet wide and 1,200 feet long (0.28 acre). Construction activities would require a temporary work area of approximately 0.5 acre, all of which would be temporarily disturbed. Within the work area, SMUD would use an excavator or backhoe to excavate a terraced hole approximately 50 feet by 50 feet (0.06 acre) and 15 feet deep, and an area approximately 100 feet by 100 feet (0.23

acre) would be required immediately adjacent to the excavation for soil stockpile and equipment and vehicle staging. Prior to installing the new valve, all of the water would be pumped out of the pipeline. Once the new valve components are installed on the existing water pipeline, the trench would be backfilled. Lastly, a permanent station would be constructed as part of connecting the valve to the pipeline.

The new station would be fenced and graveled and would measure approximately 20 feet by 20 feet (0.009 acre). Construction of the new valve station would temporarily disturb 0.5 acre. Construction for this activity would take approximately 1 to 2 months to complete.

M2c Water Pipeline Segment Replacement

If a portion of the pipeline is identified as having the potential to fail through the cathodic protection testing, or if a portion does fail, then SMUD would need to repair that section of the pipeline. The current pipeline is constructed from 20-foot-long concrete sections that are 66 inches in diameter. SMUD assumes that two sections of pipe would need to be repaired for each pipeline repair event, and that two repair events will occur during the 30-year permit term. Replacing a segment of the water pipeline would require draining or removing all the water from the pipeline, excavation around the damaged pipeline segment(s), removal and replacement of the damaged section, backfilling the excavated area, and restoring the site to preconstruction contours.

The excavation area would be approximately 8 feet wide and up to 50 feet long (0.009 acre) to accommodate two sections and the associated connections. The depth of the pipe varies but could be as much as 10 feet. The excavated dirt would be stockpiled adjacent to the excavation area, in an area approximately 50 feet by 50 feet (0.06 acre). The work area would be approximately 100 feet by 100 feet (0.23 acre).

SMUD would access the pipeline easement using existing roads. In the event that no road exists, driving off-road or walking on foot may be necessary. Equipment used for this Covered Activity would include pickup trucks, a backhoe, a crane, an equipment trailer, and a water truck. The water pipeline segment replacement could result in vehicle movement, vehicle and equipment noise, human presence, dust generation (from off-road travel and construction activities), lay down of vegetation, temporary vegetation removal, temporary ground disturbance, and permanent vegetation and land cover loss. This Covered Activity may need to be completed under emergency conditions.

The exact locations for the underground pipeline segment replacement are unknown but would occur within the existing water pipeline easement. SMUD assumes a corridor approximately 10 feet by 1,000 feet would be crossed by vehicles traveling off-road. SMUD estimates that approximately 0.23 acre would be crossed by vehicles per segment replacement event (0.46 acre over the 30-year permit term). Each segment replacement event would take about 5 days to complete.

M3 Rancho Seco Property Operation and Maintenance

SMUD owns approximately 2,400 acres at its Rancho Seco property. There are a variety of uses on this property including the decommissioned Rancho Seco Nuclear Generation Facility; electrical generation at the CPP and the Rancho Seco PV I and II projects; Rancho Seco Solar II Conservation Area; recreational uses at the Rancho Seco Lake and Park, including the Howard Ranch Trail; cattle grazing operations; and the Performing Animals Welfare Society parcel. SMUD conducts activities to maintain this property, including the annual clearing of fire breaks, and installation of new and replacement of old fencing; up to 48 acres could be disturbed for an existing firebreak that will be maintained by disking annually throughout the permit term.

The Rancho Seco Conservation Area abuts the SMUD Bank and maintains a direct linkage/connectivity between the two habitat areas.The purpose of the Conservation Area is to partially mitigate for the permanent removal of 50.31 acres and long-term permanent habitat modification of approximately 451.40 acres of upland habitat for California tiger salamander and potential take associated with mortality of individual salamanders from the Rancho Seco Solar II project. The Conservation Area is located south of Twin Cities Road (also known as SR 104) approximately 10 miles east of the City of Galt, in the southeastern corner of Sacramento County. The Conservation Area is located within the northeast quadrant on the Clay and northwest quadrant of the Goose Creek U.S. Geological Survey (USGS) 7.5-minute quadrangles. The central point of the Conservation Area is at approximate coordinates 38.340619° North, -121.122350° West (datum WGS84).

O&M activities at the Rancho Seco Solar II Conservation Area would include the following.

- Wet-season sampling of wetlands for California tiger salamanders.
- Removing invasive plant species.
- Grazing.
- Draining perennial aquatic habitat for the benefit of California tiger salamander and removing invasive fish and bullfrogs.
- Maintaining fences and gates.
- Erosion control.

3 Biological Resources Setting

3.1 Introduction

This chapter summarizes the existing conditions of biological resources in the Plan Area, including the Permit Area and the conservation banks located outside the Permit Area. This chapter focuses primarily on the Permit Area, including a description of the physical setting, land cover types, species covered in the HCP, habitat for the Covered Species, and methods used to evaluate the existing conditions. The existing biological resource information in this chapter provides the foundation for estimating effects of the HCP Covered Activities (Chapter 4, *Impact Analysis and Levels of Take*), and provides the foundation of the HCP's conservation strategy presented in Chapter 5, *Conservation Strategy*.

3.2 Physical Setting

To place the biological resources discussion into an appropriate context, this chapter provides an overview of the physical setting including the local topography, hydrology, and climate that occur in the Permit Area. All figures referenced in this chapter are located at the end of the chapter.

3.2.1 Topography

The Permit Area is in the lower Sacramento Valley of California. Elevation ranges from just below sea level near the Delta region to over 800 feet above sea level in the foothills of the Sierra Nevada in the northeastern part of the Permit Area (Figure 3-1) (U.S. Department of Agriculture Soil Conservation Service [USDA SCS] 1993).

There are two physiographic regions in the Permit Area: the Sierra Nevada foothills and the lower Sacramento Valley (USDA SCS 1993). The Sierra Nevada foothills are undulating to hilly, from 140 to 830 feet in elevation. This region is located along the northeast edge of the Permit Area.

The remainder of the Permit Area consists of the lower Sacramento Valley and is nearly level to gently rolling, with some areas in the eastern part rolling to hilly. Elevation ranges from sea level in the southwestern part to about 400 feet above sea level in the eastern part. The lower Sacramento Valley contains the Sacramento, American, and Cosumnes rivers and tributaries and their associated nearly level floodplains. North of the American River and east of the Sacramento River, there are basin and terrace remnant landforms in the American Basin, which historically contained intermittent lakes before the area was protected by levees. A low stream terrace occurs along the upstream areas of the American River and along some of the small creeks in the east. The most extensive area is the main valley floor, which consists of primarily level, low terraces, basin rims, and

local basins. There are also gently rolling to hilly areas where dissection of the high terraces is so complete that the original surface of the terrace no longer exists.

3.2.2 Geology

The Permit Area spans two geomorphic provinces: the Great Valley and the Sierra Nevada (California Department of Conservation California Geological Survey 2018). Geomorphic provinces are naturally defined geologic regions that display a distinct landscape or landform. Each region displays unique, defining features based on geology, faults, topographic relief, and climate.

The Permit Area lies mainly in the Great Valley geomorphic province, which is an alluvial plain about 50 miles wide and 400 miles long in the central part of the state. The Sacramento Valley in the northern part is drained by the Sacramento River, while the southern part, the San Joaquin Valley, is drained by the San Joaquin River. The Great Valley is a trough in which sediments have been deposited almost continuously since the Jurassic (about 160 million years ago).

The easternmost portion of the Permit Area lies in the Sierra Nevada geomorphic province, which is a tilted fault block nearly 400 miles long. The western slope is gentle (about two degrees) and disappears under the sediments of the Great Valley. Deep river canyons are cut into the western slope. The metamorphic rock contains gold-bearing veins.

3.2.3 Soils

There are many types of soils in the Permit Area, and they vary from very deep, nearly level alluvial soils, to undulating shallow soils over hardpans, to shallow hilly soils overlying bedrock (USDA SCS 1993). These soils also vary from well drained to poorly drained mineral soils and, to a lesser extent, organic soils. Individual soil units are organized into map units, which consist of soil units of the same texture and composition that occur in geographic position (USDA SCS 1993). The general map units in the Permit Area are described briefly below.

- *Very deep, nearly level to steep soils in areas of dredge tailings:* very deep and excessively or somewhat excessively drained; extremely cobbly or extremely gravelly; and located in northeastern Sacramento County near the American River in areas that have been dredged for gold.
- *Very deep, nearly level soils in freshwater marshes and backswamps, on natural levees, and on low and high floodplains:* very deep and very poorly drained to somewhat poorly drained; have a high water table and are commonly protected by levees; and in the lowlands of the Permit Area near the Delta and along major rivers and channels.

- *Urban land and very deep, nearly level soils on high flood plains, low stream terraces, and low terraces:* well-drained; composed of fine sandy loam, silt loam, or loam; and adjacent to the American and Cosumnes rivers and other streams.
- *Nearly level soils in basins and on basin rims:* moderately deep or deep and somewhat poorly drained; composed of clay, sandy clay loam, and hardpan; and located in the low areas of the western part of the Permit Area.
- *Nearly level to gently rolling soils on low terraces:* moderately deep and moderately well drained; composed of silt loam and claypan underlain by hardpan; and located in the western and central parts of the Permit Area.
- *Urban land and nearly level to steep soils on hills and in filled areas:* very shallow to very deep and moderately well drained to well drained; composed of gravelly loam, fine sandy loam, and sandy loam; and located in eastern Sacramento County.
- *Nearly level to hilly soils on high terraces and hills:* moderately deep or very deep and well drained or moderately well drained; composed of sandy clay loam, gravelly clay, claypan, or hardpan; and located on the highest terraces in the eastern part of the Permit Area.
- *Undulating to hilly soils on foothills:* very shallow to moderately deep and somewhat excessively drained and well drained; loam and claypan underlain by hard bedrock or weathered bedrock; and located in the northeastern part of the Permit Area.

In many areas, soils have been highly altered by humans for mining, agriculture, development, and flood protection. For example, extensive leveling has resulted in large areas of cut and fill, and gold dredging has destroyed some soils and created others.

3.2.4 Hydrology

Natural drainages in the Permit Area generally flow east to west or southwest (USDA SCS 1993). Major waterways within the Permit Area are shown on Figure 3-2. The major rivers in the Permit Area include the Sacramento, American, Mokelumne, and Cosumnes rivers, which are generally perennial (small portions of the Cosumnes River may be dry in low rainfall years). Based on SMUD's geographic information system (GIS) data, there are approximately 1,150 miles of intermittent streams and approximately 122.4 miles of perennial streams in the Permit Area. Most creeks in the Permit Area are intermittent. However, Dry Creek in the northern part of Sacramento County, Arcade Creek, Willow Creek, Morrison Creek, Buffalo Creek, and portions of Deer Creek flow throughout the year (USDA SCS 1993). Other creeks may contain water for the majority of the year but are supplemented by urban runoff and agricultural and residential irrigation.

Waterways subject to tidal influence include numerous sloughs and channels in the Delta region, as well as the mouth of the Cosumnes River and the Sacramento River as far north as the City of Sacramento (USDA SCS 1993).

Upstream dams provide flood protection along the Sacramento and American rivers but not the Cosumnes River. Human-made levees have also been constructed along many drainages for flood protection.

The lower Sacramento Valley and Sierra Nevada foothills contain vernal pools in some areas of nearly level to gently sloping topography (USDA SCS 1993).

3.2.4.1 Watersheds

A watershed is generally described as an area located within a basin that is entirely drained by a common watercourse. Watersheds are generally mapped and discussed in terms of hydrologic units. A hydrologic unit describes the area of land upstream from a specific point on the stream (generally the mouth or outlet) that contributes surface water runoff directly to this outlet point. Every hydrologic unit is identified by a unique Hydrologic Unit Code (HUC) consisting of 2 to 12 digits based on the levels of classification in the hydrologic unit system. Within or intersecting with the Permit Area, there are 20 watersheds derived from the Federal Standard for Delineation of Hydrologic Unit Boundaries (10 digit hydrologic units [HUC-10] watersheds) and 8 HUC-8 watersheds (USGS and USDA NRCS 2009) (Figure 3-3). Table 3-1 lists the sub-basins and watersheds within or intersecting with the Permit Area.

Table 3-1. Sub-basins and Watersheds Within the Permit Area

Sub-basin (8 digit HUC)	Watershed (10 digit HUC)	Total Acreage	Watershed Acreage in Permit Area	Percent of Watershed in Permit Area
Upper Putah (18020162)	Lower Putah Creek (1802016205)	55,542	86	<1%
Lower Sacramento (18020163)	Knights Landing Ridge Cut-Tule Canal (1802016303)	106,938	1,830	2%
	Cache Slough (1802016306)	268,590	982	<1%
	Sherman Lake-Sacramento River (1802016307)	125,614	44,671	36%
	Morrison Creek (1802016304)	82,793	82,789	100%
	Willow Slough (1802016302)	79,659	1,495	2%
Lower American (18020111)	Steelhead Creek (1802011103)	57,009	47,390	83%
	American River (1802011102)	65,428	63,835	98%
	Dry Creek (1802011101)	64,773	162,397	25%

Sub-basin (8 digit HUC)	Watershed (10 digit HUC)	Total Acreage	Watershed Acreage in Permit Area	Percent of Watershed in Permit Area
South Fork American (18020129)	Lower South Fork American River (1802012907)	76,410	1,137	1%
Upper Coon-Upper Auburn (18020161)	Pleasant Grove Creek-Cross Canal (1802016103)	80,295	470	<1%
	Curry Creek-Sacramento River (1802016104)	66,404	37,835	57%
North Fork American (18020128)	Lower North Fork American River (1802012806)	91,558	234	<1%
Upper Cosumnes (18040013)	Lower Cosumnes River (1804001308)	47,311	47,312	100%
	Laguna (1804001307)	98,149	75,353	77%
	Deer Creek (1804001305)	82,990	47,678	57%
	Upper Cosumnes River (1804001306)	114,906	34,977	30%
Upper Mokelumne (18040012)	Snodgrass Slough (1804001210)	51,787	51,787	100%
	Lower Dry Creek (1804001209)	56,184	18,801	33%
	Lower Mokelumne River (1804001211)	141,953	2,653	2%
Total	**20**	**1,814,293**	**577,553**	**N/A**

3.2.5 Climate

The climate in the Permit Area consists of hot, dry summers and cool, wet winters. The Sierra Nevada Mountains to the east shield the area from the extremes of the continental climate, and the Coast Ranges to the west block the cool ocean air in the summer (USDA SCS 1993). Daily summer temperature maximums average 87–93 degrees Fahrenheit and winter minimums average 37–50 degrees Fahrenheit (WRCC 2014). An average of 17 inches of rain falls each year (WRCC 2014).

3.3 Land Cover Types

Land cover types are widely used units for analyzing ecosystem function, evaluating habitat diversity, and defining natural communities. A land cover type reflects the dominant characteristic of the land surface as determined by vegetation, water, or human uses. Table 3-2 lists each SMUD HCP land cover type, their total acreage, and percentages of each SMUD HCP land cover type within each county in the Permit Area.

Figures 3-4 to 3-9 provide locations of the SMUD HCP land cover types present within the Permit Area.

The primary tool used to compile, map, and analyze existing land cover data for the SMUD HCP was ArcGIS 10.2 software. The ArcGIS mapping software was used to create a comprehensive GIS-based map of land cover types within the Permit Area. Several land cover GIS files were reviewed and compared to determine which data sets were the most accurate and the best fit for the SMUD HCP Permit Area. This section summarizes the process of data collection, interpretation of land cover data, land cover classification, species and habitat relationships, and nomenclature used in the HCP. Appendix C, *Land Cover GIS Methods,* provides additional information on this process.

Table 3-2. SMUD HCP Land Cover Types Within the Permit Area

SMUD HCP Land Cover Type	Land Cover Amount (acres)						
	Sacramento County	Placer County	Yolo Pipeline	Amador County	El Dorado County	San Joaquin County	Total
Eucalyptus Woodland	54	<1	0	0	0	0	54
Valley Foothill Riparian	9,845	322	100	2	4	35	10,316
Blue Oak Foothill Pine	104	0	0	0	1	0	105
Blue Oak Woodland	17,528	124	0	0	47	0	17,699
Valley Oak Woodland	1,089	0	0	0	0	0	1,089
Mine Tailing Riparian Woodland	3,186	0	0	0	0	0	3,186
Orchard/Vineyard	30,938	106	322	0	0	108	31,473
Cropland	67,581	34	1560	0	0	2	69,177
Rice	5,049	14	250	0	0	0	5,313
Pasture	20,086	210	945	0	0	73	21,313
Grasses and Forbs	167,657	28	44	14	422	10	168,175
Urban	194,241	2,780	343	0	11	3	197,378
Barren/Disturbed	17,879	<1	0	0	<1	0	17,893
Riverine	11,075	48	421	<1	7	23	11,574
Open Water/Fringe	5,849	13	143	0	10	8	6,023
Other Depressional Wetland	8,670	3	368	0	14	41	9,095
Vernal Pool, Seasonal Wetland, and Swale	5,694	1,995	0	0	<1	0	7,689
Total	**566,547**	**5,677**	**4,495**	**17**	**516**	**302**	**577,553**

3.4 Data Collection Sources and Mapping

Existing regional land cover and aquatic data sources were reviewed to obtain the best scientific data available and to maintain consistency with other local HCPs. The existing data sources reviewed include the following.

- Six County Aquatic Resources Inventory (SCARI) Land Cover (2012)
- SCARI Aquatic Resource Class (2012)
- South Sacramento HCP (SSHCP) Land Cover (2013)
- Natomas Basin HCP Land Cover (2012)
- Western Placer County HCP/Natural Community Conservation Plan (NCCP) Land Cover (2008/2009, and 2013)
- Yolo County SMUD Aquatic Data (2013)
- Yolo HCP/NCCP Land Cover Dataset (2013)
- SMUD Nature Preserve Mitigation Bank (SMUD Bank) Data (2013)
- National Hydrography Dataset (NHD) (2015)

The SCARI Land Cover dataset covered the greatest area and included all of the SMUD HCP Permit Area. It was therefore used as the basis for SMUD's Land Cover data. Where the other datasets overlapped with the SCARI Land Cover dataset, the SCARI Land Cover dataset was clipped (deleted) beneath the more current and comprehensive dataset.

The SCARI Land Cover and Aquatic Resource Class datasets included upland and wetland data prepared for the SSHCP, Western Placer County HCP/NCCP, Yolo HPC/NCCP, and Natomas Basin HCP. However, all of these datasets were updated between their use for SCARI and SMUD's analysis. SMUD used the updated datasets with a few additional exceptions/modifications, as described below.

- There are small areas along the west edge of the Permit Area following the Sacramento River where the Natomas Basin Land Cover dataset and the Yolo HCP/NCCP data overlap. In these areas the Natomas Basin HCP data was used instead of the Yolo HCP/NCCP data.
- The Yolo HCP/NCCP Land Cover dataset was supplemented by aquatic features digitized by SMUD.
- The SMUD Bank land cover data was used instead of the SSHCP land cover data because it was field-verified.
- The NHD line data was buffered to provide approximate stream widths.

A description of these data sources is included in Appendix C.

After developing a comprehensive land cover dataset, a crosswalk was prepared to show the translation of the different land cover classifications from the original datasets into SMUD HCP land cover classification (Table 3-3).

Table 3-3. Land Cover Crosswalks

SMUD HCP Land Cover Type	SCARI Land Cover	Natomas Basin HCP	South Sacramento HCP	SCARI Aquatic Resource Class	Yolo HCP/NCCP	Yolo SMUD Aquatic Data	Western Placer County HCP/NCCP	SMUD Bank Data
Eucalyptus Woodland	--	--	Eucalyptus Woodland	--	--	--	Eucalyptus Woodland	--
Valley Foothill Riparian	Valley Foothill Riparian	Riparian Scrub	Valley Oak Riparian Woodland	--	Valley Foothill Riparian	--	Valley Foothill Riparian	--
	Montane Riparian*	Riparian Woodland	Mixed Riparian Scrub				Urban Riparian	
			Mixed Riparian Woodland					
Blue Oak Foothill Pine	Blue Oak-Foothill Pine	--	--	--	--	--	--	--
Blue Oak Woodland	Blue Oak Woodland	--	Blue Oak Woodland	--	--	--	Blue Oak Woodland	--
	Blue Oak Woodland or Valley Oak Woodland						Foothill Hardwood Woodland	
	Coastal Oak Woodland		Blue Oak Savanna				Oak Woodland Savanna	
	Mixed Chaparral*							
	Montane Hardwood*							
Valley Oak Woodland	Valley Oak Woodland	Non-Riparian Woodland	Woodland Restoration	--	--	--	--	--
		Valley Oak Woodland						

SMUD HCP Land Cover Type	SCARI Land Cover	Natomas Basin HCP	South Sacramento HCP	SCARI Aquatic Resource Class	Yolo HCP/NCCP	Yolo SMUD Aquatic Data	Western Placer County HCP/NCCP	SMUD Bank Data
Mine Tailing Riparian Woodland	--	--	Mine Tailing Riparian Woodland	--	--	--	--	--
Orchard/ Vineyard	Orchard	Orchard	Orchard	--	Deciduous Fruits and Nuts	--	Orchard	--
	Deciduous Orchard							
	Vineyard		Vineyards		Vineyards			
Cropland	Cropland	Alfalfa or Grass Hay	Cropland	--	Field Crops	--	Row Crops	--
	Irrigated Row and Field Crops	Fallow						
	Irrigated Grain Crops	Fallow Row and Grain Crops			Semi Agricultural/Incidental to Agriculture			
					Truck/Nursery /Berry Crops		Unidentified Crops	
	Irrigated Hay Field	Other Row and Grain Crops, Safflower, Sunflower, Tomatoes or Wheat			Grain and Hay Crops			
Rice	Rice	Fallow Rice	--	--	Rice	--	Rice	--
		Rice						
Pasture	Pasture	Irrigated Grassland	Irrigated Pasture-Grassland	--	Pasture	--	Pasture	--

SMUD HCP Land Cover Type	SCARI Land Cover	Natomas Basin HCP	South Sacramento HCP	SCARI Aquatic Resource Class	Yolo HCP/NCCP	Yolo SMUD Aquatic Data	Western Placer County HCP/NCCP	SMUD Bank Data
Grasses and Forbs	Perennial Grassland	Non-Native Annual Grassland	Valley Grassland	Seep*	Annual Grassland	--	Annual Grassland	Upland CTS
	Annual Grassland	Grassland (Created)						Upland Annual Grassland (NSSH)
Urban	Urban	Developed (Low or High Density)	High Density Development	--	Urban	--	Riverine*	--
			Low Density Development				Rural Residential	
							Urban/ Suburban	
			Major Roads				Urban Golf Course	
	Montane Riparian*		Recreation/ Landscaped				Urban Woodland	
							Urban Park	
Barren/ Disturbed	Barren	Disturbed/ Bare	Disturbed	--	--	--	--	--
		Ruderal	Mine Tailing					
Riverine	Riverine	--	Streams/ Creeks	Riverine/ Riparian	--	--	Riverine	Intermittent Drainage
			Ephemeral Streams					
			Aqueducts	Seep*			--	
Open Water/Fringe	Lacustrine	Open Water	Open Water	Open Water/Fringe	Open Water	Seasonal Pond	Lacustrine	Open Water
							Stock Ponds	

SMUD HCP Land Cover Type	SCARI Land Cover	Natomas Basin HCP	South Sacramento HCP	SCARI Aquatic Resource Class	Yolo HCP/NCCP	Yolo SMUD Aquatic Data	Western Placer County HCP/NCCP	SMUD Bank Data
Other Depressional Wetland	Fresh Emergent Wetland	Fresh Emergent Marsh	Freshwater Marsh	Other Depressional Wetland	Fresh Emergent Wetland	--	Fresh Emergent Wetland	Juncus Wetland
		Fresh Emergent Marsh (Created)	Seasonal Wetland					Seasonal Swale
	Wet Meadow	Seasonal Wetland	Wetland Restoration					
Vernal Pool, Seasonal Wetland, and Swale	--	--	Swale	Vernal Pool	--	--	Vernal Pool Complex Low	Seasonal Wetland
			Vernal Pool				Vernal Pool Complex Intermediate	Vernal Pool
							Vernal Pool Complex High	Vernal Swale

* Only a few select locations.

3.4.1 Selection of SMUD HCP Land Cover Types

The naming convention for each SMUD HCP land cover type was based on accepted land cover and species habitat names in literature and upon consultation with the USFWS and CDFW (collectively, Wildlife Agencies), but generally follows the California Wildlife Habitat Relations (CWHR) system (Mayer and Laudenslayer 1988). CWHR was selected over other land cover/habitat classification systems because it is widely used by land managers and wildlife biologists throughout California, and it is the system most easily understood by decision makers and the general public. However, based on discussions with the Wildlife Agencies and Steering Committee members, some SMUD HCP land cover names were modified to meet the specific needs of the SMUD HCP. Table 3-3 demonstrates how land cover types used in other local conservation plans were crosswalked into the SMUD HCP land cover types. The SMUD HCP land cover types have been used in the GIS files (Appendices A and C), on figures prepared for the HCP, to define Covered Species Modeled Habitat, and to estimate effects of the Covered Activities on Modeled Habitat and species.

Seventeen HCP land cover types were identified by SMUD in the Permit Area as listed in Table 3-3 and shown in Figure 3-4.

The following six land cover types are considered tree and shrub dominated, and are presented in Figure 3-5.

- Eucalyptus Woodland
- Valley Foothill Riparian
- Blue Oak Foothill Pine
- Blue Oak Woodland
- Valley Oak Woodland
- Mine Tailing Riparian Woodland

The following three land cover types are considered agricultural dominated, and are presented in Figure 3-6.

- Orchard/Vineyard
- Cropland
- Rice

The following two land cover types are considered herbaceous dominated, and are presented in Figure 3-7.

- Pasture

- Grasses and Forbs

The following two land cover types not typically considered vegetated, and are presented in Figure 3-8.

- Urban
- Barren/Disturbed

The following four land cover types are considered aquatic dominated, and are presented in Figure 3-9.

- Riverine
- Open Water/Fringe
- Other Depressional Wetlands
- Vernal Pool, Seasonal Wetland, and Swale

3.4.2 Description of Land Cover Types in the Permit Area

Descriptions of each of the 17 SMUD HCP land cover types are provided below. Acres are rounded to the nearest whole acre, and percentages are rounded to the nearest 1/10 percent.

3.4.2.1 Eucalyptus Woodland

Eucalyptus Woodland land cover is characterized as woodland dominated by an overstory of non-native eucalyptus trees (*Eucalyptus* spp.). It generally forms dense, relatively small monotypic stands, usually of blue gum (*E. globulus*). In these conditions, the shrub layer is generally absent and the herb layer is sparse due to the dense leaf litter and germination-inhibitive chemicals produced in the leaves of mature eucalyptus trees, which are toxic to many plants (Mayer and Laudenslayer 1988; Smith 1976).

Within the Permit Area, there are 54 acres (less than 0.1 percent of the Permit Area) of SMUD HCP Eucalyptus Woodland land cover. The most significant stands of Eucalyptus Woodland in the Permit Area occur north of Twin Cities Road (Highway 104) and east of Clay Station Road, and south of Twin Cities Road along the east and west side of Clay Station Road (Figure 3-5). Individual trees and small stands of eucalyptus can be found sporadically throughout the Permit Area as well.

Outside of the Permit Area, Eucalyptus Woodland is found at low elevations throughout the valley floor and generally adjoin numerous other land covers. Although eucalyptus trees are native to Australia, and the surrounding islands, they have been planted extensively in California for landscaping, windbreaks, and hardwood production (Editors 1996).

When present, the herbaceous layer in Eucalyptus Woodland consists mostly of non-native grasses such as bromes (*Bromus* spp.) and Bermuda grass (*Cynodon dactylon*), and weedy forbs including mustards (*Brassica* spp.), bull thistle (*Cirsium vulgare*), winter vetch (*Vicia villosa*), rose clover (*Trifolium hirtum*), little hop clover (*Trifolium dubium),* English plantain (*Plantago lanceolata*), cheeseweed (*Malva parviflora*), common groundsel (*Senecio vulgaris),* red sand-spurrey (*Spergularia rubra*)*,* lesser hawkbit (*Leontodon saxatilis),* prickly sow thistle (*Sonchus asper* ssp. *asper*)*,* yard knotweed (*Polygonum aviculare*), and prickly lettuce (*Lactuca serriola*).

3.4.2.2 Valley Foothill Riparian

The SMUD HCP Valley Foothill Riparian land cover is composed of floodplain, bottomland, and streambank plant communities that occur along inland creeks, streams, rivers, and other waterways. Riparian land cover occurs in transition zones between aquatic and upland vegetation and, in an undisturbed condition, is characterized by dominant vegetation types that are tolerant of, and adapted to, relatively high soil moisture content. Riparian land cover generally occurs entirely within the floodplain of streams and rivers. However, most riparian plant species require flooding more frequently than once every 100 years. Undisturbed riparian habitats generally have three somewhat distinct layers: overstory, midstory, and understory. The Valley Foothill Riparian land cover in the Permit Area is characterized by a dominance of woody, arborescent vegetation growing within or adjacent to ponds, streams, and creeks with low-velocity flows generally in floodplains and areas of low topography.

Within the Permit Area, there are 10,357 acres (1.8 percent of the Permit Area) of SMUD HCP Valley Foothill Riparian land cover. Within the Sacramento County portion of the Permit Area, Valley Foothill Riparian occurs along Riverine (including the Sacramento, American, and Cosumnes rivers and their tributaries), Open Water/Fringe, and less extensively along Other Depressional Wetland land covers. Within the Yolo County portion of the Permit Area, Valley Foothill Riparian occurs along Riverine (including Tule Canal, Toe Drain Canal, and Willow Slough) and Open Water/Fringe (Figure 3-5).

Some Valley Foothill Riparian land cover within the Permit Area is adjacent to urban creeks (often occurring as greenbelts) and is generally disturbed by human activities, including transportation and recreational uses. The creeks are often straightened and channeled, and the riparian land cover is generally traversed by footpaths and bicycle paths. In areas disturbed by frequent flooding, fire, or human activity, riparian often consists of smaller trees, more shrubs, and more invasive non-native species.

In a mature riparian forest, canopy heights reach approximately 100 feet, and canopy cover ranges from 20 to 80 percent. Most trees are winter deciduous. Generally within SMUD's Permit Area, no single species dominates the canopy, and composition varies with elevation, aspect, hydrology, and channel type. Common species in the overstory canopy layer are Fremont's cottonwood (*Populus fremontii* ssp. *fremontii*) and valley oak (*Quercus lobata*). Other species that commonly occur in the midstory include California black walnut (*Juglans hindsii*), interior live oak (*Quercus wislizeni*), box elder (*Acer negundo*), Oregon ash (*Fraxinus latifolia*), Goodding's black willow (*Salix gooddingii*), and

big-leaf maple (*Acer macrophyllum*), depending on specific site characteristics (elevation, soils, and hydrologic regime).

Some Valley Foothill Riparian land cover in the Permit Area has a limited herbaceous understory, but supports a dense, impenetrable woody understory of California wild grape (*Vitis californica*), California rose (*Rosa californica*), California blackberry (*Rubus ursinus*), Himalayan blackberry (*Rubus armeniacus*), blue elderberry (*Sambucus nigra* ssp. *caerulea*), western poison oak (*Toxicodendron diversilobum*), common buttonbush (*Cephalanthus occidentalis*), toyon (*Heteromeles arbutifolia*), California coffee berry (*Frangula californica*), mule's-fat (*Baccharis salicifolia* ssp. *salicifolia*), coyote brush (*B. pilularis*), and various shrubby willows (e.g., arroyo willow [*Salix lasiolepis*], narrow-leaf willow [*S. exigua*], tail-leaf willow [*S. lasiandra* var. *caudata*], Goodding's black willow, and red willow [*S. laevigata*]).

Frequently in Valley Foothill Riparian, the dense understory of shrubs, bramble, vines, small-stature trees, fallen limbs, driftwood, and other debris precludes an herbaceous layer. When the woody understory is removed or reduced (e.g., from grazing, fire, scour), the herbaceous layer can flourish and consist of grasses (e.g., common velvet grass [*Holcus lanatus*]), Bermuda grass, oats (*Avena* spp.), brome, barley (*Hordeum* spp.), perennial rye grass (*Festuca perennis*), beardless wild rye (*Leymus triticoides*), deer grass (*Muhlenbergia rigens*), blue wild rye (*Elymus glaucus*), purple needle grass (*Stipa pulchra*), sedges (e.g., tall flat sedge [*Cyperus eragrostis*], Santa Barbara sedge [*Carex barbarae*], clustered field sedge [*Carex praegracilis*]), rushes (e.g., *Juncus* spp.), ferns (e.g., northern bracken fern [*Pteridium aquilinum*]), forbs (e.g., miner's-lettuce [*Claytonia perfoliata*], Queen Anne's-lace [*Daucus carota*], western vervain [*Verbena lasiostachys*], and pennyroyal [*Mentha pulegium*]), common yarrow (*Achillea millefolium*), stinging nettle (*Urtica dioica*), and mugwort (*Artemisia douglasiana*) depending on the local site conditions.

Invasive plants that have colonized Valley Foothill Riparian land cover in the Permit Area to varying degrees include tree-of-heaven (*Ailanthus altissima*), fruit trees (*Prunus* spp.), white mulberry (*Morus alba*), and perennial pepperweed (*Lepidium latifolium*).

3.4.2.3 Blue Oak Foothill Pine

Blue Oak Foothill Pine land cover within the Permit Area is characterized as woodland having a sparse tree overstory of foothill pine (*Pinus sabiniana*) above a lower canopy of blue oaks (*Quercus douglasii*). Canopy cover ranges from 10 to 59 percent. The shrub component is typically composed of several species that tend to be clumped, with interspersed patches of annual grassland. Woodlands of this type generally have small accumulations of dead and downed woody material and relatively few snags, compared with other tree land covers in the Permit Area.

Within the Permit Area, there are 104 acres (less than 0.1 percent of the Permit Area) of SMUD HCP Blue Oak Foothill Pine land cover. Blue Oak Foothill Pine is uncommon in the Permit Area, occurring near the northeast (near Folsom Lake and along northern Lake

Natoma) and mid-east (Rancho Murieta) Permit Area boundaries, and along the Cosumnes River and Lake Calero (Figure 3-5).

Although blue oaks dominate, other tree species associated with this land cover include interior live oak, California buckeye (*Aesculus californica*), and valley oak (Mayer and Laudenslayer 1988). Pure stands of blue oak tend to lack a shrub layer. However, when interior live oak and foothill pine are dominant in the overstory, shrub species are present, including coyote brush, buck brush (*Ceanothus cuneatus*), manzanita *(Arctostaphylos* spp.*),* California coffee berry, western redbud (*Cercis occidentalis*), western poison oak, blue elderberry, and California yerba santa (*Eriodictyon californicum*).

The understory tends to be primarily non-native annual grasses (e.g., oats, brome, barley, and perennial rye grass), with a mixture of native and non-native forbs as described below in Section 3.4.2.11, *Grasses and Forbs*.

3.4.2.4 Blue Oak Woodland

Blue Oak Woodland is similar to Blue Oak Foothill Pine described above except that it lacks foothill pine. Within the Permit Area, Blue Oak Woodland is characterized by almost pure stands (generally 85 to 100 percent of the trees present) of mature blue oaks. Generally within this land cover, the shrub layer is absent or sparse, and the herbaceous layer consists of non-native grasses with a sparse mixture of native and non-native forbs. When shrubs are present, they are rarely extensive, often occur on rock outcrops, and can include western poison oak, toyon, California coffee berry, and buck brush. The shrub layer is best developed along natural drainages, becoming insignificant in the uplands with more open stands of oaks (*Quercus* spp.).

Within the Permit Area, there are 17,715 acres (3.1 percent of the Permit Area) of SMUD HCP Blue Oak Woodland land cover. Blue Oak Woodland occurs extensively along the eastern border of the Permit Area. Large stands of Blue Oak Woodland occur from the southeastern border of the Permit Area, through Rancho Murieta, and up to the Folsom Lake area. There are also a few small patches of Blue Oak Woodland scattered in the middle of the Permit Area (Figure 3-5).

In general, Blue Oak Woodland typically occupies low foothills with well-drained sites on gentle to moderate slopes. At lower elevations, Blue Oak Woodland intergrades with Grasses and Forbs. Arid, rocky sites with shallow soils generally have sparse tree cover, while moist, protected sites (e.g., north slopes) and sites with deep, productive soils (e.g., along creeks) can have dense canopy closures (Mayer and Laudenslayer 1988).

The herbaceous layer consists mostly of non-native grasses such as soft chess (*Bromus hordeaceus*), oats, brome, medusa-head grass (*Elymus caput-medusae*), and annual fescues (*Festuca* spp.). Forbs such as clovers (*Trifolium* spp.), hedge parsley (*Torilis arvensis*), filaree (*Erodium* spp.), fiddleneck (*Amsinckia* spp.), and winter vetch are common. Noxious weeds include yellow star-thistle (*Centaurea solstitialis*) and Italian thistle (*Carduus pycnocephalus* ssp. *pycnocephalus*). Occasionally native grasses and

forbs such as purple needle grass, California poppy (*Eschscholzia californica*), brodiaeas (*Brodiaea* spp.), and soap plants (*Chlorogalum* spp.) occur.

3.4.2.5 Valley Oak Woodland

Valley Oak Woodland land cover is characterized by almost pure stands of mature valley oaks. Similar to Blue Oak Woodland, stands of Valley Oak Woodland vary from savanna-like to forest-like and occur on a wide range of physiographic settings, but are best developed on deep, well-drained alluvial soils, usually in valley bottoms (Mayer and Laudenslayer 1988). Denser stands typically grow in valley soils along natural drainages. Tree density decreases with the transition from lowlands to the less fertile soils of drier uplands. Other tree species associated with this land cover include interior live oak (in deep soils); blue oak (in shallow soils); and California sycamore (*Platanus racemosa*), California black walnut, and box elder associated with drainages (Mayer and Laudenslayer 1988).

Within the Permit Area, there are 1,089 acres (0.2 percent of the Permit Area) of SMUD HCP Valley Oak Woodland land cover. Valley Oak Woodland occurs along the Sacramento River, American River, Beach Lake (near Highway 50 and Laguna West), and in several other small scattered patches in the Permit Area (Figure 3-5).

Valley oak stands with little or no grazing tend to develop a partial shrub layer of bird-dispersed species, such as western poison oak, toyon, and California coffee berry (Mayer and Laudenslayer 1988). Similar to Blue Oak Woodland land cover, the shrub layer in Valley Oak Woodland is best developed along natural drainages, becoming insignificant in the uplands with more open stands of oaks. Here, the shrub understory consists of western poison oak, blue elderberry, California wild grape, toyon, California coffee berry, and California blackberry. Ground cover consists of a well-developed carpet of annual grasses and forbs, dominated by wild oats, bromes, barleys, and ryegrasses (*Lolium* spp.).

3.4.2.6 Mine Tailing Riparian Woodland

Mine Tailing Riparian Woodland is characterized by piles of gravel and rock mine tailings with a dominance of early-succession woody riparian tree species. The tailings primarily occur in two locations of the Permit Area and are a result of mineral dredging that occurred in the early 1900s through approximately 1960.

Within the Permit Area, there are 3,186 acres (0.6 percent of the Permit Area) of SMUD HCP Mine Tailing Riparian Woodland land cover. Mine Tailing Riparian Woodland primarily occurs in two areas, near Gold River and Rancho Cordova (White Rock Road and Sunrise Boulevard) and south of Rancho Murieta (between Mesa Road and Clay Station Road) (Figure 3-5).

Similar to the Valley Foothill Riparian, this land cover generally supports an overstory of tall winter deciduous trees, a midstory of smaller statured trees, and an understory of shrubs, vines, and herbs. Canopy cover is usually 20 to 80 percent. Lianas, usually wild

grape (*Vitis* spp.), frequently provide 30 to 50 percent of the ground cover. Herbaceous vegetation typically constitutes about 1 percent of the cover except in openings where tall forbs and shade-tolerant grasses occur (Conard et al. 1980). Generally, the understory is impenetrable and includes fallen limbs and other debris.

Dominant species in the overstory canopy include cottonwood (*Populus* spp.), valley oak, and Goodding's black willow. On rare occasions, California sycamore is present. Midstory trees include willows (*Salix* spp.), white alder (*Alnus rhombifolia*), box elder, and Oregon ash. Typical understory shrubs and vines include wild grape, California rose, California blackberry, Himalayan blackberry, blue elderberry, western poison oak, buttonbush (*Cephalanthus* spp.), and willows. The herbaceous layer consists of various sedges (*Carex* spp.), rushes, grasses, and forbs (e.g., miner's-lettuce, mugwort, poison-hemlock [*Conium maculatum*], and stinging nettle).

3.4.2.7 Orchard/Vineyard

Orchard/Vineyard within the Permit Area is characterized by cultivated trees and vines that produce commercial fruit or nut crops. These woody plants are generally planted in rows for ease of maintenance and crop harvesting. Both orchards and vineyards are described separately below.

Within the Permit Area, there are 31,418 acres (5.4 percent of the Permit Area) of SMUD HCP Orchard/Vineyard land cover. Orchard/Vineyard land cover is located on parcels scattered throughout the Permit Area; however, there are larger and more extensive groupings of Orchard/Vineyard land cover in the southern portion of the Permit Area. For example, Orchard/Vineyard is present along the southwestern border of the Permit Area from Walnut Grove up to Clarksburg (Figure 3-6).

Orchards are typically open, single species, tree-dominated land covers. Depending on the tree type and pruning methods, trees are usually low and bushy with an open understory to facilitate harvest. Orchards in the Permit Area include trees such as almonds (*Prunus dulcis*), apples (*Malus pumila*), apricots (*Prunus armeniaca*), cherries (*Prunus avium*), peaches and nectarines (*Prunus persica*), pears (*Pyrus communis*), plums/prunes (*Prunus domestica*), walnuts (*Juglans regia*), and oranges (*Citrus sinensis*) (Mayer and Laudenslayer 1988). Depending on the tree type, crowns often do not touch (however, in some cases they do) and are usually in a linear pattern. Spacing between trees is uniform depending on desired spread of mature trees. Below the fruit trees, the understory is either bare soil or a periodically mowed herbaceous layer of non-native species, usually composed of low-growing grasses, legumes, and other herbaceous plants. The understory is mostly dominated by grasses and forbs such as annual blue grass (*Poa annua*), Johnson grass (*Sorghum halepense*), soft chess, perennial rye grass, wild oats, red brome (*Bromus madritensis* ssp. *rubens*), red fescue (*Festuca rubra),* barnyard grass (*Echinochloa* spp.), field mustard (*Brassica rapa*), filarees, common chickweed (*Stellaria media*), clover, cut-leaved geranium (*Geranium dissectum*), English plantain, fiddleneck, prickly sow thistle, and cheeseweed. Numerous grasses and legumes are planted as cover crops in orchards either as single species or in mixes (e.g., cereal rye [*Secale cereale*], barley, clover, Sudangrass [*Sorghum bicolor* ssp.

drummondii], grain, sorghums [*Sorghum* spp.], California blackeye bean [*Vigna unguiculata*], tall fescue [*Festuca arundinacea*], and orchard grass [*Dactylis glomerata*]). Orchards typically are planted on flat, alluvial soils on the valley floor, rolling foothill areas, and most are irrigated.

Vineyards are composed of single vine species planted in rows, usually supported on wood and wire trellises. The vines are normally intertwined in the rows but open between rows. The understory in vineyards is usually absent (controlled by tillage and/or herbicides) but, when present, consists of herbs. This herbaceous layer consists of a planted cover crop (to control erosion), agricultural weeds, or a combination (Mayer and Laudenslayer 1988). Cover crops generally consist of nitrogen-fixing legumes (e.g., clover, California blackeye bean, and black medick [*Medicago lupulina*]), grains (e.g., Sudangrass, cereal rye, barley, and sorghums), and perennial grasses (e.g., tall fescue and orchard grass).

Agricultural weeds generally consist of non-native perennial grasses (e.g., Bermuda grass, Johnson grass, and dallisgrass [*Paspalum dilatatum*]), annual grasses (e.g., soft chess, perennial rye grass, wild oats, red brome, red fescue, and barnyard grass), and forbs (e.g., short podded mustard [*Hirschfeldia incana*], black mustard [*Brassica nigra*], jointed charlock [*Raphanus raphanistrum*], fiddleneck, and filaree). Vineyards can be found on flat alluvial soils in the valley floors, in rolling foothill areas, or on relatively steep slopes.

3.4.2.8 Cropland

Cropland is defined for the SMUD HCP as agriculture lands, including livestock feedlots and poultry farms that are not orchards or vineyards, pasture lands, or rice (*Oryza* spp.) fields.

Within the Permit Area, there are 69,173 acres (12.0 percent of the Permit Area) of SMUD HCP Cropland land cover. Cropland is located on parcels scattered throughout the Permit Area, but is concentrated in Yolo County and the northwestern portion of the Permit Area (in Natomas, near Interstate 5 and the Sacramento International Airport). Cropland also occurs in the southern portion of the Permit Area along Interstate 5 near Point Pleasant and Thornton and along State Highway 99 near Galt (Figure 3-6).

Agricultural crops have a variety of sizes, shapes, and growing patterns. Field corn (*Zea mays*) can reach 10 feet while other crops are less than a foot high. Most irrigated row and field crops are grown in rows. Some may form 100 percent canopy (such as wheat [*Elymus* spp.] and barley) while others may have significant bare areas between rows. Most are annuals (such as seed and grain crops), while others, such as strawberries (*Fragaria* spp.), are perennial.

The amount of disturbance associated with each crop depends on location, crop type, and farming practice. Cultivated cropland comprises land in row crops or close-grown crops that can be planted in rotations. Most annually cultivated cover types exhibit significant changes in accessibility due to their planting, growth, and harvest regimes.

However, some annually cultivated types remain moderately accessible most of the growing season and provide high foraging value during harvest as vegetation is removed when rodent prey populations are greatest (Estep Environmental Consulting 2009). A mosaic of perennial and annually cultivated cover types creates an agricultural landscape of consistently high value due to the season-long availability of some perennial cover types and the seasonal pulse of high value foraging opportunities provided by some seasonally cultivated cover types.

Croplands are located on flat to gently rolling terrain. When flat terrain is put into crop production, it usually is leveled to facilitate irrigation. Rolling terrain is either dry farmed or irrigated by sprinklers.

Agricultural crops within the Permit Area include corn, safflower (*Carthamus tinctorius*), common wheat (*Triticum aestivum*), oats, sorghum, barley, beans (*Phaseolus* spp.), Sudangrass, sugar beets (*Beta vulgaris*), cowpeas (*Vigna* spp.), garlic (*Allium sativum*), mustard greens (*Brassica juncea*), spinach (*Spinacia oleracea*), and sunflowers (*Helianthus* spp.).

Livestock feedlots or "feedyards" are confined livestock feeding operations that support virtually no vegetation. Poultry farms, like feedlots, generally do not support any vegetation.

3.4.2.9 Rice

Rice within the Permit Area is characterized by seasonally flood-irrigated agricultural lands that support hydrophytic annual grasses, which produce commercial cereal grains (e.g., cultivated rice [*Oryza sativa*] or wild rice [*Zizania* spp.]).

Within the Permit Area, there are 5,313 acres (1.0 percent of the Permit Area) of SMUD HCP Rice land cover. In the Permit Area, Rice is located east of the Sacramento International Airport, along State Highway 70, and in Yolo County near the Willow Slough Bypass, and near the intersection of County Road 29 and County Road 92E (Figure 3-6).

Commercial cultivated rice generally is only a couple of feet tall, whereas wild rice may reach 6 feet or more. Rice is usually located on flat terrain that has been leveled to facilitate flood irrigation. Leveled fields are flooded much of the rice growing period then dried to facilitate seed maturation and harvesting. Rice can grow on poor quality soils, especially clay soils that are not suitable for other crops. Prior to harvesting, the canopy closure of rice, if not disturbed, is nearly 100 percent.

The standard rice farming procedure includes preparing the fields, flooding and seeding, harvesting, milling, and storing. Farmers prepare their fields for planting in April. First, fields are leveled using laser-guided grading equipment about every 5 years. Fields are tilled with a chisel to break up soil clods and to aerate the soil, followed by disking to reduce clod size, and are then smoothed out with laser-directed bucket scrapers. The fields are typically planted from late April through May. Water is run into the fields to a depth of 4 to 8 inches. Growers reduce or eliminate water flow about 5 weeks before

harvest, allowing water in the field to subside in preparation for drainage and the upcoming harvest. By September, the grain heads are mature and ready to be harvested. In general it takes rice about 4 to 5 months to mature. Once the rice grain reaches the desired moisture content, the fields are harvested with a combine.

3.4.2.10 Pasture

Pasture within the Permit Area is characterized by irrigated lands that produce year-round onsite forage for livestock. The vegetation in Pasture is usually a mixture of perennial grasses and legumes that can reach 100 percent ground cover. Height of vegetation varies from a few inches to 2 feet or higher, depending on site-specific conditions (e.g., season, irrigation, plant species composition, and grazing regime). Pastures that have been irrigated for decades sometimes resemble meadows or seasonal wetlands as wetland plant species that thrive in perennial saturated soil conditions become established.

Within the Permit Area, there are 21,240 acres (3.7 percent of the Permit Area) of SMUD HCP Pasture land cover. Pasture is distributed throughout the Permit Area (Figure 3-7).

The mix of grasses and legumes varies within a pasture according to site conditions (geographic area, soil type, slopes, surrounding land uses), and management practices such as seed mixture, fertilization, irrigation, weed control, and grazing regime (e.g., type of livestock, stocking rates and seasons). Plant species seeded in pastures also vary; perennial rye grass, tall fescue, dallisgrass, white clover (*Trifolium repens*), strawberry clover (*Trifolium fragiferum*), and garden bird's-foot-trefoil (*Lotus corniculatus*) are common plant species seeded in pastures.

Because of their intensive need for water, pastures usually occur on level or nearly level terrain with clayey soils to maximize irrigation (flood irrigation). However, pasture does occur on more permeable soils with gently rolling to hilly terrain, especially if an inexpensive ample water supply is available. The type of irrigation system used generally depends on the water source and terrain. Sprinkler irrigation can be used on all terrains but only from a piped water source. Flood irrigation can be utilized from both an open ditch system as well as a piped system. Wild flooding is a type of irrigation utilized in hilly terrains where water is released at selected points along contour ditches.

3.4.2.11 Grasses and Forbs

The SMUD HCP Grasses and Forbs land cover type is characterized by herbaceous plant cover and predominantly non-native annual grasses and forbs, with less than 10 percent cover of woody vegetation (trees and shrubs). This land cover type generally occurs in the well-drained upland areas where the topography consists of flat plains or gently rolling foothills. This land cover is transitional to other SMUD HCP land cover types, including Vernal Pool, Seasonal Wetland, and Swale; riparian; and oak woodlands.

Within the Permit Area, there are 168,230 acres (29.1 percent of the Permit Area) of SMUD HCP Grasses and Forbs land cover. Although the Grasses and Forbs land cover

type is common throughout the Permit Area, it is most abundant in the eastern portion (Figure 3-7).

Plant species composition is generally dependent on site conditions (soil type, slopes), weather patterns, and past and present disturbance regimes (historic uses such as winter wheat production, leveling, plowing, and livestock grazing). Nonetheless, this land cover is usually dominated by introduced non-native annual grasses such as wild oats, soft chess, brome, barley, medusa-head grass, and annual fescues. Forbs are rarely dominant to annual grasses and consist of yellowflower tarweed (*Holocarpha virgata*), Fitch's false tarplant (*Centromadia fitchii*), prickly lettuce, dove weed (*Croton setigerus*), yellow star-thistle, filaree, broad leaf filaree (*Erodium botrys*), dovefoot geranium (*Geranium molle*), clovers, and bur clover (*Medicago polymorpha*).

Although mostly dominated by naturalized non-native plant species, native perennial bunch grasses and forbs do occur in the Permit Area, especially on rocky soils. These species include purple needle grass, Idaho fescue (*Festuca idahoensis*), California melic (*Melica californica*), squirreltail (*Elymus elymoides*), one sided bluegrass (*Poa secunda*), blue wild rye, California poppy, small-flowered fiddleneck (*Amsinckia menziesii*), miner's-lettuce, bluedicks (*Dichelostemma capitatum*), miniature lupine (*Lupinus bicolor*), baby blue eyes (*Nemophila menziesii*), California plantain (*Plantago erecta*), vinegar-weed (*Trichostema lanceolatum*), tomcat clover (*Trifolium willdenovii*), winecup clarkia (*Clarkia purpurea*), johnny-tucks (*Triphysaria eriantha*), common madia (*Madia elegans*), cream cups (*Platystemon californicus*), gold nuggets (*Calochortus luteus*), and Ithuriel's spear (*Triteleia laxa*). Regardless if native or not, most plant species that occur in this land cover type are typically shorter than 3 feet.

3.4.2.12 Urban

Urban land cover within the Permit Area is characterized by anthropogenic features such as urban centers, industrial areas, airports, wastewater treatment plants, residences, and other developed areas that consist of human-made structures and surfaces (e.g., buildings, parking lots, roads, bridges, driveways) and associated landscaping (e.g., trees, shrubs, and lawns).

Within the Permit Area, there are 197,265 acres (34.2 percent of the Permit Area) of SMUD HCP Urban land cover. The Urban land cover is very dense within the middle northern section of the Permit Area, including the cities of Sacramento, Elk Grove, and Rancho Cordova. Additional areas of Urban land cover, including rural residential areas, the city of Galt, and other communities are scattered throughout the Permit Area (Figure 3-8).

Tree groves, common in city parks, green belts, and cemeteries, vary in height, tree spacing, crown shape, and understory conditions, depending upon the planted species, design, and age. Lawns are structurally the most uniform vegetative units of Urban land cover. A variety of grass species are employed, which are maintained at a uniform height and continuous ground cover. Shrub cover is more limited in distribution than the other landscape vegetation types. Hedges represent a variation of the urban shrub cover. The

juxtaposition of urban vegetation types within cities produces a rich mosaic with considerable edge areas.

Most landscaped recreation areas are planted with non-native grasses, shrubs, and trees. Large residential lots have most of the native vegetation removed and replaced with mowed annual grassland, lawns, and widely scattered non-native and some native tree species; such management techniques are often intended to reduce the risk of fire. Undeveloped lots often become infested with weedy, non-native species, especially yellow star-thistle.

Common landscape tree species include sugar maple (*Acer saccharum*), red maple (*A. rubrum*), deodar cedar (*Cedrus deodara*), basswood tree (*Tilia* spp.), velvet ash (*Fraxinus velutina*), and English holly (*Ilex aquifolium*). In newer developments, frequently planted trees include sweetgum (*Liquidambar* spp.), European birch (*Betula* spp.), weeping willow (*Salix babylonica*), coast redwood (*Sequoia sempervirens*), and purple-leaf plum (*Prunus cerasifera*).

3.4.2.13 Barren/Disturbed

Barren/Disturbed land cover in the Permit Area is characterized by areas that are generally void of vegetation or disturbed regularly such that vegetative growth is sparse. For the purpose of this HCP, barren is defined as any area with less than 2 percent total cover by herbaceous plants and less than 10 percent total cover by trees or shrubs. Urban settings covered in pavement and buildings may be classified as barren as long as vegetation does not reach the percent plant cover thresholds.

Within the Permit Area, there are 17,893 acres (3.1 percent of the Permit Area) of SMUD HCP Barren/Disturbed land cover. Although Barren/Disturbed land cover occurs throughout the Permit Area, it is most common just south of Highway 50 and the City of Fair Oaks (Figure 3-8).

Disturbed areas have been subject to previous or ongoing disturbances. Scraped or graded land, gravel mining, and waste disposal, roadsides, trails, and parking lots are included in this land cover type. Disturbed land cover is vegetated with diverse weedy plants and typically includes Johnson grass, Canadian horseweed (*Erigeron canadensis*), milk thistle (*Silybum marianum*), yellow star-thistle, and field bindweed.

3.4.2.14 Riverine

The Riverine land cover type in the Permit Area is characterized by perennial, intermittent, and ephemeral waterways (Figure 3-9).

Within the Permit Area, there are 10,793.52 acres (1.87 percent of the Permit Area) of SMUD HCP Riverine land cover. The Riverine land cover type occurs throughout the Permit Area. The Permit Area is within the Sacramento River watershed, which covers approximately 27,000 square miles, with 400 miles of river from Lake Shasta to the convergence of the Sacramento-San Joaquin Delta.

Perennial rivers within the Permit Area include the Sacramento, American, Mokelumne and Cosumnes rivers (Figure 3-5). Perennial creeks and streams support flowing water year-round in normal rainfall years. Sacramento County is located near the base of the Sierra with a rolling terrain that contains several watersheds. Near the confluence of the American and Sacramento rivers, the topography becomes flat and is characterized by meandering sloughs, wetlands, and shallow lakes. There are more than 40 named creeks, streams, and sloughs in Sacramento County. Some of the larger perennial creeks, streams, and sloughs within the Permit Area include Arcade Creek, Buffalo Creek, Deer Creek, Dry Creek, Morrison Creek, Steelhead Creek, South Fork Putah Creek, and Willow Creek (Figure 3-9).

The hydrologic flow regime in a waterway profoundly affects its ecology, in particular its ability to support fish and other aquatic organisms. Intermittent creeks and streams receive some input from groundwater discharge in addition to precipitation runoff and seasonal flow, but typically do not flow in the late summer and fall. Ephemeral creeks and streams flow only during, and for short durations after, rainfall events and receive no input from groundwater.

Human-made canals and ditches transport water for agricultural irrigation and urban and suburban uses. Agricultural ditches often play a key role in providing hydrologic connectivity especially in urban areas such as Sacramento County. Agriculture also often is associated with streams, canals, and ditches used for irrigation.

Emergent vegetation may grow along river banks, including duckweed (*Lemna* spp.) and mosquito fern (*Azolla* spp.), which may float on the surface. Abundant decaying matter on the river bottom promotes the growth of plankton populations that are largely absent in fast water. This land cover does not include riparian vegetation, which is included in the Valley Foothill Riparian land cover.

3.4.2.15 Open Water/Fringe

The Open Water/Fringe land cover type within the Permit Area is characterized by perennially ponded bodies of water that are generally absent of vegetation. These water bodies vary in size and depth and include lakes, reservoirs, ponds, and stockponds. Open water features in the SMUD HCP Permit Area may range from less than an acre to hundreds of acres. Depths range from a few inches to hundreds of feet. Open water land cover generally has a depth greater than 3.5 feet. Perennial water bodies typically support fish.

Within the Permit Area, there are 6,502 acres (1.1 percent of the Permit Area) of SMUD HCP Open Water/Fringe land cover. Open Water/Fringe occurs throughout the Permit Area (Figure 3-9); the largest reservoir within the Permit Area is Folsom Lake, in the northeast corner of the Permit Area.

Although generally unvegetated, emergent plants (broad-leaf cattail [*Typha latifolia*]), submergent plants (pondweeds [*Potamogeton* spp.]), and floating plants (e.g., lesser duckweed [*Lemna aequinoctialis*], large mosquito fern [*Azolla filiculoides*], hairy

pepperwort [*Marsilea vestita* ssp. *vestita*], water lilies [*Nymphaea* spp.], and western water-milfoil [*Myriophyllum hippuroides*]) are often present in the more shallow "fringe."

3.4.2.16 Other Depressional Wetland

Other Depressional Wetland land cover is a comprehensive category for all wetland types that do not meet the classifications for the Riverine; Open Water/Fringe; or Vernal Pool, Seasonal Wetland, and Swale land cover types.

Within the Permit Area, there are 9,437acres (1.6 percent of the Permit Area) of SMUD HCP Other Depressional Wetland land cover. Other Depressional Wetland land cover is scattered throughout the Permit Area (Figure 3-9).

Although usually dominated by hydrophytic (water-loving) plants such as grasses, reeds, rushes, and sedges (Mayer and Laudenslayer 1988), the vegetation within Other Depressional Wetlands land cover varies with the differing hydrologic regimes (seasonal, intermittent, and perennial inundation or saturation). Other Depressional Wetlands that are inundated perennially or nearly so to a depth of less than 3 feet are usually dominated by emergent monocots such as cattails (*Typha* spp.), common tules (*Schoenoplectus acutus* var. *occidentalis*), and arrowhead (*Sagittaria* spp.). If the wetland has ponding durations that are quarterly (3 months) to semi-permanent (6 months), then species such as American water-plantain (*Alisma triviale*) and swamp smartweed (*Persicaria hydropiperoides*) may occur. If the wetland is only inundated seasonally (less than 3–4 months), then plants such as common spikerush (*Eleocharis palustris*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), toad rush (*Juncus bufonius*), willowherb (*Epilobium cleistogamum, E. campestre*), annual rabbit's-foot grass (*Polypogon monspeliensis*), garden bird's-foot-trefoil, curly dock (*Rumex crispus*), fiddle dock (*Rumex pulcher*), waxy manna grass (*Glyceria declinata*), needle spikerush (*Eleocharis acicularis*), perennial rye grass, spiny-fruit buttercup (*Ranunculus muricatus*), dallisgrass, and tall flat sedge are present.

If inundation duration is short but soil saturation is lengthy, then sedges and rushes (e.g., iris-leaf rush [*Juncus xiphioides*], Baltic rush [*Juncus balticus* ssp. *ater*], and Pacific rush [*Juncus effusus* var. *pacificus*]) usually dominate. Other Depressional Wetlands that have alkaline-saline soils and water at or near the surface for extended periods are generally dominated by salt grass (*Distichlis spicata*).

Other Depressional Wetland land cover varies in size from a little less than 100 square feet to over 100 acres. Although occurring on many exposures and slopes, these wetlands are most common on level to gently rolling topography. These wetlands occur naturally along water bodies (i.e., rivers, streams, lakes, and ponds), and as artificial impoundments behind dams, road grades, or low berms.

3.4.2.17 Vernal Pool, Seasonal Wetland, and Swale

Vernal Pool, Seasonal Wetland, and Swale land cover in the Permit Area is characterized as seasonally flooded depressions and seasonal wetlands that support a native endemic

flora under a combination of specific climatic, soil, hydrologic, and topographic conditions. These conditions include a Mediterranean climate, soil types that include a restrictive subsurface layer impermeable to water infiltration on which a shallow water table is perched during the wet season, and a micro-topographic pattern of shallow depressions and swales in a level landscape.

Within the Permit Area, there are 7,784 acres (1.4 percent of the Permit Area) of SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover. The Vernal Pool, Seasonal Wetland, and Swale land cover type is located in patches throughout the Permit Area (Figure 3-9).

Vernal pools and seasonal wetlands occur in undulating topography and may be isolated from one another, but, more often, they are interconnected by vernal swales or ephemeral drainages in complexes that may extend for hundreds of acres. Swales are poorly defined herbaceous-vegetated drainage ways (no distinct bed and bank) occurring on less than 5 percent slopes that convey water, often between vernal pools and seasonal wetlands, for short periods during and after major rainfall events. Vernal pools are ecologically integrated with the surrounding uplands; typically the Grasses and Forbs land cover dominates the watersheds of a vernal pool or vernal pool complex.

Vernal Pool, Seasonal Wetland, and Swales are typically dominated by short-lived annual native plants that can complete their lifecycles during the inundation and drying phases that characterize the land cover. Native endemic plants typical of vernal pools include several species of downingia (*Downingia* spp.), goldfields (*Lasthenia* spp.), popcornflower (*Plagiobothrys* spp.), clovers, bractless hedge-hyssop (*Gratiola ebracteata*), coyote thistle (*Eryngium* spp.), spikerush (*Eleocharis* spp.), rush, buttercup (*Ranunculus* spp.), woolly marbles (*Psilocarphus* spp.), willowherb, quillwort (*Isoetes* spp.), and navarretia (*Navarretia* spp.).

Non-native species found in vernal pools include perennial rye grass, lesser quaking grass (*Briza minor*), soft chess, lesser hawkbit, hyssop loosestrife (*Lythrum hyssopifolia*), and cut-leaved geranium. Other species present within vernal pools include vernal pool Indian paintbrush (*Castilleja campestris*), yellowflower tarweed, brome fescue (*Festuca bromoides*), tricolor monkeyflower (*Mimulus tricolor*), and annual hair grass (*Deschampsia danthonioides*).

3.4.3 Land Cover Classification and Covered Species Habitat Modeling

Land cover types in the Permit Area, as shown on Figure 3-4, provide habitat for the HCP Covered Species. The HCP land cover types that could be used by each Covered Species were identified based on species experts' knowledge, literature review, and input from the Resource Agencies. Table 3-4 lists the suitable land cover types that may be occupied by Covered Species; identifies when the land cover may be occupied in the species life cycle; and summarizes the geographic range, elevational range, and species-specific habitat requirements (e.g., specific soil types) used to model habitat for each

species. The specific habitat requirements and methods for modeling each species' habitat are described in detail in Appendix A, *Species Accounts*.

Figures 3-10 through 3-16 present the land cover types modeled as suitable habitat for each Covered Species. In addition, the maps provide information on Covered Species' known occurrences using information obtained from the California Natural Diversity Database (CNDDB) (CNDDB 2013), U.S. Fish and Wildlife Service (USFWS) Vernal Pool Recovery Core Areas (USFWS 2005a), SMUD species observation data, and designated critical habitat.

3.5 Covered Species

This HCP addresses seven listed species (Tables 1-1 and 3-4): two plant species and five wildlife species. Covered Species are plant and wildlife species that may occur within the Permit Area; are protected under federal Endangered Species Act (ESA), California Endangered Species Act (CESA), or related regulations or may be listed during the proposed Permit Term; and may be affected by SMUD HCP Covered Activities.

Table 3-4. Plant and Wildlife Covered Species, Land Cover, and Modeled Habitat Parameters

Scientific Name, Common Name	Habitat Use	SMUD HCP Land Cover																	Modeled Habitat Parameters
		Eucalyptus Woodland	Valley Foothill Riparian	Blue Oak Foothill Pine	Blue Oak Woodland	Valley Oak Woodland	Mine Tailing Riparian Woodland	Orchard / Vineyard	Cropland	Rice	Pasture	Grasses and Forbs	Urban	Barren/Disturbed	Riverine	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	
Plants																			
Orcuttia tenuis, slender Orcutt grass	Entire Life Cycle																	X	Figure 3-10; Modeled Habitat limited to areas within USFWS-designated core recovery areas
Orcuttia viscida, Sacramento Orcutt grass	Entire Life Cycle																	X	Figure 3-11; Modeled Habitat limited to areas within USFWS-designated core recovery areas
Invertebrates																			
Branchinecta lynchi, vernal pool fairy shrimp	Entire Life Cycle																	X	Figure 3-12
Lepidurus packardi, vernal pool tadpole shrimp	Entire Life Cycle																	X	Figure 3-13

Scientific Name, Common Name	Habitat Use	SMUD HCP Land Cover																	Modeled Habitat Parameters
		Eucalyptus Woodland	Valley Foothill Riparian	Blue Oak Foothill Pine	Blue Oak Woodland	Valley Oak Woodland	Mine Tailing Riparian Woodland	Orchard / Vineyard	Cropland	Rice	Pasture	Grasses and Forbs	Urban	Barren/Disturbed	Riverine	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	
Desmocerus californicus dimorphus, valley elderberry longhorn beetle	Entire Life Cycle		X				X												Figure 3-14
Amphibians																			
Ambystoma californiense, California tiger salamander	Aquatic															X	X	X	Figure 3-15; range limited to areas south of the Cosumnes River; upland Modeled Habitat limited to areas within 1.2 miles of aquatic Modeled Habitat
	Upland				X	X					X	X							

Scientific Name, Common Name	Habitat Use	SMUD HCP Land Cover																	Modeled Habitat Parameters
		Eucalyptus Woodland	Valley Foothill Riparian	Blue Oak Foothill Pine	Blue Oak Woodland	Valley Oak Woodland	Mine Tailing Riparian Woodland	Orchard / Vineyard	Cropland	Rice	Pasture	Grasses and Forbs	Urban	Barren/Disturbed	Riverine	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	
Reptiles																			
Thamnophis gigas, giant garter snake	Aquatic									X					X	X	X		Figure 3-16; aquatic Modeled Habitat limited to areas below 90 feet elevation in southern portion of the Permit Area; west of the Natomas East Main Drainage Canal in northern portion of the Permit Area; and the portion of the Permit Area in Yolo County. Upland Modeled Habitat limited to areas within 200 feet of aquatic Modeled Habitat.
	Upland		X		X	X					X	X							

3.5.1 Selection of Covered Species

The seven HCP Covered Species were selected after an initial assessment of the proposed Covered Activities on 210 plant and animal species that may occur in the Permit Area and are listed species, or that could become listed species during the proposed Permit Term (Appendix B, *Potential Covered Species Evaluation*, Tables B-1 and B-2). The comprehensive list of special-status species that occur or may occur within the Permit Area was developed using database queries, literature searches, and species expert input. Special-status species are defined as plants and animals that are legally protected under the federal ESA, CESA, or other regulations; and species that are considered sufficiently rare by the scientific community to qualify for such listing.

The potential species evaluation list was compiled from the following resources.

- Query of the USFWS database for the 7.5-minute quadrangles in the Permit Area and within a 5-mile buffer of the Permit Area for species listed as threatened or endangered, or proposed to be listed species under the federal ESA.
- Query of the California Native Plant Society (CNPS) database of rare, threatened, or endangered plants for the 7.5-minute quadrangles in the Permit Area and within a 5-mile buffer of the Permit Area.
- CNDDB occurrences within the Permit Area and a 5-mile buffer of the Permit Area.

In addition to these searches, species were also considered for coverage if they were included in the following documents.

- USFWS Vernal Pool Recovery Plan (USFWS 2005a)
- USFWS Bird Species of Conservation Concern (USFWS 2008)
- South Sacramento HCP (County of Sacramento et al. 2010)
- Natomas Basin HCP (City of Sacramento et al. 2003)
- Metro Air Park HCP (Thomas Reid Associates 2001)
- Yolo HCP/NCCP (Yolo County 2013)
- Western Placer County HCP/NCCP (Placer County 2011)
- SMUD Nature Preserve Mitigation Bank (SMUD Bank, SMUD 2013)

Once the comprehensive species list was compiled, the next step included reviewing each species using the following considerations.

- Federal and state legal status.
- Status of plants listed with CNPS.

- Potential for future federal or state listing.
- Occurrence in the Permit Area.
- Sufficient scientific information to address species' biological requirements, conservation needs, and compensation options.
- Potential for Covered Activities to result in take, including harm.

The future listing potential of a species was determined through review of published documentation on Environmental Conservation Online System (ECOS) (USFWS 2013). The occurrence in the Permit Area was determined by using CNDDB Rare Find 5 along with species experts' observations. Sufficient information was determined by performing literature searches and checking Nature Serve Explorer (Nature Serve 2013) to determine if there was occurrence information, distribution, and life history (ecology) data. The potential to be affected was determined by whether the species may occur, breed, and/or forage in locations where Covered Activities are likely to occur in the Permit Area. A species was proposed for coverage if it was listed or had the potential to be listed; was known to occur, breed, and/or forage in the Permit Area; there was sufficient species information; and SMUD HCP Covered Activities would likely take the species or its suitable habitat.

Fully protected species including white-tailed kite and golden eagle met the criteria listed above. However, they were not included as Covered Species because the fully protected statute prohibits take of individuals and the loss of habitat alone was not sufficient to justify inclusion in the HCP.

The rationale and background research conducted for each of the potential species on the initial comprehensive list is shown in Table B-2 of Appendix B. The initial species list was reviewed with input from species experts, Wildlife Agencies, and other HCP stakeholders. Seven species were eventually selected for coverage under this HCP (see Tables 1-1 and 3-4).

3.6 Covered Species Descriptions and Covered Species Modeled Habitats

Seven species have been selected as Covered Species under the HCP: two plants, three invertebrates, one amphibian, and one reptile. A brief description of each Covered Species is provided below. Full descriptions of the species biology and required habitats are provided in Appendix C.

3.6.1 Covered Plants

3.6.1.1 Slender Orcutt Grass *(Orcuttia tenuis)*

Listing Status: Federally threatened, state endangered, and CNPS List 1B.1.

Slender Orcutt grass is a small annual herb in the grass family (Poaceae). Slender Orcutt grass is one of 33 species of vernal pool plants and animals included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005a). This species has been identified in the Mather USFWS Vernal Pool Core Recovery Area in the Permit Area.

Critical habitat was designated for this species and several other vernal pool species in 2003 (USFWS 2003). There are 1,161 acres of slender Orcutt grass critical habitat in the Permit Area.

Slender Orcutt grass is among the most widespread of the rare *Orcuttiae* grasses and exhibits the widest range in elevation, from 100 to 5,775 feet. Within California, CNPS has records for slender Orcutt grass scattered in distinct areas of northern California in gravelly vernal pools that occur on remnant alluvial fans, on high stream terraces, and recent basalt flows within valley grassland and blue oak woodland (CNPS 2013; USFWS 2005a). These habitats correspond to the SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type. Slender Orcutt grass has a wetland indicator status of obligate wetland (OBL), which means it almost always occurs in wetlands under natural conditions (USACE 2008).

The majority of the CNDDB occurrences, including those in the Permit Area, reported unknown population trends; four reported decreasing populations; two reported stable populations; and two reported fluctuating populations (CNDDB 2013). Similar to other vernal pool annuals, slender Orcutt grass populations can vary greatly in size from year to year with fluctuations of up to four orders of magnitude documented in Lake and Shasta counties (USFWS 2003). This variability is attributable to interactions of seed dormancy, early seedling survivorship, and average seed set per plant, as determined by seasonal and between-year limitations in available moisture (Griggs and Jain 1983; Holland 1987). Threats to slender Orcutt grass in the Permit Area include encroaching development, thatch build-up, competition with invasive plants, hydrological changes, use of herbicide, human disturbance, and cattle grazing (CNDDB 2013).

There are three CNDDB occurrences within the Permit Area, all in vernal pools in the Mather Core Recovery Area (CNDDB 2013; USFWS 2005a) (Figure 3-10).

HCP Modeled Habitat for slender Orcutt grass is SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type within the designated USFWS Vernal Pool Core Recovery Areas (Table 3-4) (USFWS 2005a): Phoenix Field and Park, Mather, and Cosumnes/Rancho Seco (Figure 3-10). The Permit Area supports a total of 3,273.14 acres of Modeled Habitat for slender Orcutt grass.

3.6.1.2 Sacramento Orcutt Grass *(Orcuttia viscida)*

Listing status: Federally endangered, state endangered, and CNPS List 1B.1.

Sacramento Orcutt grass is a small annual herb in the grass family (Poaceae). Sacramento Orcutt grass is one of 33 species of vernal pool plants and animals included

in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005a). This species has been identified in USFWS Vernal Pool Core Recovery Areas including Cosumnes/Rancho Seco, Mather, and Phoenix Field and Park.

Critical habitat was designated for this species in 2003 (USFWS 2003) (Figure 3-11). There are 33,273 acres of Sacramento Orcutt grass critical habitat in the Permit Area.

The recorded range of the species is entirely within the HCP Permit Area, extending in a narrow band of habitat from the terrace just north of the American River in the vicinity of Orangevale, south approximately 26 miles to the vicinity of Rancho Seco Lake on the Arroyo Seco Mesa. It is primarily concentrated into a single area of about 2.3 square miles (600 hectares) in the vicinity of Rancho Cordova east of Mather Field (CNDDB 2013). Soils underlying pools where Sacramento Orcutt grass occur are acidic with an iron-silica hardpan (Stone et al. 1988), containing numerous cobbles (Crampton 1959; Stone et al. 1988). There are no historic records or collections of this species made outside of this area (Stone et al. 1988).

Vernal pools that provide habitat for this species exist within the Permit Area and correspond to the SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover types. Sacramento Orcutt grass has a wetland indicator status of OBL, which means it almost always occurs in wetlands under natural conditions (USACE 2008).

Most of the CNDDB occurrences in the Permit Area list the population trend as unknown, with two occurrences as decreasing and one as fluctuating (CNDDB 2013). There has been no comprehensive effort to monitor all populations of Sacramento Orcutt grass, but informal monitoring projects have been conducted by CDFW at the Phoenix Field Ecological Preserve and at the Kiefer Landfill sites (County of Sacramento et al. 2010). Abundance within Orcutt grass populations varies greatly between species, between populations within species, and within populations year-to-year (Griggs and Jain 1983; Holland 1987). This variability is attributable to interactions of seed dormancy, early seedling survivorship, and average seed set per plant, as determined by seasonal and between-year limitations in available moisture (Griggs and Jain 1983; Holland 1987).

Threats to Sacramento Orcutt grass in the Permit Area include incompatible cattle grazing regimes, off road vehicle use, development, altered hydrology, competition with invasive species, activities associated with transmission line maintenance, recreational activities, and landfill expansion (CNDDB 2013).

There are 12 occurrences of Sacramento Orcutt grass in the Permit Area, 2 of which are extirpated (CNDDB 2013). All 10 extant CNDDB occurrences are in vernal pools located in the eastern and northeastern portions of the Permit Area (CNDDB 2013) (Figure 3-11).

HCP Modeled Habitat for Sacramento Orcutt grass is SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type within designated USFWS Vernal Pool Core Recovery Areas (Table 3-4) (USFWS 2005a), including Phoenix Field and Park, Mather, and Cosumnes/Rancho Seco (Figure 3-11). The Permit Area supports a total of 3,273.14 acres of Modeled Habitat for Sacramento Orcutt grass.

3.6.2 Covered Invertebrates

3.6.2.1 Vernal Pool Fairy Shrimp *(Branchinecta lynchi)*

Listing Status: Federally threatened.

The vernal pool fairy shrimp is a freshwater crustacean in the family Branchinectidae. It is one of 33 species of vernal pool plants and animals included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005a). This species has been recorded in Cosumnes/Rancho Seco, Mather, and Western Placer County USFWS Vernal Pool Core Recovery Areas in the Permit Area.

There are 39,543 acres of critical habitat in the Permit Area. The Permit Area contains all or a portion of critical habitat units[1] 13 and 14A and 14B. Unit 13 is in the Mather Field area, and Units 14A and 14B are in the Rancho Seco area in southeastern Sacramento County and into western Amador County.

Vernal pool fairy shrimp has an ephemeral life cycle and exists in a variety of vernal pools or vernal pool-like habitats, from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools (Eng et al. 1990; Helm 1998). The species does not occur in riverine, marine, or other permanent bodies of water (USFWS 2007a). Vernal pool fairy shrimp are typically associated with smaller and shallower vernal pools (typically about 6 inches deep) that have relatively short periods of inundation (Helm 1998) and relatively low to moderate total dissolved solids (TDS) and alkalinity (Eriksen and Belk 1999). Occupied habitats range in size from rock outcrop pools as small as 1 square yard to large vernal pools up to 2 acres (Helm 1998; Helm and Vollmar 2002). The potential ponding depth of occupied habitat ranges from 1.2 to 48 inches (USFWS 2007a). These habitats correspond to the SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type.

The population trend at all CNDDB occurrences, including within the Permit Area, is listed as unknown (CNDDB 2013). USFWS (2007a) did not have information on range-wide population or abundance trends for the vernal pool fairy shrimp, although the numbers of recorded observations had increased due to project-related surveys. Accurate population trends for this species in Sacramento County are lacking due to limited numbers of surveys, fluctuations with water year, inconsistency in referring to individual seasonal pools and pool complexes, and lack of information on areas that were surveyed with negative results (County of Sacramento et al. 2010).

In the Southeastern Sacramento Vernal Pool Region, which covers a large portion of the Permit Area, the primary threat to vernal pool fairy shrimp is urban development (USFWS 2005a). Throughout the species' range in California, principal threats that face vernal pool fairy shrimp are the conversion of its habitat to agricultural uses and urban development, and stochastic extinction due to the small and isolated nature of remaining

[1] In 2005, the USFWS designated 111 units (areas ranging in size from 10 to 40 acres) as critical habitat for vernal pool species (70 FR 46924).

populations (USFWS 2005a, 2006a). Because of the limited and disjunct distribution of seasonally inundated pools, any reduction in habitat quantity could adversely affect vernal pool fairy shrimp populations (USFWS 1996).

There are 72 CNDDB occurrences in the Permit Area (CNDDB 2013). Figure 3-12 illustrates the known recorded occurrences of vernal pool fairy shrimp within the Permit Area, including occurrences at the SMUD Bank.

HCP Modeled Habitat for vernal pool fairy shrimp is SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type (Figure 3-12). The Permit Area supports a total of 7,784 acres of vernal pool fairy shrimp Modeled Habitat.

3.6.2.2 Vernal Pool Tadpole Shrimp *(Lepidurus packardi)*

Listing Status: Federally endangered.

The vernal pool tadpole shrimp is also a freshwater crustacean in the family Branchinectidae. It is one of 33 species of vernal pool plants and animals included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005a). This species has been identified in the Cosumnes/Rancho Seco, Mather, and Western Placer County USFWS Vernal Pool Core Recovery Areas in the Permit Area. There are 39,543 acres of vernal pool tadpole shrimp critical habitat in the Permit Area.

Vernal pool tadpole shrimp is endemic in seasonal pools, vernal pools, vernal lakes, vernal swales, ponded clay flats, alkaline pools, and roadside ditches (CNDDB 2013; Helm 1998). Habitats where vernal pool tadpole shrimp have been observed range in size from small (as small as 6.5 square feet), clear, well-vegetated vernal pools to highly turbid alkali playa pools to large vernal lakes such as Olcutt Lake at the Jepson Prairie Preserve in Solano County and Dales Lake in Tehama County (100 to more than 250 acres) (Helm 1998; Helm pers. comm.). These pools and other ephemeral wetlands must dry out and inundate for vernal pool tadpole shrimp cysts to hatch. Adult tadpole shrimp populations generally persist until the habitat dries up.

Vernal pools, seasonal pools, vernal swales, and alkaline pools that provide habitat for this species exist within the Permit Area and correspond to the SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type.

The population trend for CNDDB occurrences, including those within the Permit Area, is listed as unknown (CNDDB 2013). Annual surveys have not occurred at all sites with known vernal pool tadpole shrimp populations (USFWS 2007b). Surveys that have been completed are mainly to determine presence. No trends (either increasing or decreasing) have been reported for any of the monitored sites; however, the accelerated loss and fragmentation of habitat is expected to markedly decrease the long-term viability of this species (USFWS 2007b).

In the Southeastern Sacramento Vernal Pool Region, including the within the Permit Area, extant populations of vernal pool tadpole shrimp are threatened by continued extensive

urban development (USFWS 2005a). Threats facing vernal pool tadpole shrimp include the conversion of seasonal pool habitat to agricultural uses and urban development, and stochastic extinction due to the small and isolated nature of remaining populations (USFWS 1994). Other threats include excessive livestock grazing, predation by non-native bullfrog (*Rana catesbeiana [=Lithobates catesbeianus]*), and off-road vehicles (County of Sacramento et al. 2010).

There are 83 recorded vernal pool tadpole shrimp CNDDB occurrences in the Permit Area (CNDDB 2013). The Mather core area contains possibly the highest density of vernal pool tadpole shrimp occurrences within the range of the species (USFWS 2005a). The species has also been identified at the SMUD Bank.

HCP Modeled Habitat for vernal pool tadpole shrimp is SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover (Figure 3-13). The Permit Area supports a total of 7,784 acres of Modeled Habitat for this species.

3.6.2.3 Valley Elderberry Longhorn Beetle *(Desmocerus californicus dimorphus)*

Listing Status: Federally threatened.

The valley elderberry longhorn beetle is found only in association with its host plant, elderberry (*Sambucus* sp.). USFWS recognizes the range of valley elderberry longhorn beetle to include the American, San Joaquin, and Sacramento river watersheds and tributaries of these watersheds below elevations of 3,000 feet (USFWS 1999a), though the majority of valley elderberry longhorn beetle occurrences have been documented below 500 feet in elevation (USFWS 2017). Valley elderberry longhorn beetle are considered to potentially occur in all mature elderberry shrubs, with stems greater than 1 inch in diameter at the ground level. Adult valley elderberry longhorn beetle are only active during the flowering period of the elderberry, typically early March through June (Barr 1991). Riparian areas that provide habitat for this species exist within the Permit Area and correspond to the SMUD HCP Valley Foothill Riparian and Mine Tailing Riparian Woodland land cover types.

There are 515 acres of critical habitat in the Permit Area. The Sacramento Zone is 25 acres in the City of Sacramento enclosed on the north by the Route 160 Freeway, on the west and southwest by the Western Pacific Railroad tracks, and on the east by Commerce Circle and its extension southward to the railroad tracks. The American River Parkway Zone is 490 acres and comprises the American River Parkway on the south bank of the American River bounded to the south and east by Ambassador Drive and to the north and northeast by River Bend Park (USFWS 1980).

The population trend of valley elderberry longhorn beetle within the Permit Area is unknown (CNDDB 2013). It has been estimated that 90 percent of California riparian habitat has been lost over the last century and a half (Barr 1991; Naiman et al. 1993; Smith 1980); however, these losses are difficult to accurately quantify in terms of direct valley elderberry longhorn beetle habitat losses (Talley et al. 2006). Currently, less than

1 percent of the original upland riparian habitat remains in the Central Valley, mostly distributed in small, isolated fragments (Collinge et al. 2001). Although valley elderberry longhorn beetle is widespread across its range, it has been extirpated from many historically occupied drainages. The extant valley elderberry longhorn beetle population has a scattered distribution, and local populations can be exceedingly isolated.

The primary threats to valley elderberry longhorn beetle throughout the species' range are activities that have resulted in widespread alteration and fragmentation of riparian habitats and, to a lesser extent, upland habitats that support valley elderberry longhorn beetle (USFWS 2006b). These threats include: loss and alteration of habitat by agricultural conversion, recreational, industrial, and urban development; levee construction, stream and river channelization, removal of riparian vegetation and rip-rapping of shoreline; ongoing maintenance of levees and canals for purposes of flood control and agriculture; non-native animals such as the Argentine ant (*Linepithema humile*), which may eat the early life stages of valley elderberry longhorn beetle; inappropriate grazing; and use of insecticides (USFWS 2006b). Over the past 25 years, the rate of riparian habitat loss has slowed significantly due to limitations in the amount of riparian habitat remaining, protections provided under the federal ESA, other regulatory protections, and restoration efforts.

There are 16 recorded valley elderberry longhorn beetle CNDDB occurrences in the Permit Area, primarily within riparian zones associated with the Sacramento, American, and Cosumnes rivers (CNDDB 2013). Several other occurrences are located in Yolo County adjacent to the Sacramento River (CNDDB 2013) (Figure 3-14).

An elderberry survey conducted at the American River Parkway, which included some shrubs within existing SMUD easements, found exit holes within 33 percent of all elderberry shrubs surveyed (Area West Environmental 2014). This rate of occupancy is higher compared to occupancy surveys conducted throughout the range of valley elderberry longhorn beetle between 1991 and 1997, which indicated that only 25 percent of apparently suitable sites were inhabited (Barr 1991; Collinge et al. 2001). The American River Parkway valley elderberry longhorn beetle survey covered 36 acres of Modeled Habitat (Valley Foothill Riparian). This habitat was found to contain 325 elderberry shrubs of suitable size for valley elderberry longhorn beetle, which equates to a density of 8.9 elderberry shrubs per acre of Modeled Habitat. Therefore, SMUD will assume a density of nine elderberry shrubs per acre of Modeled Habitat within the Permit Area.

HCP Modeled Habitat for valley elderberry longhorn beetle is SMUD HCP Valley Foothill Riparian and Mine Tailing Riparian Woodland land cover types in the Permit Area (Figure 3-14). The Permit Area supports a total of 13,543 acres of valley elderberry longhorn beetle Modeled Habitat.

3.6.3 Covered Amphibians

3.6.3.1 California Tiger Salamander *(Ambystoma californiense)*

Listing Status: Federally threatened and state threatened.

California tiger salamanders (CTS) are a relatively large, secretive amphibian endemic to California. A *Recovery Plan for the Central California Disjunct Population Segment of the California Tiger Salamander* was published in 2017 (USFWS 2017b). This species has been identified in the USFWS Central Valley Recovery Unit.

Critical habitat was designated for this species in 2005 (USFWS 2005b) (Figure 3-15). There are 19,569 acres of CTS critical habitat in the Permit Area.

CTS require both wetland and adjacent upland habitat to complete their life cycle (Shaffer et al. 1993). CTS usually breed in ponds and pools that form during winter and may dry out in summer, primarily within grassland and woodland areas (Storer 1925; Stebbins and McGinnis 2012). Vernal pools and other seasonal rain pools are the primary breeding habitat of CTS (Barry and Shaffer 1994; Jennings and Hayes 1994). The species requires pools with at least 10 weeks of inundation in order to complete metamorphosis of larvae (Anderson 1968). CTS are usually only found in water bodies that are large enough to retain water long enough for CTS to complete metamorphosis (Laabs et al. 2001). The species is also known to successfully reproduce in ponds, including artificial stockponds (Barry and Shaffer 1994; USFWS 2004). The presence of predatory fish and bullfrogs, however, can affect the suitability of perennial ponds (Fitzpatrick and Shaffer 2004). Barry and Shaffer (1994) note that stockponds can be productive breeding sites as long as they are drained annually, which can prevent predatory species from establishing. Aquatic habitat used by CTS corresponds to the SMUD HCP Open Water/Fringe; Other Depressional Wetland; and Vernal Pool, Seasonal Wetland, and Swale land cover types.

Adult CTS are terrestrial and occur most of the year (6 to 9 months) in grassland and open woodland habitats where they live entirely within the underground burrows of small mammals, such as California ground squirrels (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*) (Loredo and Van Vuren 1996; Petranka 1998; Trenham 1998). Active rodent burrow systems are probably necessary to sustain CTS populations because inactive burrow systems begin to deteriorate and collapse over time (Loredo et al. 1996). Upland habitat used by CTS corresponds to the SMUD HCP Blue Oak Woodland, Valley Oak Woodland, Pasture, and Grasses and Forbs land cover types.

It is generally accepted that CTS's range in the Permit Area is restricted to areas south of the Cosumnes River in Sacramento County (CNDDB 2013; CDFW 2003). In the Yolo County portion of the Permit Area, CTS's range is west of the Yolo Bypass, which is a floodplain that has historically been inundated as early as October and as late as June, with a typical peak period of inundation during January–March (Sommer et al. 2001) precluding the bypass from being used as upland habitat for CTS. For CTS moving from breeding pools to upland refuge, Searcy et al. (2013) found the median migration distance for all age classes of CTS to be 1,824 feet, with the adult age class having the

farthest median migration distance of 2,188 feet. The maximum dispersal distance for adult CTS is documented to be 1.3 miles (Sweet 1998 as cited in County of Sacramento et al. 2010; Trenham et al. 2001).

Trends of CNDDB occurrences are reported as unknown within the Permit Area, and throughout the species' range are reported as unknown or decreasing (CNDDB 2013). A study from 1996 suggests that CTS is in the early stages of range contraction and fragmentation (Fisher and Shaffer 1996) and that if this trend continues, the species is vulnerable to extinction (Barry and Shaffer 1994; Loredo et al. 1996). It has been estimated that CTS has disappeared from about 55 percent of its historic range in California (Jennings and Hayes 1994).

Within the Permit Area, threats to the species include development, cattle grazing, presence of bullfrogs, and construction activities. Throughout the species' range, conversion of habitat to urban and agricultural use resulting in habitat loss and fragmentation is considered the most significant threat to CTS (USFWS 2004).

There are 21 presumed extant occurrences in the Permit Area, primarily in the vicinity of Rancho Seco (the southeastern portion of Sacramento County south of the Consumes River) (CNDDB 2013). There is also one occurrence in the city of Davis, about 2.5 miles south of the SMUD gas pipeline (CNDDB 2013). This species has been observed using aquatic and upland habitat at the SMUD Bank.

SMUD HCP aquatic Modeled Habitat for CTS is SMUD HCP Open Water/Fringe; Other Depressional Wetland; and Vernal Pool, Seasonal Wetland, and Swale land cover types (Figure 3-15). In Sacramento County, aquatic Modeled Habitat is limited to areas south of the Cosumnes River, and in Yolo County, aquatic Modeled Habitat is limited to areas west of the Yolo Bypass (Figure 3-15). The Permit Area supports 7,404 acres of aquatic Modeled Habitat.

SMUD HCP upland Modeled Habitat for this species is SMUD HCP Blue Oak Woodland, Valley Oak Woodland, Pasture, and Grasses and Forbs land cover types (Table 3-4) located within 1.2 miles of the aquatic Modeled Habitat. The Permit Area supports 95,327 acres of upland Modeled Habitat.

3.6.4 Covered Reptiles

3.6.4.1 Giant Garter Snake *(Thamnophis gigas)*

Listing Status: Federally threatened and state threatened.

The giant garter snake is endemic to marshes, sloughs, ponds, small lakes, mud-bottom canals adjacent to rice fields, and occasionally slow streams on the valley floors of the Sacramento and San Joaquin valleys of central California (Hansen and Brode 1980; USFWS 2012). The Recovery Plan for Giant Garter Snake (*Thamnophis gigas*) was published in 2017 (USFWS 2017c). Critical habitat for this species has not been designated.

Habitat for giant garter snake consists of adequate water during the active season (May 1 – October 1), emergent herbaceous wetland vegetation (such as tules [*Schoenoplectus* sp.] and cattails) for escape and foraging habitat; grassy banks and openings in waterside vegetation for basking; and higher elevation upland habitat for cover and refuge from flooding (USFWS 2012). Aquatic habitat is remnant native marshes and sloughs, restored wetlands, low gradient streams, and agricultural wetlands including rice fields and irrigation and drainage canals. Giant garter snake typically inhabit small mammal burrows and other soil and rock crevices within 200 feet of aquatic habitat during the colder months of winter (October to April) (Hansen and Brode 1993; Wylie et al. 1997; Wylie et al. 2003). Large rivers and wetlands with sand, gravel, or rock substrates do not support this species (USFWS 1999b).

In the SMUD HCP Permit Area, the range of this species is limited to the area west of the Natomas East Main Drainage Canal in the northern portion of the Permit Area (including Yolo County) where suitable habitat is present. In the Permit Area, one giant garter snake occurrence was recorded at 90 feet elevation in the southern portion of the Permit Area (CNDDB 2013); therefore, the range in the southern portion of the Permit Area is restricted to areas below 90 feet elevation.

The aquatic habitat that this species uses within the Permit Area corresponds to the SMUD HCP Rice, Riverine, Open Water/Fringe, and Other Depressional Wetland land cover types. Upland habitats for this species correspond to the SMUD HCP Valley Foothill Riparian, Blue Oak Woodland, Valley Oak Woodland, Pasture, and Grasses and Forbs land cover types located within 200 feet of aquatic Modeled Habitat.

Population trends for CNDDB occurrences in the Permit Area are listed as unknown except for one record listed as stable (CNDDB 2013). The current distribution and abundance of giant garter snake throughout its range has been reduced significantly from historic levels. Agriculture and flood control measures have extirpated the species from the southern third of its range, which comprised the historic Buena Vista, Tulare, and Kern lakebeds. Almost no suitable freshwater habitat remains south of Fresno (USFWS 1999b). Some populations may not be viable because they are small, highly fragmented, and restricted to small patches of marginal habitat.

Habitat loss from agricultural development and flood control activities has been the primary factor in the decline of giant garter snake populations. Upstream watershed modifications, water storage and diversion projects, and urban and agricultural development cumulatively affect wetland habitat for giant garter snake on the valley floor. Other factors contributing to the decline of giant garter snake include interrupted water supply, poor water quality, and contaminants. Small remaining populations are susceptible to predation by mammals, birds, and introduced game fish such as largemouth bass (*Micropterus salmoides*) and catfish (*Ictalurus* spp.). Additional causes of mortality include vehicular traffic, agricultural practices, and maintenance of water channels (e.g., scraping canal banks, mowing, and applying herbicides) (USFWS 1999b). Habitat fragmentation and population isolation also threatened giant garter snake (USFWS 2012).

There are 54 CNDDB occurrences of this species in the western portion of the Permit Area, with over 25 of those occurrences concentrated in the northwestern corner of the Permit Area (CNDDB 2013) (Figure 3-16).

The Permit Area supports 19,344.39 acres of aquatic Modeled Habitat and 22,170 acres of upland Modeled Habitat.

3.7 SMUD Bank

The SMUD Bank encompasses approximately 1,132 acres owned by SMUD in southeastern Sacramento County, approximately 12 miles east of State Route 99, south of State Route 104, and east of the decommissioned Rancho Seco Nuclear Generating Station (shut down in 1989) in Sacramento County, California (Figure 3-17).

The SMUD Bank is characterized by rolling hills covered with native and naturalized non-native annual grasses typical of the Sacramento County region. The SMUD Bank includes approximately 1,034 acres of protected annual grasslands and 0.8 acre of riparian scrub vegetation. The SMUD Bank also contains a significant number of vernal pools. Within the Bank, vernal pools are underlain by an impermeable duripan and/or clay layers (claypan). The SMUD Bank contains 52.6 acres of protected wetland habitats and associated plant and wildlife species; 3.0 acres of previously restored wetlands; and 25 acres of restored/established vernal pools, vernal swales, seasonal wetlands, and seasonal swales.

3.8 Other Conservation Banks

The conservation banks that are outside the Permit Area but included in the Plan Area are described below. These banks are shown in Figure 1-1.

3.8.1 Nicholas Ranch Conservation Bank

The Nicolaus Ranch Conservation Bank is a 42-acre site approved by USFWS to offset unavoidable impacts on the valley elderberry longhorn beetle. The site is located adjacent to the Cosumnes River in south Sacramento County. The Nicholas Ranch Conservation Bank supports valley elderberry longhorn beetle within a riparian natural community. The Permit Area is within the service area for the Nicholas Ranch Conservation Bank.

3.8.2 River Ranch VELB Conservation Bank

The 211-acre River Ranch VELB Conservation Bank is approved by the USFWS to sell conservation credits for the loss of valley elderberry longhorn beetle habitat within the approved service area, which includes the Permit Area. The River Ranch Conservation Bank is located in Yolo County and provides restored habitat for valley elderberry longhorn beetle. The River Ranch VELB Conservation Bank has been planted with blue

elderberry and associated native riparian species. The overall goal of this bank is to establish and manage riparian habitat adjacent to the Sacramento River that maximizes habitat benefits and recovery efforts for valley elderberry longhorn beetle. Many valley elderberry longhorn beetles have been observed and documented on the Bank site over the years.

3.8.3 French Camp Conservation Bank

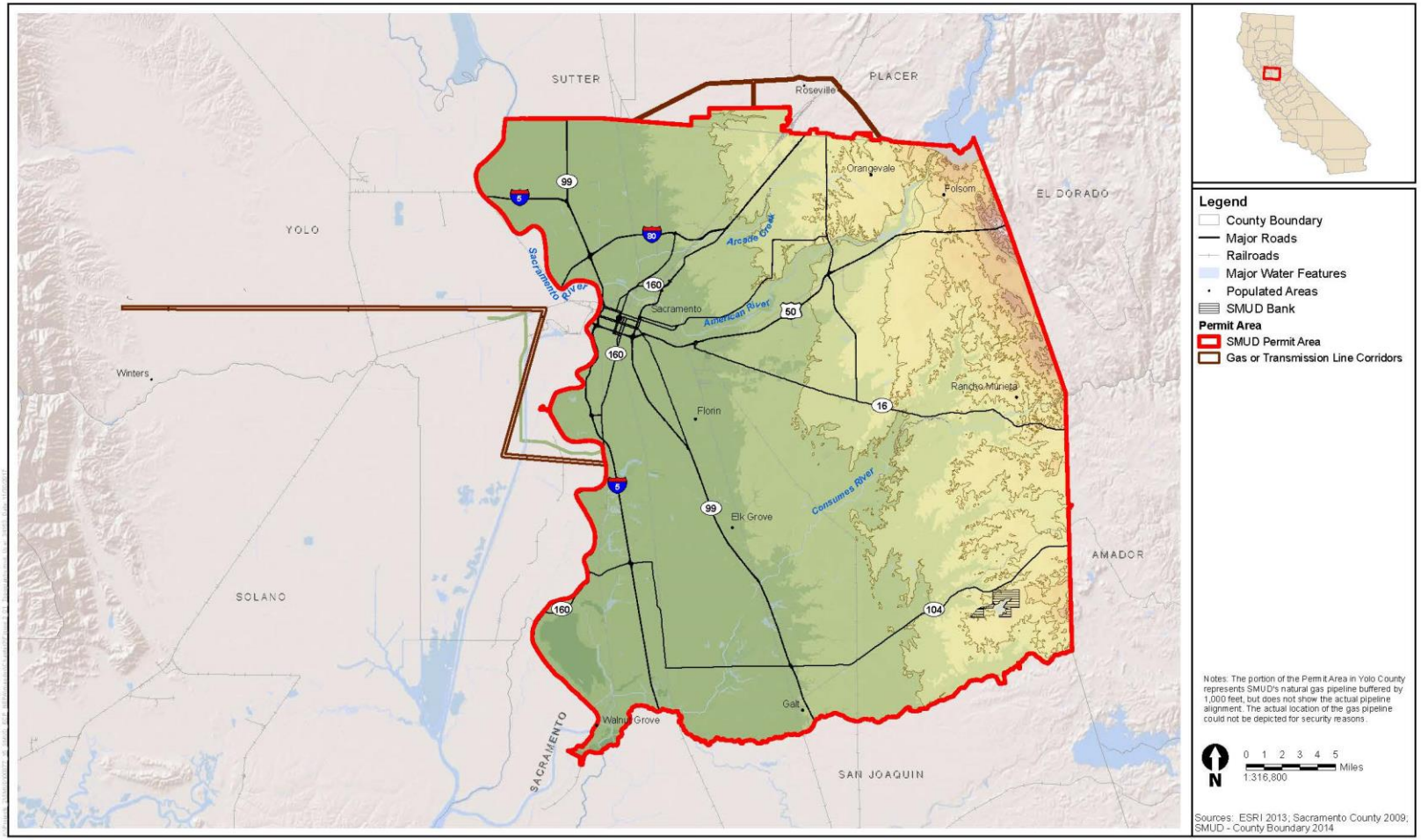
The French Camp Conservation Bank is approved by USFWS to sell conservation credits for the loss of valley elderberry longhorn beetle habitat within the approved service area, which includes the Permit Area. The site provides 84 acres of elderberry shrubs and riparian associates planted with the goal of contributing to recovery of the valley elderberry longhorn beetle. The French Camp Conservation Bank is adjacent to French Camp Slough in San Joaquin County, and the Permit Area is within the service area for this bank.

3.8.4 Bryte Ranch Conservation Bank

The 573-acre Bryte Ranch Conservation Bank is approved by the USFWS to sell preservation credits for the loss of vernal pool fairy shrimp and vernal pool tadpole shrimp habitat. This bank is located within the Mather Core area of the Southeast Sacramento Valley Vernal Pool Region.

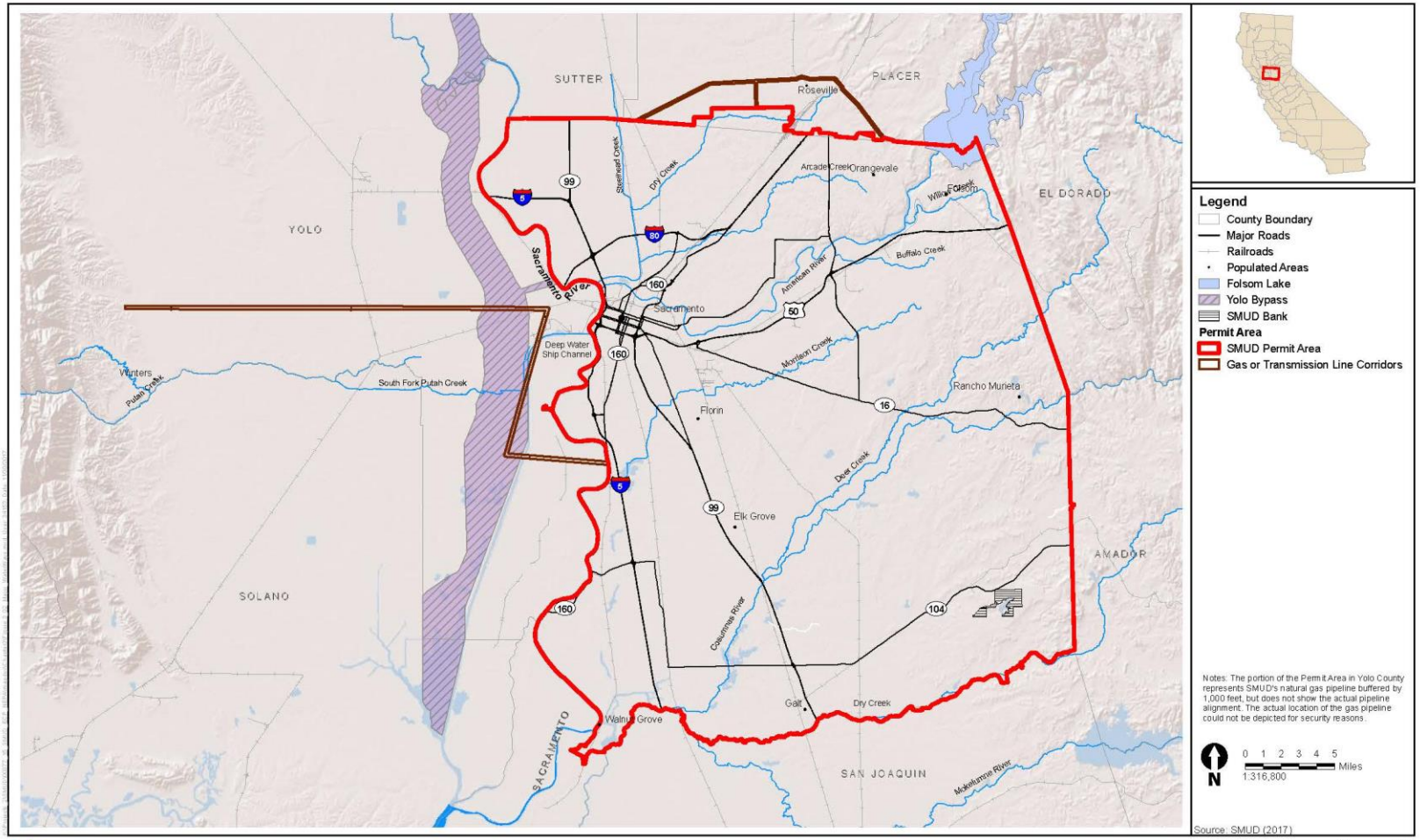
3.8.5 Clay Station Conservation Bank

The Clay Station Conservation Bank is a 405-acre site approved by USFWS to offset unavoidable impacts on vernal pool fairy shrimp and vernal pool tadpole shrimp habitat. The site is located west of Clay Station Road and north of Twin Cities Road in southeast Sacramento County. The bank is also approved to sell Corps of Engineers wetlands mitigation credits. The Permit Area is within the service area for the Clay Station Conservation Bank.



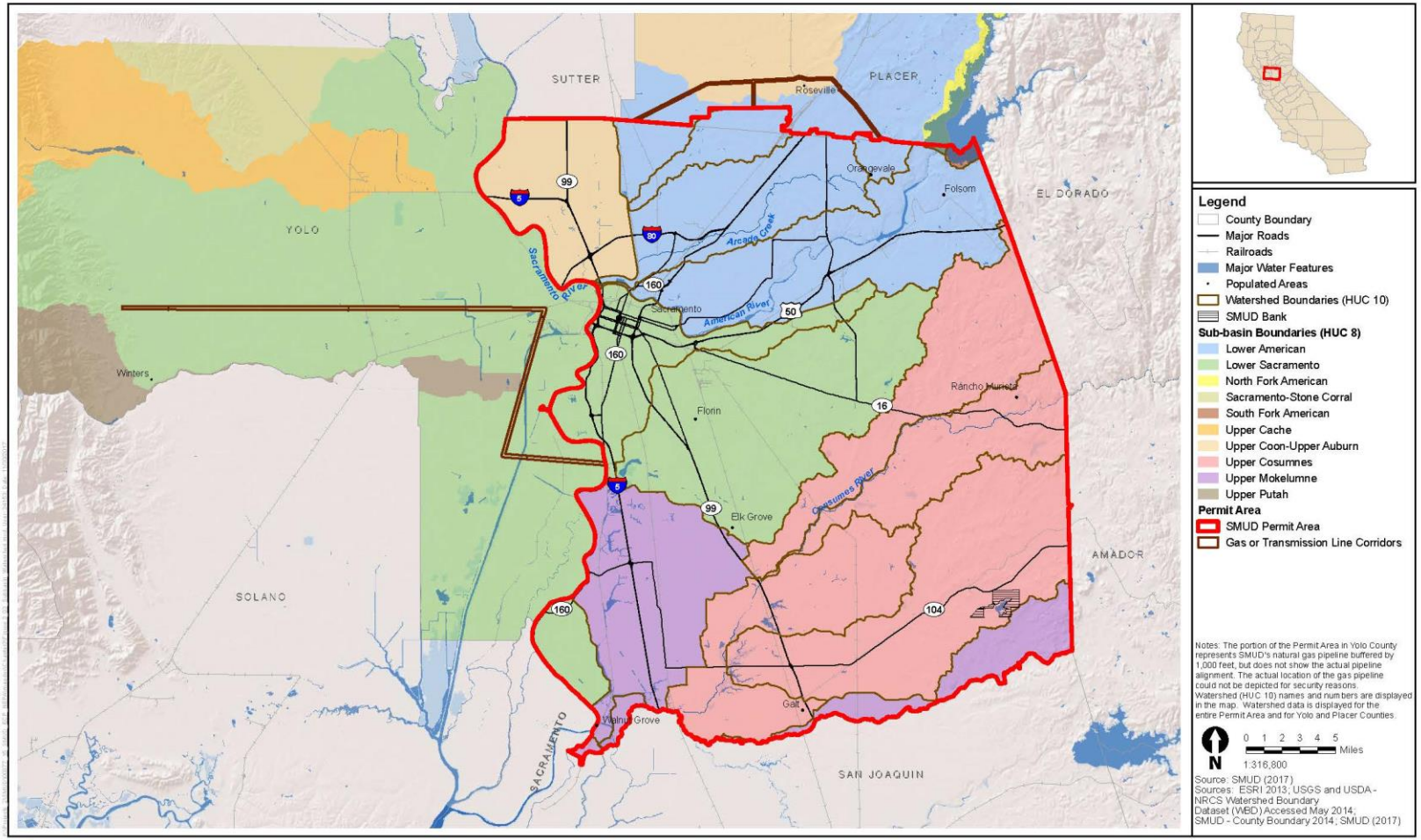
ICF

Figure 3-1
Topography
SMUD HCP



ICF

Figure 3-2
Major Waterways
SMUD HCP



ICF

Figure 3-3
Sub-basins and Watersheds
SMUD HCP

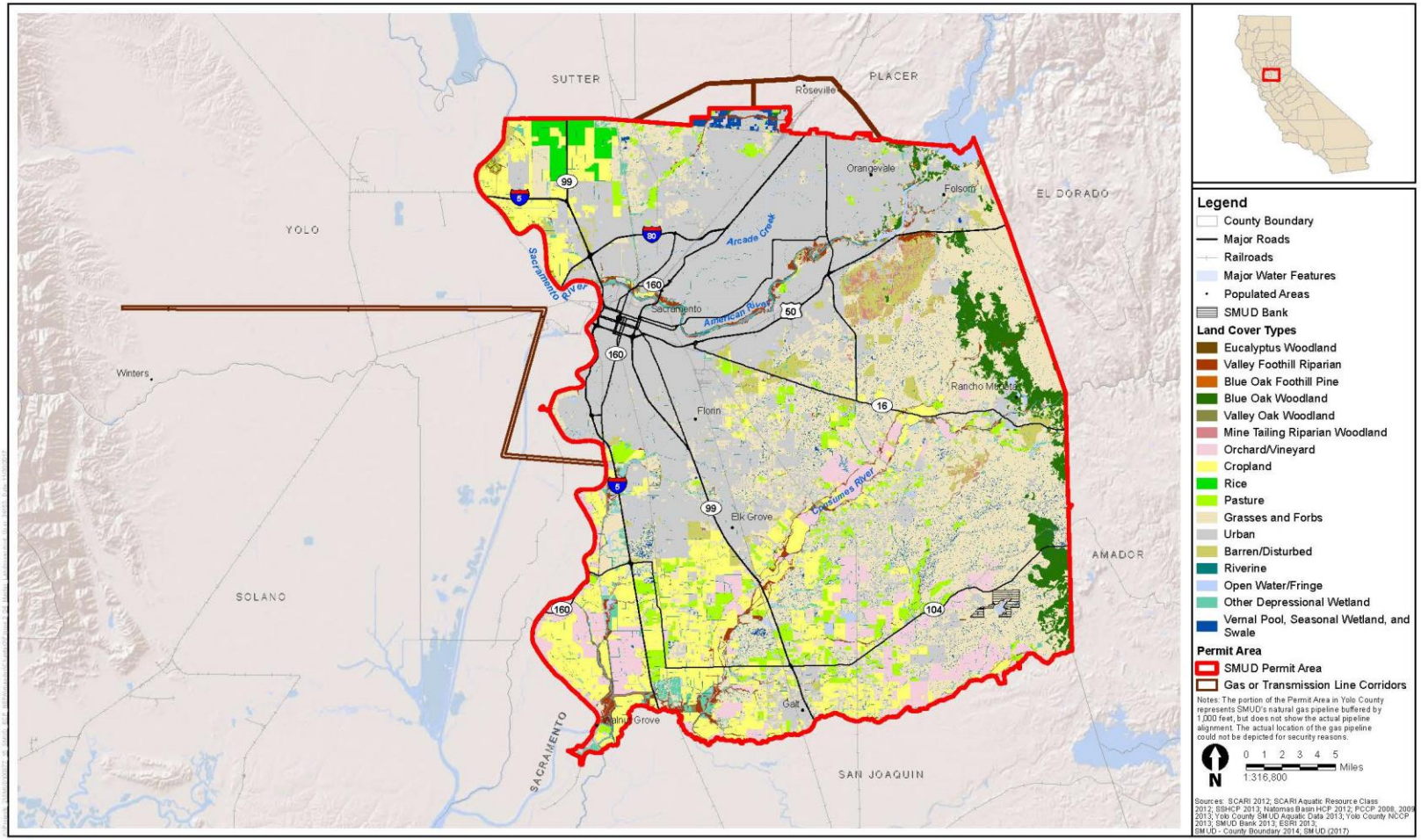


Figure 3-4
Land Cover Types
SMUD HCP

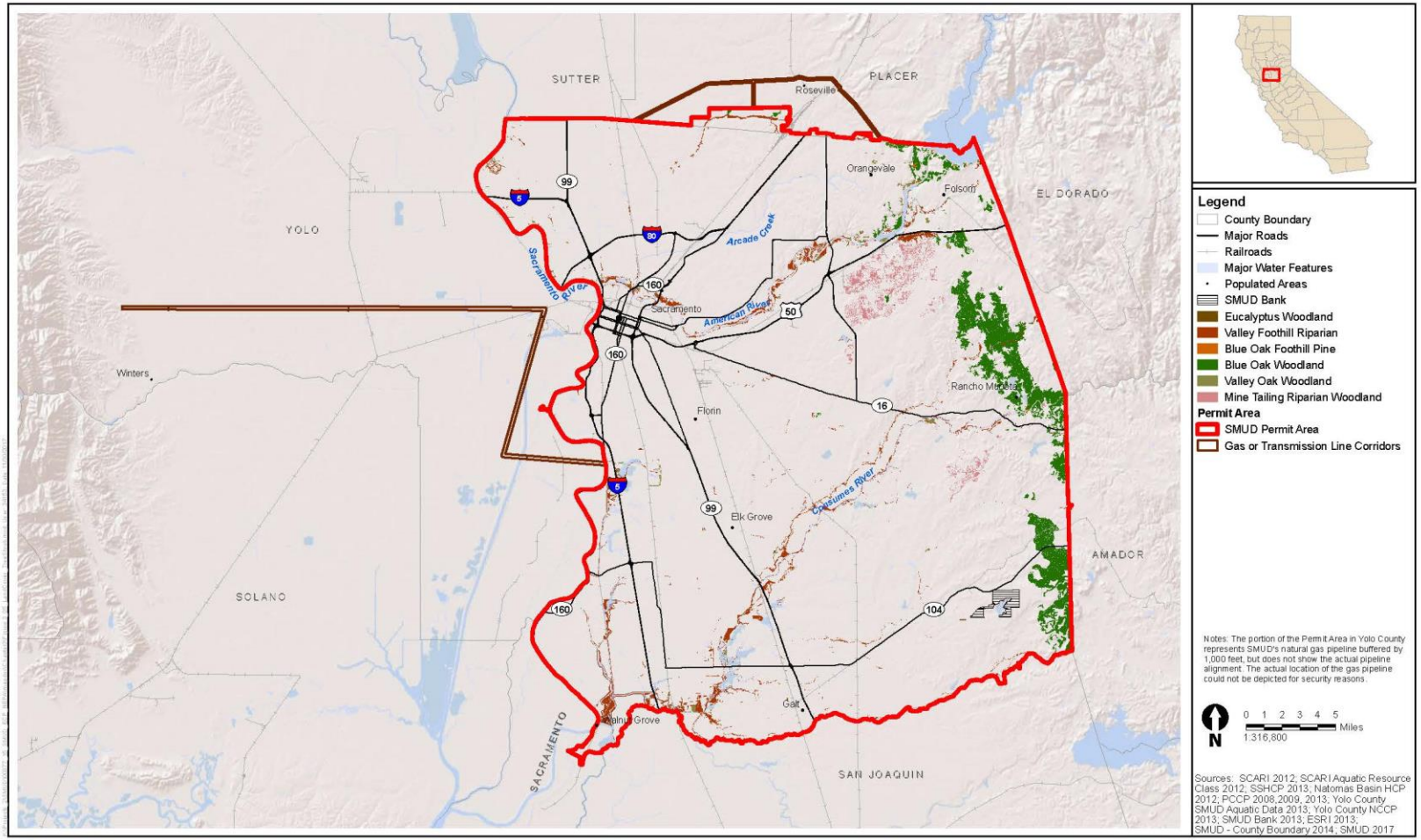


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Figure 3-5
Land Cover Types: Tree and Shrub
SMUD HCP

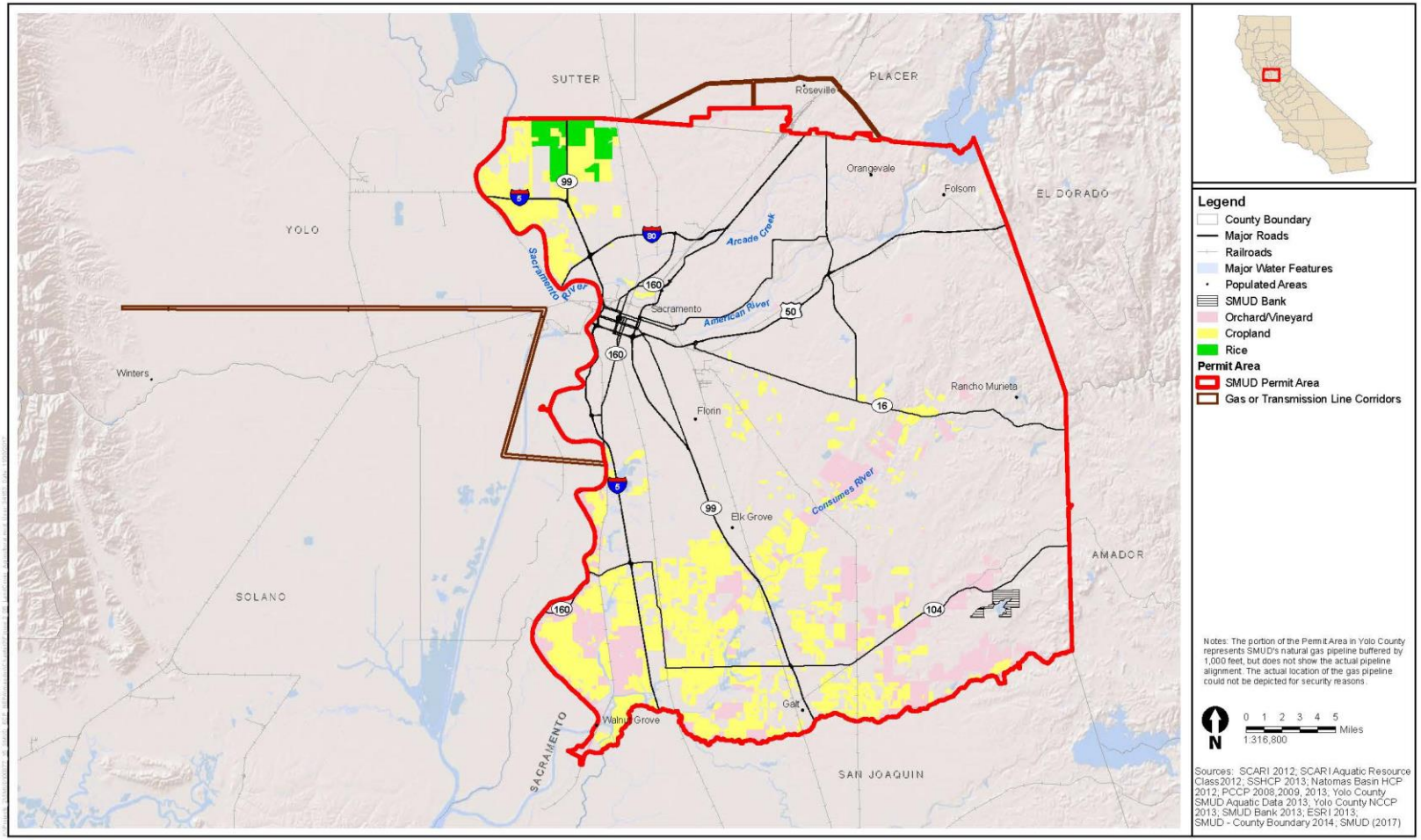

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Figure 3-6
Land Cover Types: Agricultural
SMUD HCP

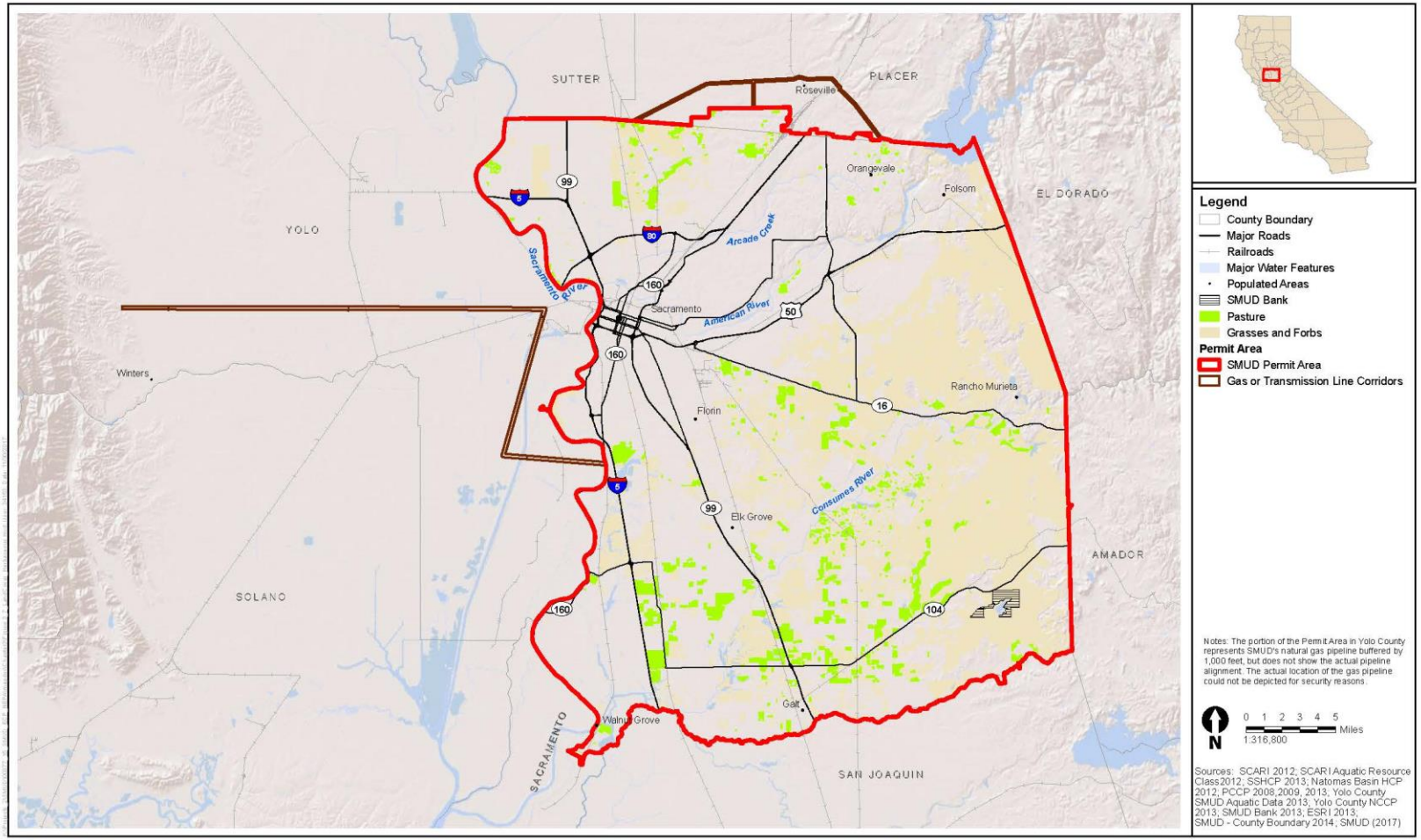

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Figure 3-7
Land Cover Types: Herbaceous
SMUD HCP

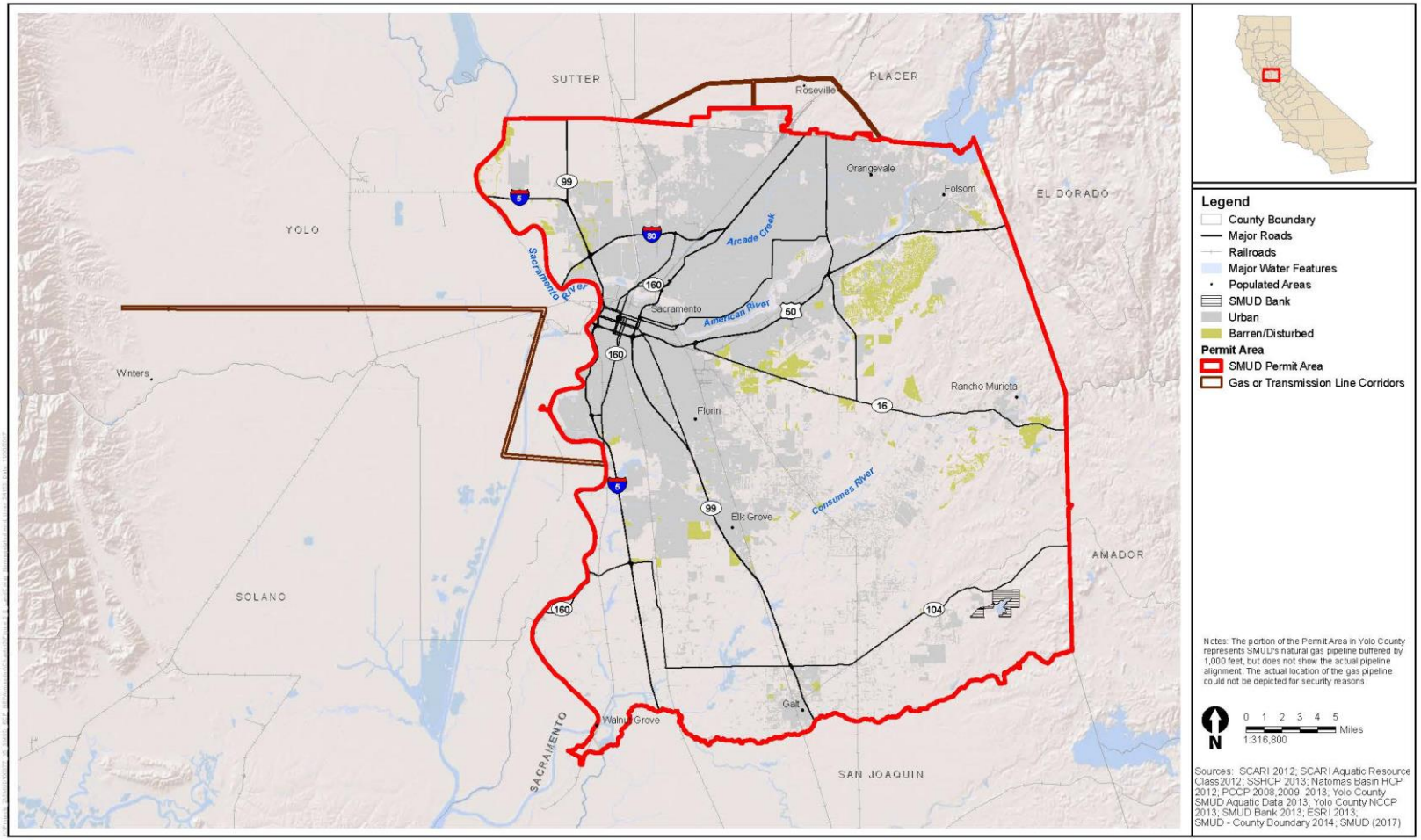

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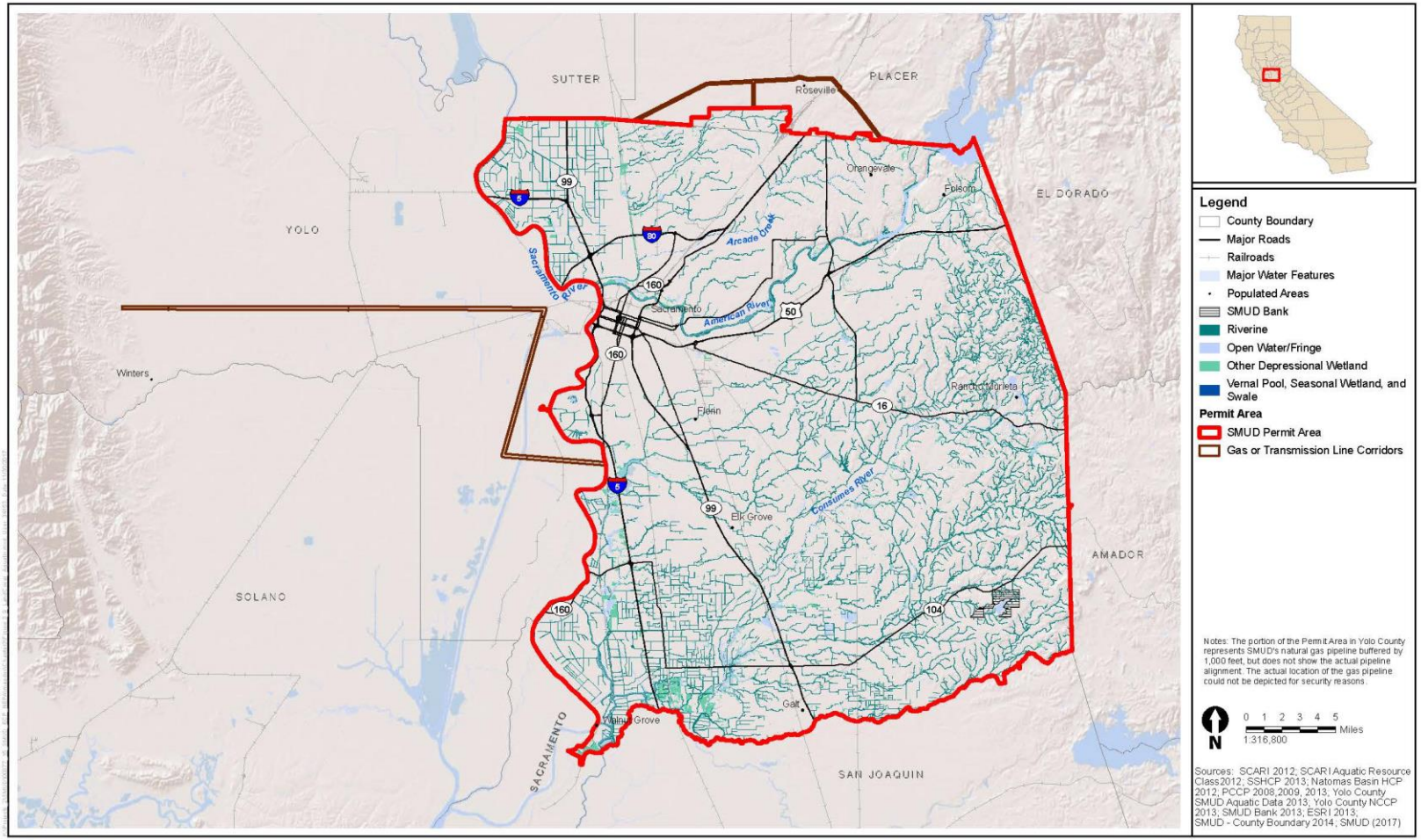
Figure 3-8
Land Cover Types: Non-Vegetated
SMUD HCP



ICF

Figure 3-9
Land Cover Types: Aquatic
SMUD HCP

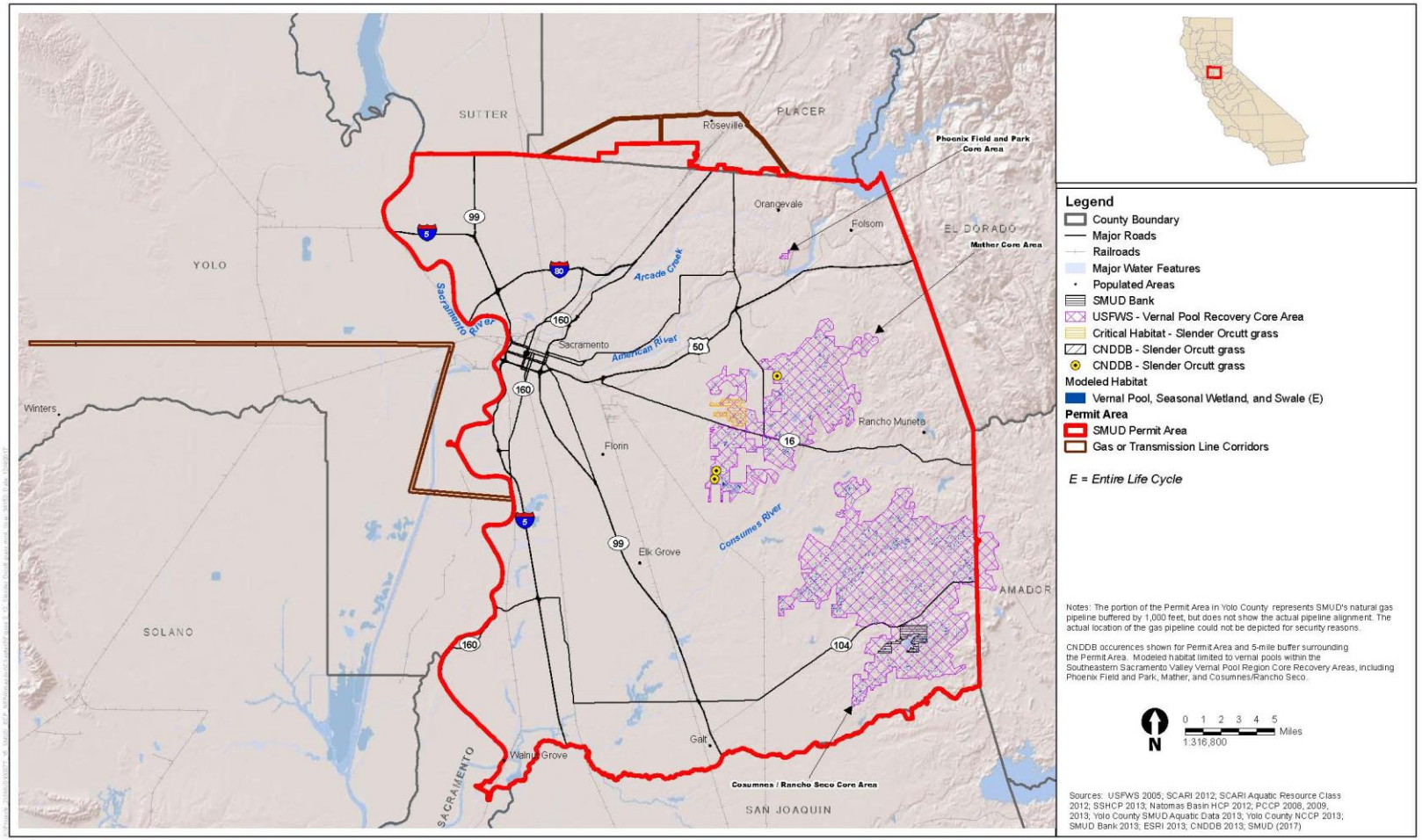
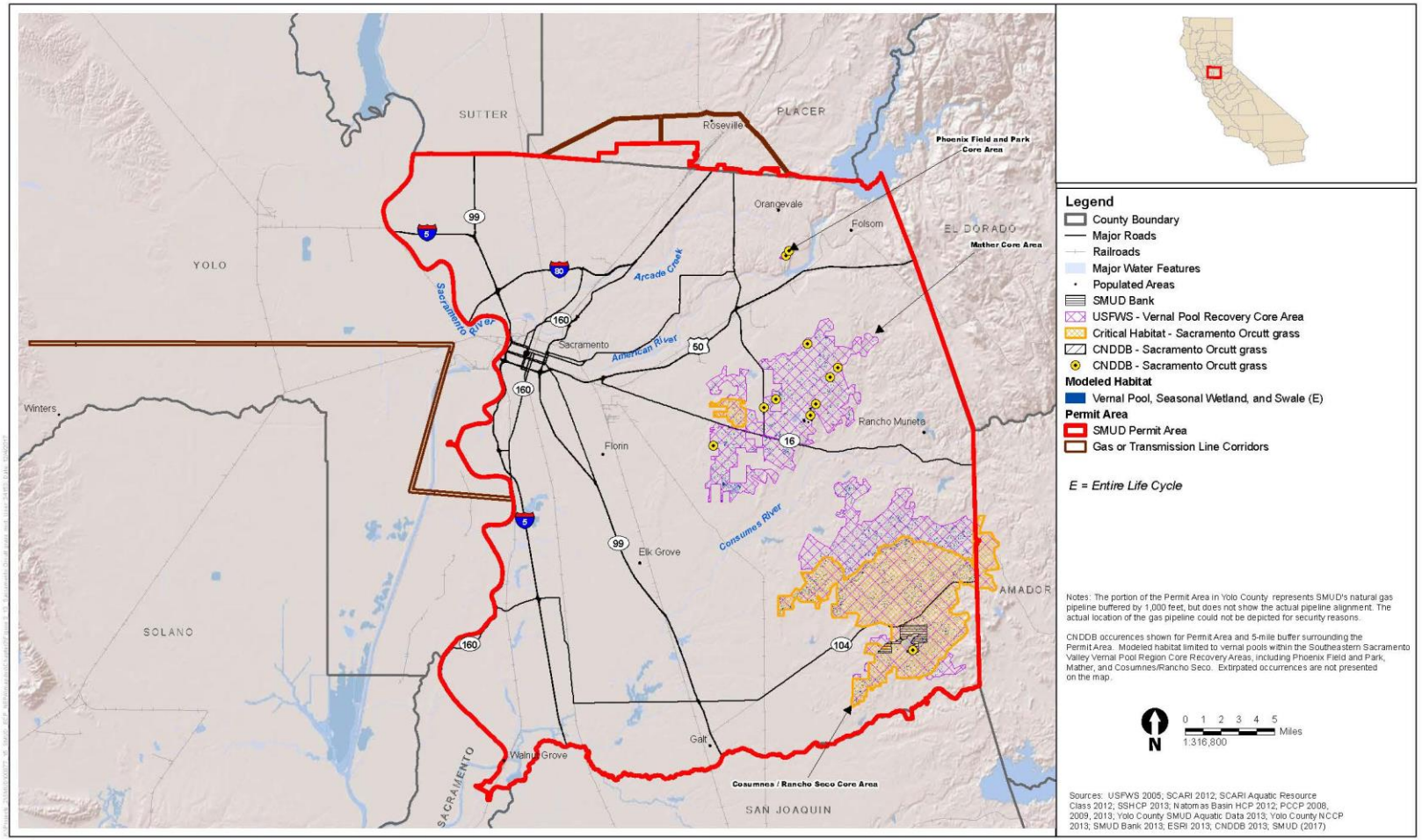
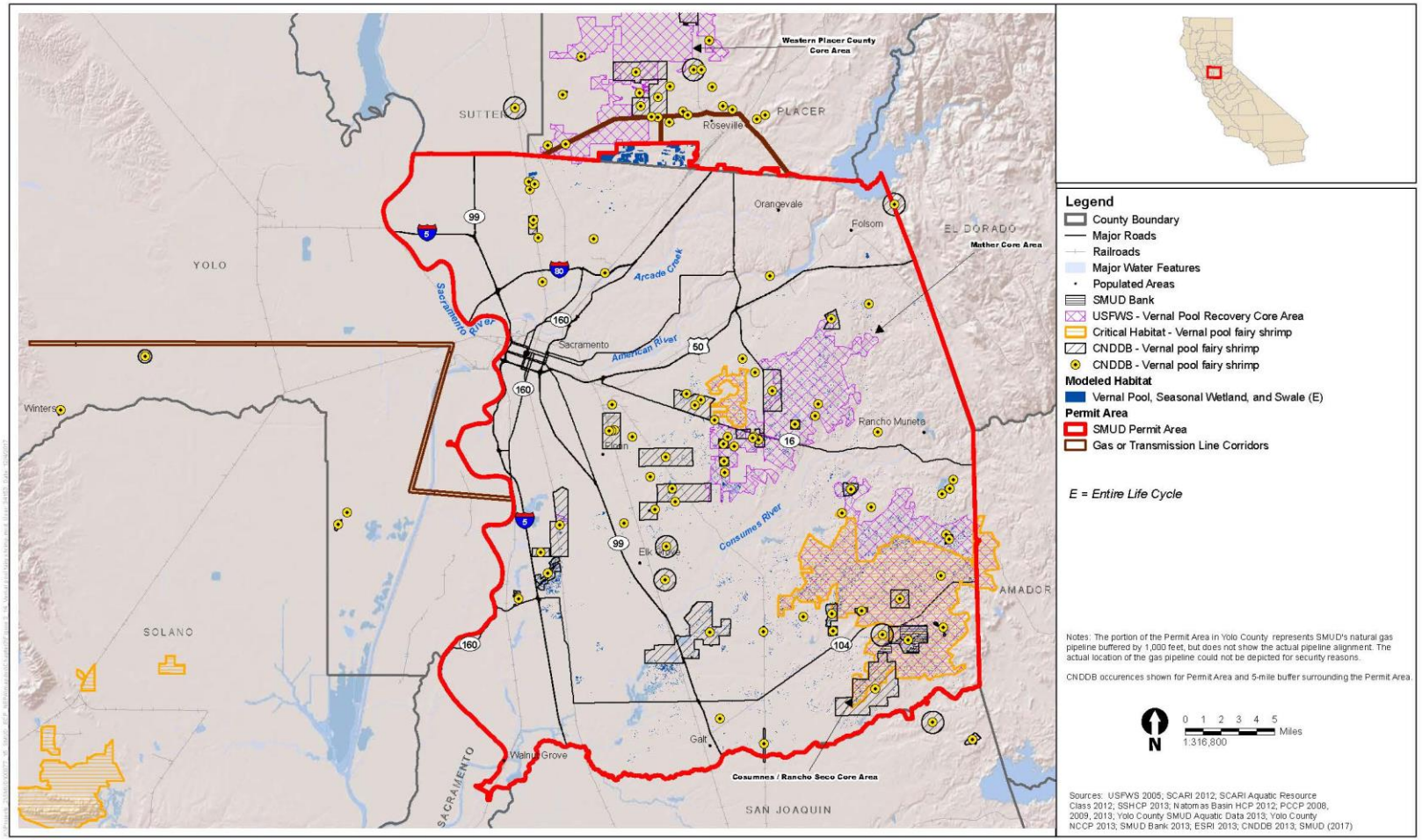


Figure 3-10
Modeled Habitat - Slender Orcutt grass (*Orcuttia tenuis*)
SMUD HCP



ICF

Figure 3-11
Modeled Habitat - Sacramento Orcutt grass (*Orcuttia viscida*)
SMUD HCP



ICF

Figure 3-12
Modeled Habitat - Vernal pool fairy shrimp (*Branchinecta lynchi*) SMUD HCP

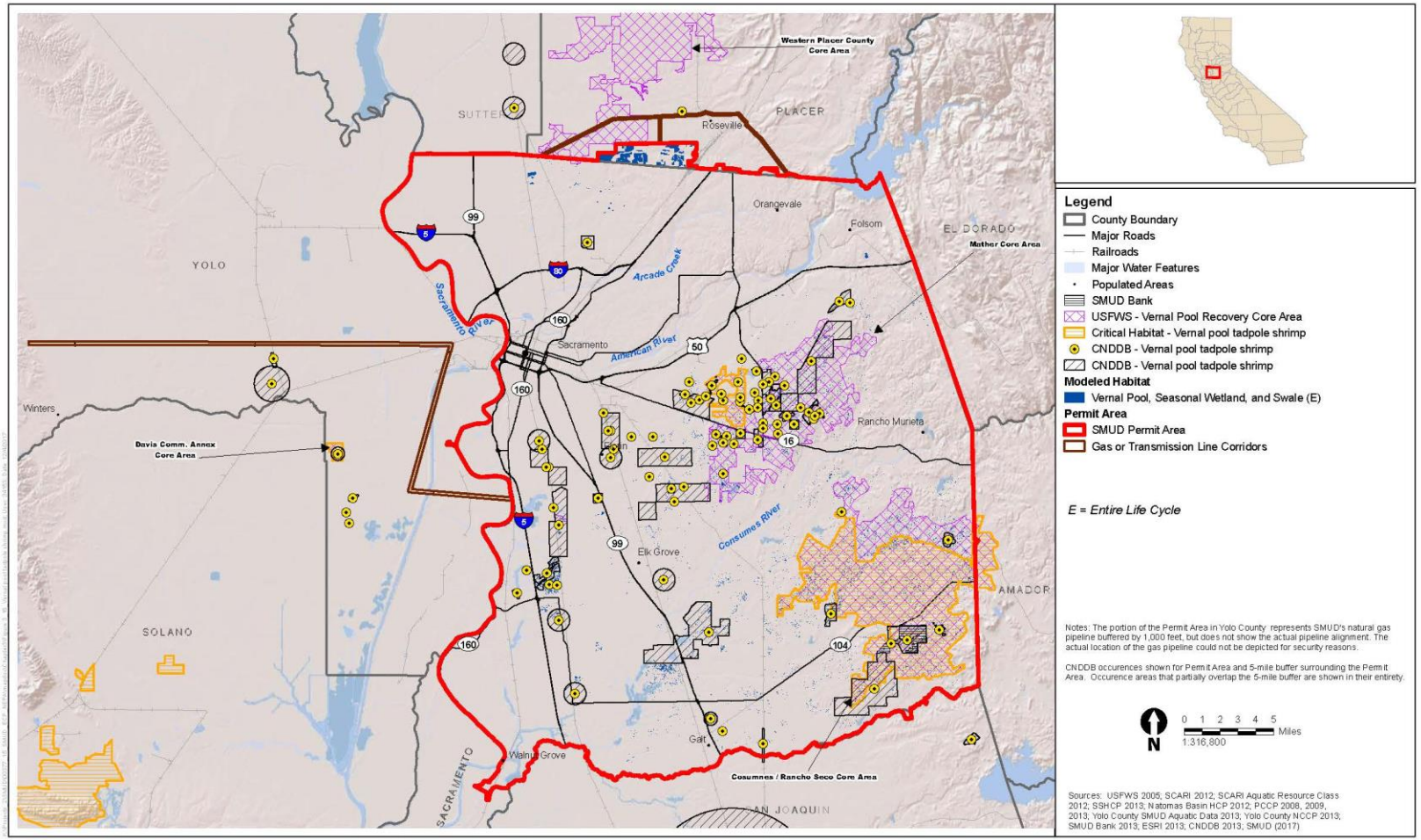


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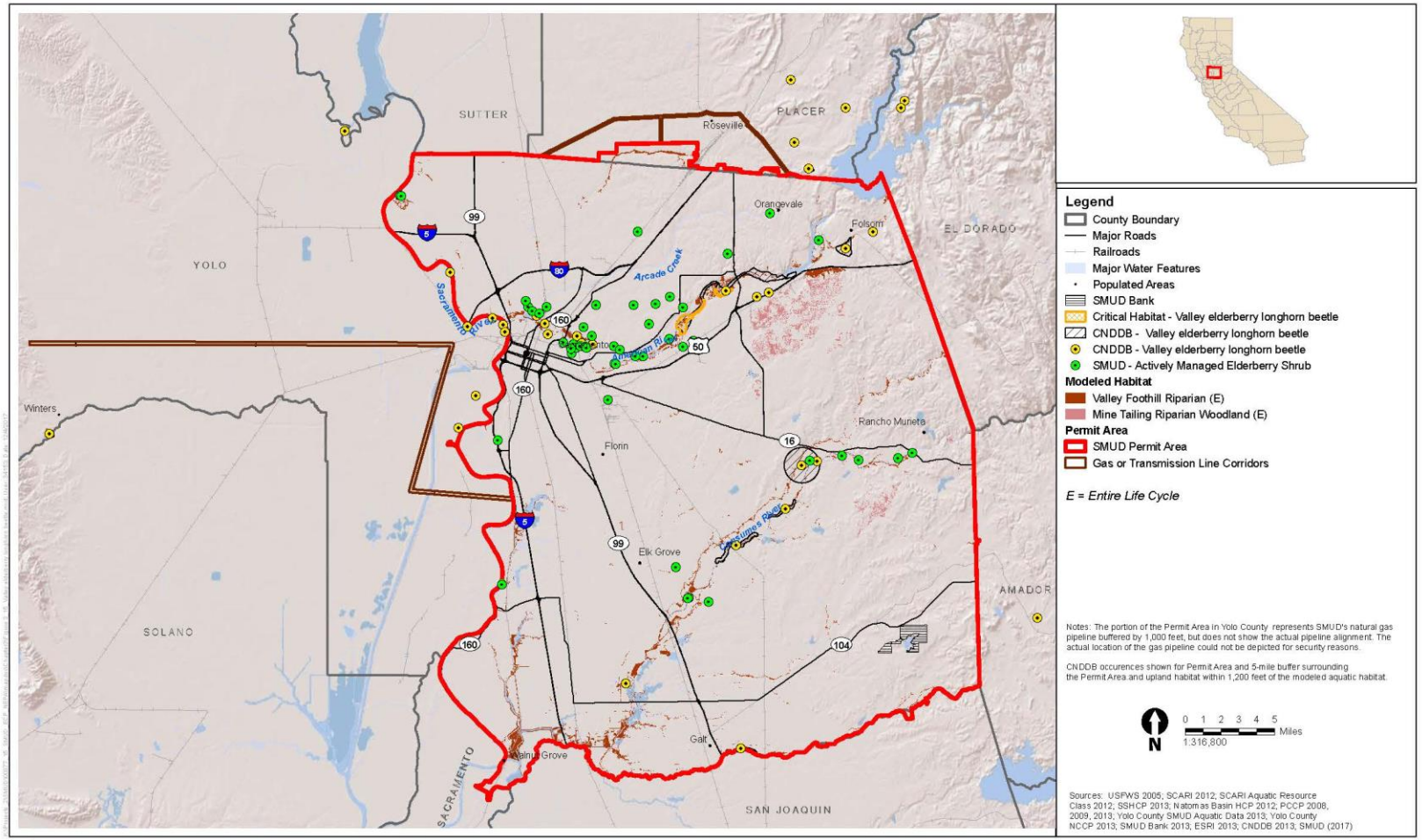
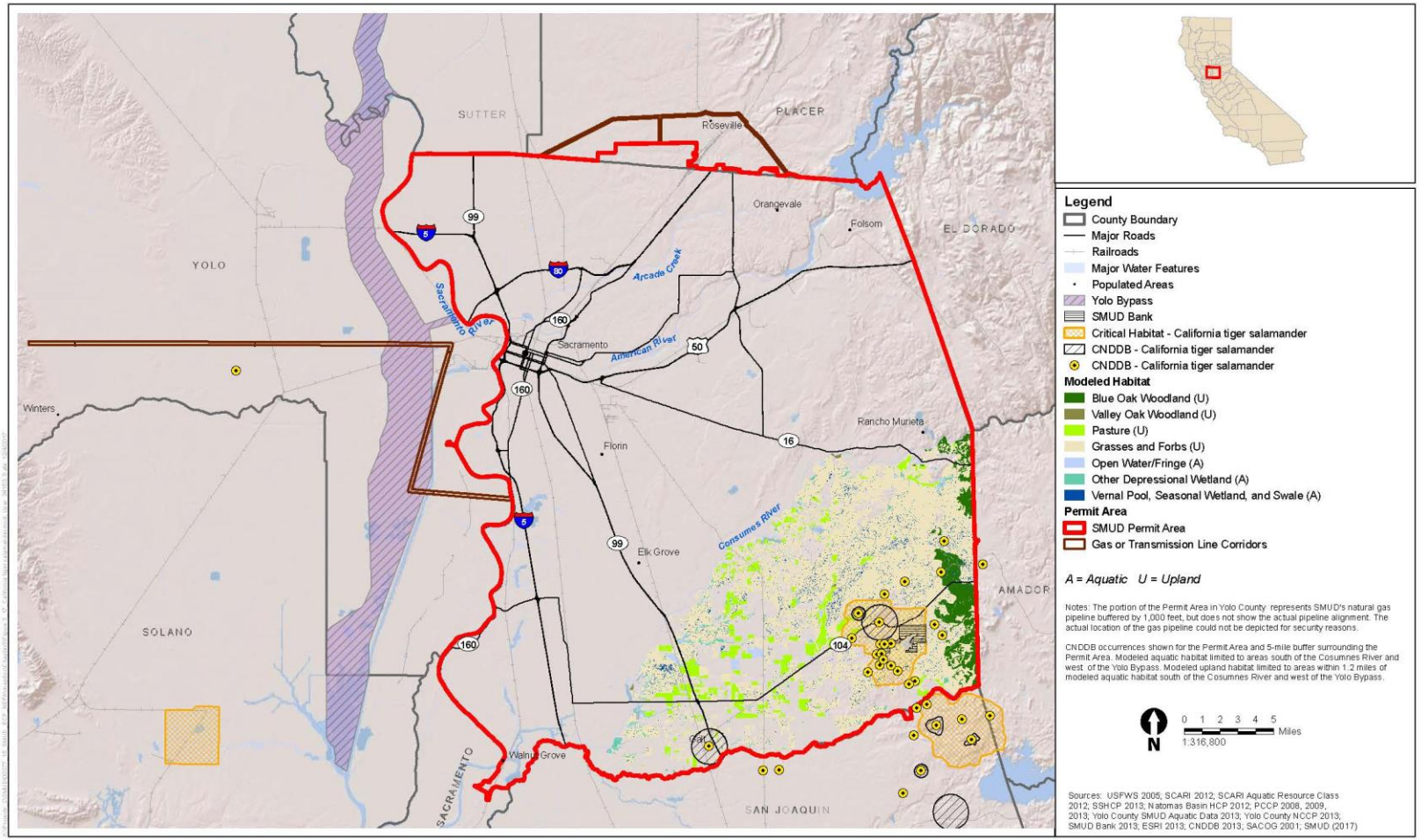
Figure 3-13
Modeled Habitat - Vernal pool tadpole shrimp (*Lepidurus packardi*)
SMUD HCP



ICF

Figure 3-14
Modeled Habitat - Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) SMUD HCP



ICF

Figure 3-15
Modeled Habitat - California tiger salamander (*Ambystoma californiense*)
SMUD HCP

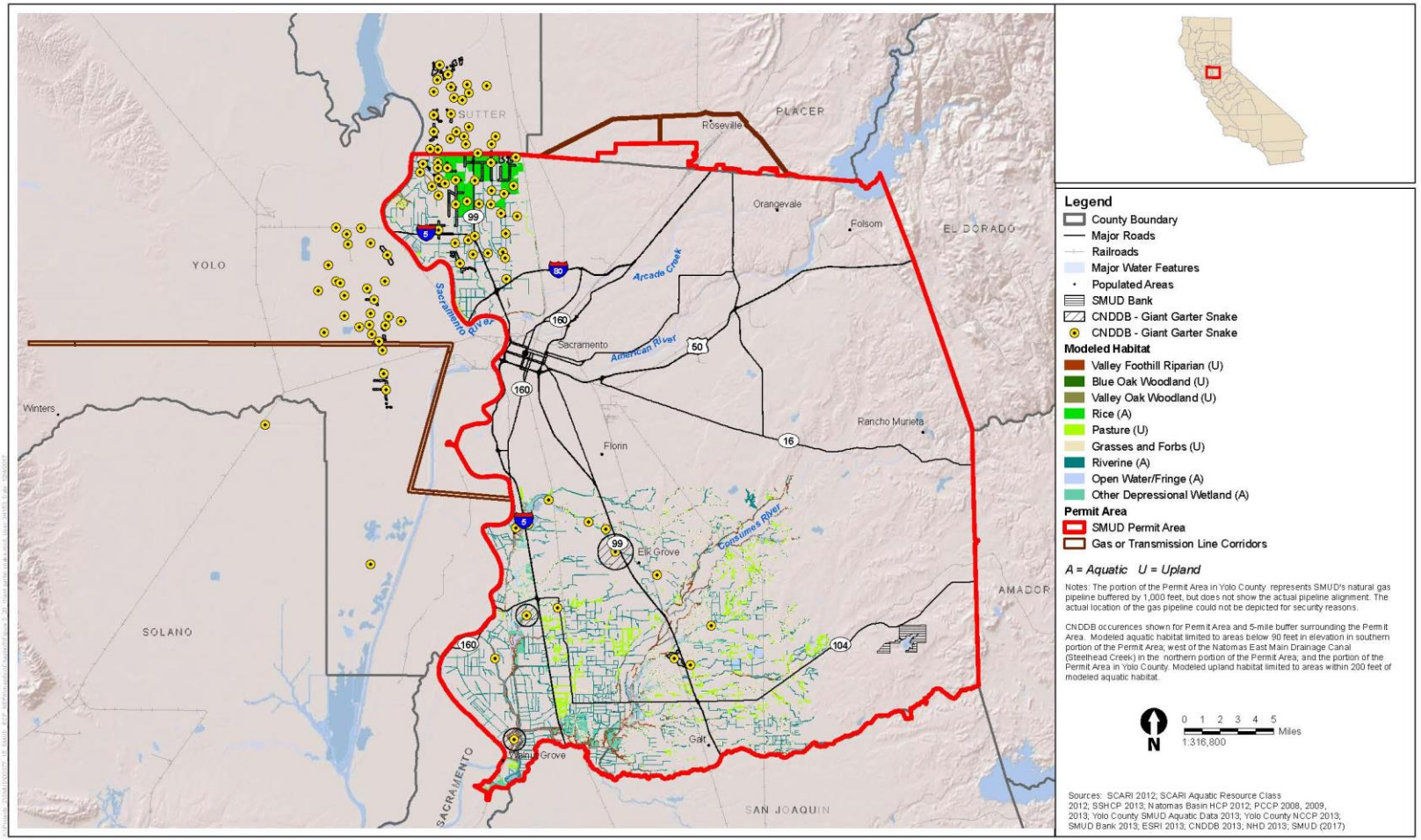
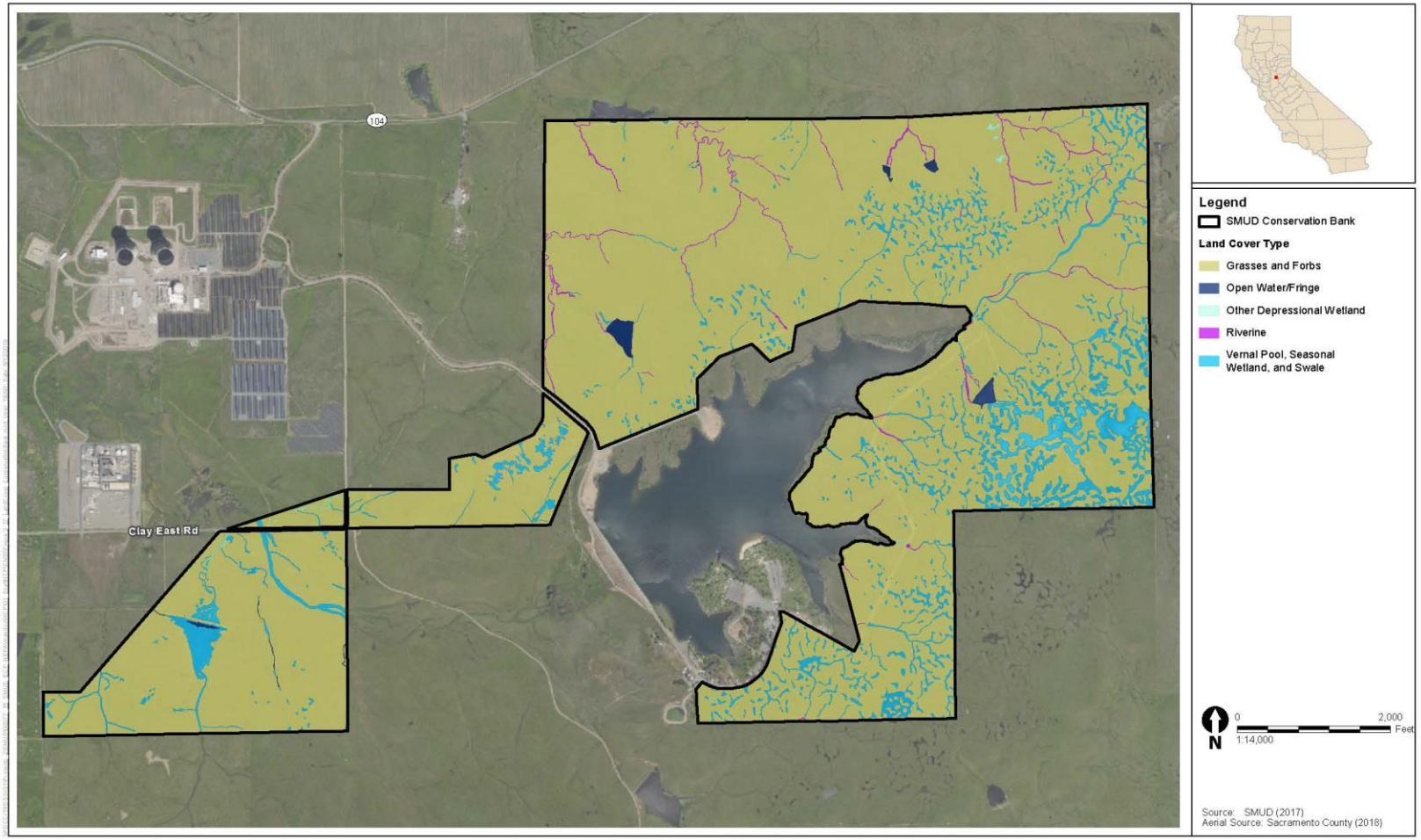


Figure 3-16
Modeled Habitat - Giant garter snake (*Thamnophis gigas*)
SMUD HCP



ICF

Figure 3-17
SMUD Conservation Bank Land Cover
SMUD HCP

4 Impact Analysis and Levels of Take

4.1 Introduction

This chapter describes the effects of SMUD HCP Covered Activities on the Covered Species in the Plan Area and the impact of resulting take on each Covered Species. This chapter details the approach SMUD used to estimate the number of habitat acres that would be disturbed for each Covered Activity across the Permit Area, including both temporary and permanent disturbances within Covered Activity footprints and in the vicinity of these footprints, and resulting direct or indirect effects on the species (Section 4.2, *Methods for Analysis*). This chapter also estimates the acres of disturbance and loss from Covered Activities on land cover types (Section 4.3*, Land Cover Disturbance*) and Covered Species' Modeled Habitat within the Permit Area (Section 4.4, *Covered Species Impact Analysis*). Finally, this chapter summarizes the impacts on Covered Species and indicates the incidental take authorization SMUD is requesting for each Covered Species.

4.2 Methods for Analysis

The effects of the Covered Activities on the Covered Species are estimated and quantified based on the projected loss of habitat modeled for each Covered Species in the Permit Area. Covered Species Modeled Habitat was used as a surrogate for take of individuals for several reasons. First, there is incomplete species occurrence data in the Permit Area due to the size of the Permit Area, uncertainty of exact locations where the Covered Activities will occur, and a lack of field surveys in some areas. Second, many of the Covered Species are difficult to detect during some portions of their lifecycles, so even when species surveys are conducted, individuals may be missed. Finally, using Modeled Habitat for Covered Species provides a consistent, repeatable, and conservative approach to estimating species take. As described in Chapter 3, *Biological Resources Setting,* species models tend to overestimate the extent of species' habitat because of the limitations of land cover mapping and the inability to map some habitat features at a regional scale. Also, while all Covered Species Modeled Habitat is suitable and assumed to be occupied for purposes of determining avoidance and minimization measures (AMMs) and mitigation, individual locations of Covered Activities may or may not be occupied by Covered Species. Therefore, using disturbance and loss of Modeled Habitat as a surrogate for take of individuals will tend to overestimate the amount of take occurring from Covered Activities, but will allow SMUD more freedom to implement its Covered Activities.

SMUD used a systematic approach to quantify species' habitat loss or disturbance resulting from Covered Activities. The approach to quantifying acres of habitat disturbance has two main goals: (1) to analyze how Covered Activities result in disturbance and loss of Covered Species Modeled Habitat (see Chapter 3), and (2) to assess the potential for Covered Activities to result in take of individuals, using Modeled Habitat as a surrogate for measurements of the take of individuals. For the SMUD HCP,

the approach to quantifying Modeled Habitat loss or disturbance to Covered Species involved the following:

1. SMUD developed annual estimates of temporary and permanent disturbances resulting from each Covered Activity using the estimated size of the footprint (i.e., work area) for each Covered Activity and the estimated frequency with which it will occur over the permit term, as presented in Chapter 2, *Covered Activities*.
2. SMUD quantified the amount of Covered Species Modeled Habitat that overlaps with SMUD's facilities.
3. SMUD estimated the permanent loss of Modeled Habitat or temporary disturbance to Modeled Habitat based on the proportion of the SMUD facility that occurs within the Covered Species Modeled Habitat.
4. SMUD estimated acres of potential disturbance of Modeled Habitat within designated critical habitat units for Covered Species that have designated critical habitat.

This approach is described in greater detail below. Appendices D, *Land Cover Impacts*, and E, *Covered Species Impacts* provide additional detail about the assumptions made for the purpose of the analysis, and tables with detailed calculations.

4.2.1 Terminology used in the Impact Analysis

This chapter describes effects pathways for the Covered Species as outlined in Section 8.2.1 of the HCP Handbook (USFWS and NOAA Fisheries 2016). The effects pathways described herein link a Covered Activity to the associated stressor or disturbance, and in turn link the stressor or disturbance to the effect on the species. For each Covered Species, this chapter then quantifies take from the Covered Activities and describes the impact of that take on the Covered Species. The SMUD HCP uses the terminology defined below to explain these effects pathways.

4.2.1.1 Disturbance, Effects, Take, and Impacts

The SMUD HCP differentiates causal relationships along the effects pathway as follows.

Stressor. A *stressor*, as defined in the HCP Handbook, is any agent capable of causing an adverse or beneficial change to a resource on which a species depends. The SMUD HCP only uses this term in the context of adverse change. The Covered Activities and their associated stressors for each group of Covered Species are indicated in Tables 4-3 through 4-7.

Disturbance. For the purpose of this analysis, the term *disturbance* is used to describe an adverse change of habitat conditions. This could be in the form of habitat loss (i.e., removal), temporary removal of habitat elements such as cover or shelter, or introduction of stressors such as noise or lighting.

***Effects*.** For the purpose of this analysis, the term *effects* is used to describe how the stressor results in adverse changes in the feeding, breeding, or sheltering behavior of the species.

***Take*.** Section 3 of the federal Endangered Species Act (ESA) defines *take* as "…to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." Take associated with the Covered Activities could be in the form of wounding or killing (e.g., inadvertently crushing individuals with equipment), or could be in the form of harm. *Harm*, as is defined by the U.S. Fish and Wildlife Service (USFWS), includes significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering."

***Impact of the Take on the Species*.** This phrase refers to the adverse change in the overall population or species as a whole, as a result of the take resulting from the Covered Activities.

4.2.1.2 Categories of Stressors or Habitat Disturbance

The SMUD HCP describes stressors or habitat disturbances in the following four categories.

Direct Injury or Mortality. For the purpose of this analysis, *direct injury or mortality* refers to injury or mortality of Covered Species that is the immediate result of Covered Activities. This category includes stressors such as striking individuals with vehicles, crushing individuals with equipment, or burying individuals with earth moving activities.

Permanent Habitat Loss. This phrase refers to the complete removal of all habitat elements from a work area for a duration longer than 1 year. *Permanent habitat loss* would result from any of the following activities or conditions.

- New facilities (i.e., minor new construction).
- Conversion of the existing land cover type suitable for a Covered Species to a developed land cover type or to a land cover type that would no longer be suitable for a Covered Species.
- Any activity that disturbs the vegetative cover, soils, topography, and/or hydrological conditions to an extent that they would not recover within 1 year of the disturbance.
- A long-term, substantial increase in the frequency and magnitude of human-related disturbances such that the habitat is no longer available to the Covered Species.

Covered Activities that could result in permanent habitat loss include pole replacements, new substations and substation expansions, and some vegetation management activities (e.g., clearing vegetation around the base of certain poles). See Appendix D, Table D-3 for a full accounting of expected permanent land cover loss from each covered activity.

Temporary Habitat Disturbance. This phrase refers to removal of some or all the habitat elements from a work area for a duration of 1 year or less. *Temporary habitat disturbance* only refers to disturbance within the direct Covered Activity footprint.

Temporary habitat disturbance is attributed to Covered Activities that involve excavation, grading, or stockpiling of soil that alters existing vegetation, soils, topography, and hydrology for a period of days, weeks, or months, but no longer than 12 months. Temporary habitat disturbance also can result from equipment staging. While these disturbances may result in take of Covered Species, Covered Species habitat disturbances persist for no longer than 12 months and allow habitat functions and values to return within 1 year following the initial disturbance. Temporary habitat disturbance for plants is defined as temporarily removing topsoil and seedbank where the plants recover within 1 year.

Disturbance of Habitat in the Vicinity of Covered Activities. This phrase refers to disturbances beyond the boundary of the Covered Activity work area (i.e., outside the area where work and equipment will occur). This category of disturbance can be temporary and only occur during the Covered Activity (e.g., noise from equipment) or, in the absence of appropriate AMMs, this category of disturbance can be permanent (e.g., change in hydrologic conditions).

4.2.2 Estimating Permanent Habitat Loss and Temporary Habitat Disturbance

4.2.2.1 Estimating Land Cover Disturbance by Covered Activity

The SMUD HCP estimates take by assuming where Covered Activities will likely occur based on existing easements and facilities. It also uses baseline data within the area of potential effect (i.e., easement area) and applies assumptions regarding the size, frequency, and locations of existing facilities for each Covered Activity.

4.2.2.1.1 Estimating Disturbance from Operations and Maintenance of Existing Facilities

SMUD used geographic information system (GIS) software to electronically overlay the land cover types (Table 4-1) with the locations of SMUD's existing easements (using line data buffered with the maximum easement widths) and facilities (using point data with assumed size for each activities' disturbance area (e.g., if a point overlaps Grasses and Forbs Modeled Habitat and the assumed disturbance area is 100 square feet, then SMUD assumes 100 square feet of Grasses and Forbs Modeled Habitat disturbance)). See Chapter 2 for a description of easements and facilities. Table D-3 in Appendix D summarizes assumptions used to calculate land cover disturbance relative to the expected duration, frequency, and footprint of each Covered Activity.

SMUD estimates take by assuming where Covered Activities will occur based on existing easements and facilities. SMUD also estimates acres of disturbance resulting from Covered Activities based on the proportion of each land cover type or Covered Species

Modeled Habitat type within the easements. To accomplish this, SMUD determined the proportion of each land cover type within its existing easements (total acres of the land cover type in easements divided by the total acres of easements) (Table D-2 in Appendix D). For example, one-third of SMUD's gas pipeline easements occur in the Cropland land cover type; therefore, SMUD is assuming that one-third of the acres disturbed for each Covered Activity type in SMUD's gas pipeline easements would occur in the Cropland land cover type. SMUD estimated 0.09 acre of land would be affected by G5b, *Underground Pipeline Maintenance and Repair*, and that one-third of these acres, or 0.03 acre, would be in the Cropland land cover type.

4.2.2.1.2 Estimating Disturbance from New Facilities

SMUD estimated the number and/or lengths of new facilities that are expected to be constructed each year and over the permit term. SMUD used GIS software to electronically overlay the land cover types with the locations of SMUD's existing easements and facilities and calculated the acres of Modeled Habitat within SMUD's easements, as well as the number of facilities within each land cover type. SMUD assumed facilities constructed in the future would follow the proportionality of existing facilities in each land cover type. SMUD estimated the number of new facilities, the land cover type they would be constructed in, and the amount of Modeled Habitat disturbed by new construction.

4.2.2.1.3 Facility Disturbances Based on Point Data

SMUD's facility data includes points (e.g., poles, towers, transformers, transformer banks, transformer boxes, pull boxes, valves), polylines (e.g., conductor, cable, fiber, or gas pipeline), and polygons (e.g., substations). The quantitative estimates are based on calculating disturbance estimates by activity and calculating the number of facilities within each habitat type and the amount of disturbance associated with each Covered Activity.

SMUD utilized a systematic approach to quantify Land Cover and Modeled Habitat impacts from Covered Activities. The approach to quantifying habitat impacts for Covered Species involves the following.

1. Developing annual estimates of temporary and permanent impacts resulting from each Covered Activity using the estimated size of the Covered Activity and the estimated frequency with which it occurs in a given year.
2. Quantifying the amount of Modeled Habitat by Covered Species and facility type.
3. Estimating potential habitat loss based on the proportion of the facility easement that falls within the Modeled Habitat of each Covered Species.
4. Adjusting impact estimates based on Covered Activity practices and input from subject matter experts to adjust the impact estimates.
5. Estimating potential impacts on Critical Habitat for Covered Species that have designated critical habitat.

4.2.2.1.4 Disturbance Based on Utility Easement Data

SMUD used GIS software to electronically overlay SMUD's existing easements and facilities on the land cover types within the Permit Area. The total acreage of each land cover type within SMUD easements was calculated using this GIS methodology, as was the total number and location of facilities (e.g., poles, towers, pull boxes, etc.) within the Permit Area. SMUD calculated acres of impacts for each Covered Activity by multiplying the impact (permanent and temporary) acreage of a single Covered Activity event by the total number of times that the Covered Activity would occur each year or the number of times the activity is expected to occur over the 30-year permit term (frequency).

SMUD assumed impact locations for each Covered Activity based off the land cover types within its existing easements or at facility locations. SMUD determined the proportion of each land cover type within its existing easements (total acres of the land cover type in easements divided by the total acres of easements). For example, one-third of SMUD's gas pipeline easements occur in the Cropland land cover type; therefore, SMUD is assuming that one-third of the Covered Activities in SMUD's gas pipeline easements would occur in the Cropland land cover type. This proportion was then used to extrapolate the acres of each Covered Species' Modeled Habitat and Critical Habitat that would be affected by each of SMUD's Covered Activities that occur in existing easements. The calculation results in annual impacts for each Covered Activity in land cover types throughout the Permit Area. This exercise was carried out for each Covered Activity. The acreages were then summed to generate the total permanent habitat loss and temporary habitat disturbance expected from Covered Activities annually and over the Permit Term.

Annual impacts represent an average, with some years being higher and other years being lower. Thirty-year impacts represent a ceiling of impacts (i.e., a cap) that cannot be exceeded without a major amendment to the permits. This impact analysis uses the following conservative assumptions to present potential impacts from covered activities: (1) all Modeled Habitat is assumed to be occupied; (2) habitat loss calculations used for various Covered Activities are conservative and, therefore, overestimate the amount of habitat loss that would result from Covered Activities; and (3) larger-scale Covered Activities would be infrequent, and, thus, calculations may overestimate total annual impacts.

Table 4-1. SMUD HCP Land Cover Total Acreage Summary

SMUD HCP Land Cover Type	Land Cover Area in SMUD's Easement (acres)						Numbers of Facilities in Land Cover Types						
	Transmission Line Easement	Subtransmission and Distribution Easement	Total Electrical Line Easement	Total Fiber-optic Line Easement	Total Gas Pipeline Easement	Other Facilities*	Transmission Towers and Poles	Subtransmission and Distribution Poles	Total Substructures	Total Pull Boxes	Electrical Substations	Gas Pipeline Valve Stations	Poles in State Responsibility Areas (SRAs)
Eucalyptus Woodland	--	2.02	2.02	--	--	--	--	12	3	--	--	--	--
Valley Foothill Riparian	90.56	77.92	168.48	--	--	--	--	843	60	51	--	--	13
Blue Oak Foothill Pine	1.79	6.13	7.92	--	--	--	--	27	13	1	--	--	2
Blue Oak Woodland	79.33	108.62	187.95	--	--	--	--	588	212	60	--	--	15
Valley Oak Woodland	5.01	25.32	30.33	--	--	--	--	202	44	40	--	--	--
Mine Tailing Riparian Woodland	--	7.84	7.84	--	--	--	--	69	1	1	--	--	--
Orchard/Vineyard	148.61	172.38	320.99	20.74	26.66	1.79	31	2,140	42	18	--	1	41
Cropland	220.63	371.52	592.15	40.36	98.84	--	57	4,343	76	131	3	4	6
Rice	4.22	17.99	22.20	0.52	13.29	--	1	167	4	2	--	--	--
Pasture	253.50	225.41	478.91	30.97	50.90	4.82	61	1,897	221	184	2	--	17
Grasses and Forbs	1,069.37	1,756.14	2,825.51	135.17	32.81	298.36	337	13,515	1,876	1,676	9	2	469
Urban	1,864.20	20,353.46	22,217.66	241.61	64.03	27.06	796	117,199	43,530	21,634	204	5	347
Barren/Disturbed	56.89	498.36	555.25	10.85	2.64	--	9	1,166	994	859	7	--	8
Riverine	45.67	140.36	186.03	5.55	7.32	2.96	12	1,108	113	172	3	--	6
Open Water/Fringe	14.22	23.78	38.01	1.58	5.39	0.77	3	113	43	22	--	--	--
Other Depressional Wetland	65.75	58.17	123.92	6.74	17.60	0.53	11	294	82	50	--	--	--
Vernal Pool, Seasonal Wetland, and Swale	233.91	31.60	265.51	22.86	0.04	1.37	49	315	18	25	--	--	3
Total	**4,153.66**	**23,877.01**	**28,030.68**	**534.00**	**321.30**	**337.66**	**1,427**	**143,998**	**47,352**	**24,926**	**229**	**12**	**927**

* Refers to acreages of special areas that SMUD manages including: Cosumnes Power Plant; Mitigation Bank - Oak Tree Planting Area; and Cosumnes Power Plant Water Pipeline.

4.2.2.2 Estimating Disturbance of Modeled Habitat within Covered Activity Footprints

This chapter quantifies take of each Covered Species in terms of loss or disturbance of its Modeled Habitat (see Chapter 3) and assumes all disturbed Modeled Habitat is also occupied by the Covered Species. This key assumption may overestimate the take of Covered Species, which makes the analysis conservative in favor of the species. This approach was chosen to allow SMUD maximum flexibility in implementing the Covered Activities, and to reduce time and money spent on time-consuming activities, such as species surveys. SMUD estimated the amount of direct permanent loss and temporary disturbance of Covered Species Modeled Habitat using the following approach.

SMUD estimated the amount of each SMUD HCP Modeled Habitat type that could be temporarily or permanently disturbed by SMUD's Covered Activities over the proposed 30-year permit term using the same proportionality approach described above in Section 4.2.2.1, *Estimating Land Cover Disturbance by Covered Activity*, but based on Modeled Habitat type rather than land cover type. For example, if one-tenth of the acres within SMUD's gas pipeline easements consist of California tiger salamander Modeled Habitat, then SMUD assumed that one-tenth of the acres disturbed for each activity type will occur in California tiger salamander habitat. SMUD estimated 176 acres of land would be affected by E9c, *Direct-Buried Cable Replacement-Trenching*, and that one-tenth of these acres, or 18 acres, would be in California tiger salamander Modeled Habitat.

A similar approach was used to determine the amount in acres of each Covered Species Modeled Habitat present at SMUD's facilities (i.e., substations or electrical poles). The proportion of facilities in each Covered Species' Modeled Habitat was calculated (number of facilities in a Modeled Habitat divided by the total number of facilities; Tables E-1 through E-3 for each Covered Species (E1a through E1g) of Appendix E. This proportion was then multiplied by the total estimated disturbance acreage for each Covered Activity (based on the number of facilities and amount of disturbance per facility) to calculate the total estimated loss or disturbance of Modeled Habitat for each Covered Species (Tables E-1d through E-1i of Appendix E). If 5% of the acres of existing facilities overlap with Modeled Habitat, then SMUD estimated that 5% of the disturbed acres will consist of Modeled Habitat.

SMUD estimated the level of disturbance of valley elderberry longhorn beetle habitat based on numbers of elderberry shrubs that could be disturbed, and assumed an average canopy size to estimate acres of Modeled Habitat. These numbers were estimated based on the number of shrubs in SMUD easements on an annual basis over the last 11 years.

4.2.2.3 Estimating Vernal Pool, Seasonal Wetland, and Swale Disturbance in the Vicinity of Covered Activities

SMUD quantified disturbance of the SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type resulting from Covered Activities in the vicinity of this land cover type, as is standard practice for addressing indirect effects on listed vernal pool

crustaceans. The quantitative analysis of disturbance from Covered Activities in the vicinity of the Vernal Pool, Seasonal Wetland, and Swale land cover type assessed Covered Activities that involve trenching or excavation because these are the only Covered Activities that have the potential to result in indirect effects on the vernal pool Covered Species. The analysis focused exclusively on Vernal Pool, Seasonal Wetland, and Swale land cover outside of urban areas, which are also within 250 feet of Covered Activities that involve trenching or excavation or within 50 feet of *Covered Activity E9c. Underground Component Repair and Replacement—Direct-Buried Cable Replacement—Trenching*.

The underground facilities that were included in this analysis consisted of underground cable in conduit, underground direct-buried cable, and gas pipeline. The specific Covered Activities included in this analysis are the following:

- *Covered Activity E9d. Underground Component Repair and Replacement—Direct-Buried Cable Replacement—Horizontal Directional Drilling (HDD)*
- *Covered Activity E9e. Underground Component Repair and Replacement—Cable Repair (Third Party Damage/Dig In)*
- *Covered Activity E14a. New Underground Subtransmission and Distribution Line Construction—Trenching*
- *Covered Activity E14b. New Underground Subtransmission and Distribution Line Construction—Horizontal Directional Drilling (HDD)*
- *Covered Activity E16. New Substation Construction*
- *Covered Activity G5b. Pipeline Maintenance and Repair—Underground Pipeline Maintenance and Repair*
- *Covered Activity G9. New Construction for Valve Stations and Pressure-Limiting Stations*
- *Covered Activity G10a. New Construction for Realigned Pipelines—Trenching*
- *Covered Activity G10b. New Construction for Realigned Pipelines—Horizontal Directional Drilling*
- *Covered Activity G10c. New Construction for Realigned Pipelines—Directional Boring*

Covered Activity E9c. Underground Component Repair and Replacement—Direct-Buried Cable Replacement—Trenching associated with underground direct-buried cable comprised the largest amount of potential habitat disturbance in the vicinity of Covered Activities, and was further refined to avoid an overestimation of the total amount disturbed. Underground direct-buried cable typically connects overhead facilities to residential or commercial buildings. The setting for underground direct-buried cable in proximity to SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover is typically rural residential or high-density residential developments that have open space corridors

containing SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover. The landscape immediately surrounding or adjacent to SMUD's underground direct-buried cable typically includes disturbed or developed areas such as streets, driveways, and buildings.

As described in Chapter 2, the typical trench dimensions for installation of new conduit measures 2 feet wide by 4 feet deep. Once the trench is excavated, one to six segments of 4- or 6-inch-diameter plastic conduit would be installed on the trench floor and partially backfilled with concrete slurry. The trench would be backfilled using the previously excavated soil with the conduit buried with at least 2 feet of cover. Because of the nature of the trenching activity, (i.e., backfilling the bottom 2 feet with cement, thereby sealing any breaks in the restrictive layer caused by trenching), and the proximity to streets and development that have modified the microwatershed of the landscape, SMUD used a 50-foot buffer to calculate the acreage of SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover that may be disturbed in the vicinity of *Covered Activity E9c. Underground Component Repair and Replacement—Direct-Buried Cable Replacement—Trenching*. The Vernal Pool, Seasonal Wetland, and Swale features within 50 feet of the direct-buried cable were assessed individually to determine likelihood of potential habitat disturbance caused by Covered Activities in the vicinity. The 50-foot distance is conservative and errs on the side of the species in terms of potential effects, since these are areas that have previously been disturbed from underground cable placement, and measures will be implemented to avoid effects on nearby habitat. Individual aquatic features were excluded from the analysis if the landscape was significantly altered (i.e., no evidence of natural vernal pool or swale) or if the feature was located across a roadway from the underground facility because the roadway was considered a hydrologic barrier, as the road would have disrupted surface flow, and work done for the road base would have disrupted subsurface flow. There are approximately 20 underground direct-buried cable segments that are within 50 feet of SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover.

4.2.3 Designated Critical Habitat Impacts

The acreage of impact for Covered Species with designated critical habitat was determined through a GIS-based analysis using the latest USFWS maps of critical habitat unit boundaries (Figure 4-1). The approach SMUD used to calculate the potential amount of Covered Species' ground cover disturbance within critical habitat was similar to that used for the Modeled Habitat (described above). The land cover types and calculations of acres affected within each Covered Species' designated critical habitat are provided in Appendix H, *SMUD HCP Covered Species Critical Habitat Effects by Unit*.

For Covered Activities that occur in SMUD's easements, SMUD started with the projected frequency, occurrence, and areas of temporary and permanent impacts for each Covered Activity, as described in Chapter 2. SMUD determined the proportion of Covered Species' critical habitat within its easements by dividing the area of critical habitat within its easement by the total area of easement, using the GIS mapping program. This proportion was then used to determine the amount of Covered Species' critical habitat in the Permit

Area that would be temporarily or permanently affected by SMUD's Covered Activities that occur in easements. This method assumes that Covered Activities will be distributed in proportion to occurrence of SMUD HCP land cover types to existing facilities or easements.

For Covered Activities associated with SMUD facilities, SMUD calculated the number of facilities in each Covered Species' critical habitat. SMUD calculated the proportion of facilities in critical habitat (number of facilities in critical habitat divided by the total number of facilities). SMUD then used this proportion to determine the amount of critical habitat that would be temporarily or permanently affected by SMUD's Covered Activities that take place at facilities.

4.2.4 Tiered Approach to Analysis

To minimize redundancy, the effects analyses for Covered Species use a tiered approach. Section 4.4.1, *Effects Common Among All Species,* describes stressors and effects common to all the Covered Species, and the AMMs to minimize these effects. For each large taxonomic group (i.e., plants, invertebrates, amphibian, and reptiles), this chapter includes a section describing stressors and effects, and associated AMMs, that are common among all Covered Species in that taxonomic group in addition to those already described in Section 4.4.1. Lastly, this chapter provides an analysis for each species, providing information not provided at the general or larger taxon-associated levels.

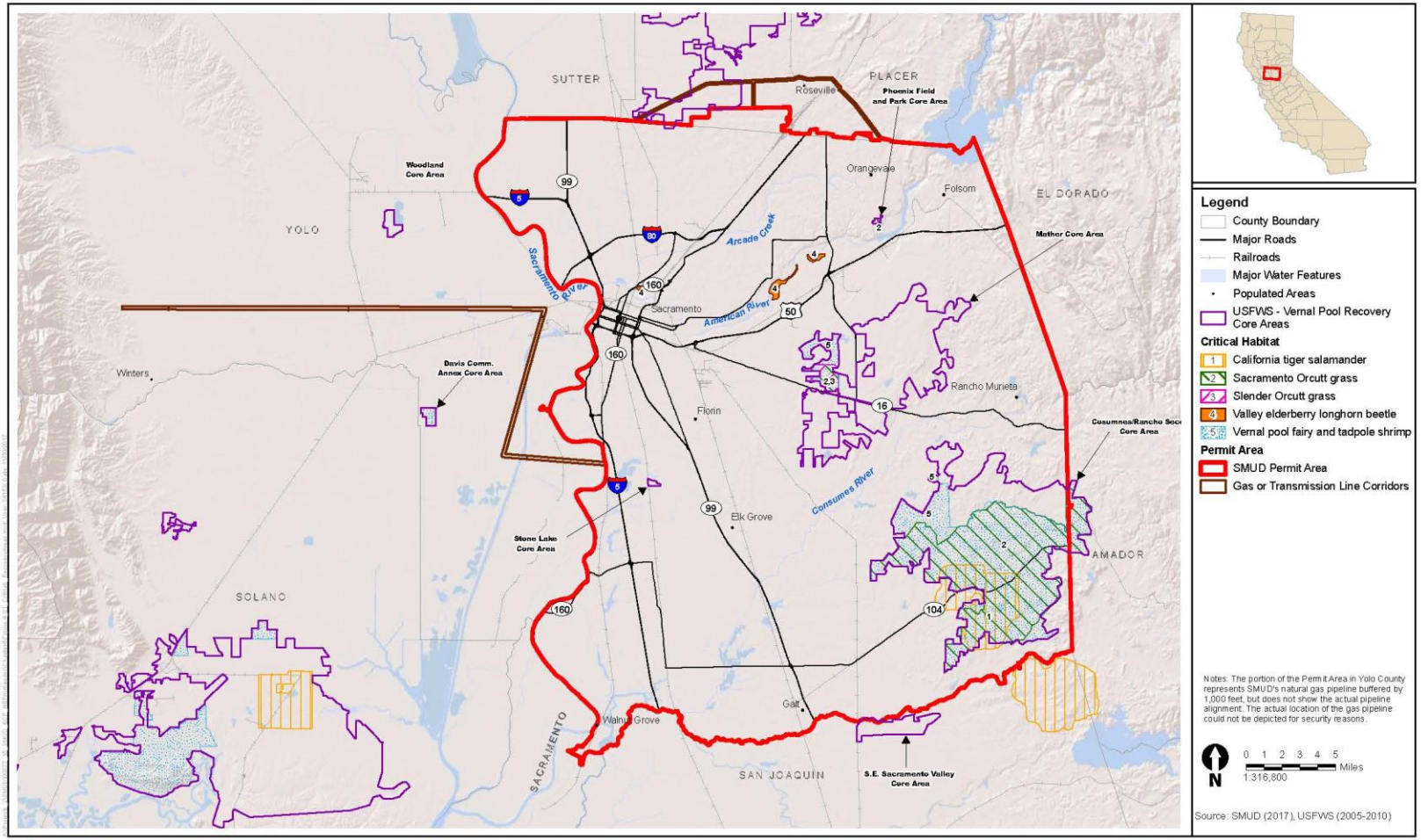


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Figure 4-1
Critical Habitat and Core Recovery Areas
SMUD HCP

4.3 Land Cover Disturbance

Table 4-2 summarizes disturbances of each land cover type on an annual basis and over the 30-year permit term. An estimated total of 7,286.1 acres of land cover will be temporarily disturbed by Covered Activities over the permit term, most of which (90 percent) will consist of the SMUD HCP Urban land cover type. An estimated 114.4 acres of land cover will be permanently removed by Covered Activities over the permit term, most of which will consist of the SMUD HCP Grasses and Forbs (53 percent) and Urban (32 percent) land cover types.

Table 4-2. Summary of Estimated Land Cover Loss or Disturbance

SMUD HCP Land Cover Types	Annual Loss or Disturbance		Total Loss or Disturbance over 30-Year Permit Term	
	Temporary (acres)	Permanent (acres)	Temporary (acres)	Permanent (acres)
Eucalyptus Woodland	0.02	0.0001	0.65	0.003
Valley Foothill Riparian	1.76	0.003	52.77	0.09
Blue Oak Foothill Pine	0.11	0.001	3.41	0.02
Blue Oak Woodland	1.56	0.01	46.78	0.23
Valley Oak Woodland	0.21	0.001	6.24	0.03
Mine Tailing Riparian Woodland	0.05	0.0001	1.38	0.004
Orchard/Vineyard	1.52	0.03	45.57	0.83
Cropland	3.77	0.10	113.13	3.09
Rice	0.30	0.001	8.85	0.02
Pasture	1.98	0.01	59.51	0.17
Grasses and Forbs	12.05	2.00	361.37	60.04
Urban	218.00	1.19	6,540.11	35.65
Barren/Disturbed	1.06	0.003	31.94	0.10
Riverine	0.15	0.002	4.62	0.05
Open Water/Fringe	0.06	0.0003	1.83	0.01
Other Depressional Wetland	0.20	0.001	6.09	0.02
Vernal Pools, Seasonal Wetlands, and Swale	0.06	0.47	1.82	14.05
Total	**242.86**	**3.82**	**7,286.07**	**114.41**

4.4 Covered Species Impact Analysis

This section provides an analysis that addresses the following categories for each Covered Species: direct injury or mortality, permanent habitat loss, temporary habitat disturbance, and habitat disturbance in the vicinity of the Covered Activities (Section 4.2.1.2, *Categories of Stressors or Habitat Disturbance*).

Annual habitat disturbance represents an average, with some years being higher and other years being lower. Total habitat disturbance over the entire 30-year permit term

represents a ceiling of take (i.e., a cap on Covered Species take that is quantified based on acres disturbed) that cannot be exceeded without a permit amendment.

This impact analysis uses the following conservative assumptions to estimate effects on Covered Species from Covered Activities: (1) Modeled Habitat is assumed to be occupied; and (2) disturbance calculations used for various Covered Activities are intended to reflect the average amount of disturbance that may occur from a given covered activity and, therefore, may in some cases overestimate the amount of ground disturbance that would result from Covered Activities.

The following sections describe the estimated effects of implementing the Covered Activities on each of the Covered Species and their respective habitats. Additional species information and full citations for sources considered in the literature review are provided in Chapter 3, Section 3.5, *Covered Species*, and Appendix C, *Species Accounts*. The species descriptions in Appendix C supplement this chapter and provide additional information on the species' listing status, range, ecology, population trends and threats, and management tools.

4.4.1 Effects Common Among All Species

4.4.1.1 Direct Injury or Mortality

Direct injury or mortality, for the purpose of this effects analysis, refers to injury or mortality of Covered Species individuals occurring at the time the Covered Activity takes place, as a direct result of the Covered Activity. For plant Covered Species, the term *direct damage or destruction* is used instead of *direct injury or mortality.*

The stressors potentially leading to direct injury or mortality of Covered Species differ by taxon. For plants and ground dwelling wildlife (amphibians, reptiles), common relevant stressors include temporary or permanent ground disturbance. The movement or parking of vehicles and/or the placement of equipment and staging materials may damage, injure or crush individuals. Ground disturbance such as blading and excavation can damage, injure, or kill individuals. Placement of stockpiled or excess soil or chipped plant material could also bury individuals. The following AMMs will minimize direct injury or mortality of wildlife Covered Species, or damage or destruction of plant Covered Species (see Table 5-1, *Avoidance and Minimization Measures,* for additional details).

- G-AMM2, *Minimize Impacts of Work Area,* will avoid or minimize the effect by limiting the work area footprint to the smallest area necessary to complete the activity.
- G-AMM3, *Work Area Access*, will avoid or minimize the effect by limiting access to previously disturbed areas where possible. If it is not possible to avoid Modeled Habitat, SMUD will implement G-AMM4, *Off Road Speed Limit*, which requires that when driving off of paved roads in Covered Species habitat, vehicles will not exceed a speed limit of 15 miles per hour (providing both drivers and species sufficient time to react to avoid direct injury or mortality from vehicles); G-AMM15, *Temporary Vehicle Access to Work Areas,* which requires SMUD field crews to minimize clearing

vegetation and grading for temporary vehicle access, and to return temporary roads to pre-project conditions; VP-AMM1, *Avoid Driving through Vernal Pools*, which requires SMUD field crews to avoid driving through SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover to the maximum extent feasible; and VP-AMM2, *Minimize Vehicle Impacts on Vernal Pools,* which states that if a work area or access to the work area is located on SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover, SMUD field crews will evaluate site conditions and determine if soil moisture is present.

- G-AMM18, *Unanticipated Covered or ESA and CESA-Listed Species,* will avoid or minimize this effect by requiring SMUD field crews to stop work and contact SMUD Environmental Services if a Covered Species or ESA and CESA-listed species is found in or within 100 feet of a work area (with G-AMM1, *Annual Environmental Training,* SMUD field crews will be trained to identify these species). In addition, SMUD Environmental Services will have the authority to stop work to ensure that there will be no unauthorized take of the animal species and that the plants will not be damaged or destroyed.

Additional stressors specific to the taxa, and measures to reduce effects on the species, are described in subsequent sections.

4.4.1.2 Permanent Habitat Loss

Covered Activities and stressors that could lead to permanent habitat loss differ by taxon and are described in subsequent sections. When habitat is removed, the Covered Species relying on that habitat have a reduced carrying capacity such that populations may decline and extinction may become more likely. Habitat loss is the primary threat to most of the Covered Species.

Permanent habitat loss could also lead to fragmentation of the remaining habitat. Most permanent losses of Covered Species Modeled Habitat, however, would be 0.25 acre or less, focused in uplands, and be geographically dispersed over large geographic areas. Such small losses of Modeled Habitat are not expected to fragment habitat areas or impair genetic exchange between populations of Covered Species.

SMUD will minimize permanent habitat loss for Covered Species by implementing G-AMM2, *Minimize Impacts of Work Area,* which limits the work area footprint to the smallest area necessary to complete the activity (Table 5-1). Additionally, the SMUD HCP does not authorize permanent Modeled Habitat loss beyond the amount established as the take limit for each species (Tables 4-8 and 4-9).

4.4.1.3 Temporary Habitat Disturbance

Covered Activities and stressors that could lead to temporary habitat disturbance differ by taxon and are described in subsequent sections. These disturbances are treated as temporary because the disturbed habitat will be restored or is expected to recover on its own within 1 year. Temporary habitat disturbance would make the habitat temporarily

unavailable to the species, potentially reducing the species' carrying capacity for a short period (less than 1 year).

SMUD will minimize the area of temporary habitat disturbance for Covered Species as follows.

- G-AMM2, *Minimize Impacts of Work Area*, will avoid or minimize temporary habitat disturbance of Covered Species Modeled Habitat by limiting the work area footprint to the smallest area necessary to complete the activity.

Additional, taxon-specific AMMs are described in subsequent sections. The SMUD HCP does not authorize temporary Modeled Habitat disturbance beyond the amount established as the take limit for each species (Table 4-9).

4.4.1.4 Habitat Disturbance in the Vicinity of the Covered Activities

SMUD will typically limit operations and maintenance activities to areas outside of Modeled Habitat, particularly for vernal pools and other wetland habitats; however, Covered Activities in the vicinity of Modeled Habitat could reduce habitat suitability for Covered Species. Stressors that could lead to habitat disturbance in the vicinity of Covered Activities differ by taxon, as described in subsequent sections. In general, disturbance in the vicinity of Covered Activities may render the habitat less suitable for the species, which could lead to reduced carrying capacity of the habitat and result in reduced Covered Species populations in the absence of AMMs. This effect could be limited to the period of time the Covered Activity takes place (e.g., construction-related noise or lighting) or could include effects that persist after the Covered Activity is completed (e.g., altered hydrology). SMUD expects to avoid long-term effects in the vicinity of Covered Activities by implementing the AMMs, as described at taxon-specific levels in subsequent sections of this chapter.

The spread of invasive species is a stressor that could affect Modeled Habitat for all the Covered Species. Covered Activities could facilitate the spread of invasive or nonnative plant species within Modeled Habitat by introducing seed material attached to vehicles and construction equipment. Dense colonization of invasive plant species could alter the vegetation profile such that these areas would no longer provide suitable habitat for the Covered Species. The effects of habitat loss are described above. Implementation of G-AMM1, *Annual Environmental Training;* G-AMM2, *Minimize Impacts of Work Area*; G-AMM3*, Work Area Access*; G-AMM11, *Stabilization of Disturbed Areas*; and G-AMM14, *Revegetation of Work Areas,* would minimize the spread of invasive or nonnative plants, and subsequently adverse effects on Covered Species and their Modeled Habitat.

4.4.2 Plants

4.4.2.1 Slender Orcutt Grass and Sacramento Orcutt Grass

4.4.2.1.1 Direct Damage or Destruction of Plants

Stressors that could lead to direct damage or destruction of plants include temporary and permanent vegetation removal or ground disturbance, vehicle and equipment movement, laydown of vegetation, hazardous materials exposure, and placement of materials. Table 4-3 lists the specific Covered Activities associated with these stressors for plant Covered Species.

The movement or parking of vehicles and/or the placement of equipment and staging materials may damage or crush adult plants or seedlings. Ground disturbance such as blading and excavation can destroy or damage mature individual plants, and destroy or bury seeds to the extent where they cannot germinate successfully. Placement of stockpiled or excess soil or chipped plant material could also bury plants or seeds. Generally, SMUD will not conduct work within a water body, so destruction of plants resulting from in-water work is expected to be infrequent. In addition to the AMMs described in Section 4.4.1.1, *Direct Injury or Mortality,* SMUD will implement the following measures to minimize direct damage or destruction of individuals of plant Covered Species.

- VP-AMM1, *Avoid Driving through Vernal Pools.* SMUD field crews will avoid driving through SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover to the maximum extent feasible. When this is not feasible, SMUD will implement VP-AMM2, *Minimize Vehicle Impacts on Vernal Pools*.
- VP-AMM4, *Avoid Occupied Orcutt Grass Habitat.* SMUD Environmental Services will review design plans to ensure that no new poles or other facilities are placed in vernal pools that are known (as noted in an up to date [current at time of project implementation] California Natural Diversity Database query) to support slender Orcutt grass or Sacramento Orcutt grass.

4.4.2.1.2 Permanent Habitat Loss

Stressors that could lead to permanent loss of Modeled Habitat for slender Orcutt grass and Sacramento Orcutt grass include permanent vegetation removal or ground disturbance. Table 4-3 lists the Covered Activities associated with each of these stressors. This section describes the effects of habitat loss on Covered Species and the AMMs SMUD will implement to avoid and minimize these effects.

When habitat is removed, the Covered Species relying on that habitat have a reduced carrying capacity such that populations may decline and extinction may become more likely. Habitat loss is the primary threat to most of the Covered Species.

Permanent habitat loss could also lead to fragmentation of the remaining habitat. Most permanent losses of Covered Species Modeled Habitat, however, would be 0.25 acre or less, focused in uplands, and would be geographically dispersed over large geographic areas. Such small losses of Modeled Habitat are not expected to fragment habitat areas or impair genetic exchange between populations of Covered Species.

SMUD will minimize permanent habitat loss for Covered Species by implementing G-AMM2, *Minimize Work Area,* which limits the work area footprint to the smallest area necessary to complete the activity (Table 5-1). Additionally, the SMUD HCP does not authorize permanent Modeled Habitat loss beyond the amount established as the take limit for each species (Table 4-9).

Covered Activities could result in permanent habitat loss or disturbance of an average of less than 0.1 acre of Modeled Habitat for these species in the Permit Area annually and no more than 4.3 acres over 30 years (Table 4-8).

4.4.2.1.3 Temporary Habitat Disturbance

Covered Activities could result in temporary disturbance of plant Covered Species Modeled Habitat within the Covered Activity footprint through temporary disturbance of vegetation or temporary ground disturbance. Table 4-3 lists the Covered Activities associated with each of these stressors.

Covered Activities could temporarily disturb an average of less than 0.1 acre of Modeled Habitat for these species annually and no more than 0.1 acre over 30 years (Table 4-8).

Section 4.4.1.3, *Temporary Habitat Disturbance,* describes the effects of temporary habitat disturbance on Covered Species and AMMs relevant to all species, including plant Covered Species. SMUD will further minimize the area of temporary habitat disturbance for plant Covered Species as follows.

- G-AMM13, *Soil Management,* will avoid or minimize temporary habitat disturbance of plant Covered Species Modeled Habitat by requiring SMUD field crews to avoid Open Water/Fringe; Other Depressional Wetlands; Vernal Pool, Seasonal Wetland, and Swale land cover types; or in Modeled Habitat with burrows when stockpiling soil at work site.

While SMUD will minimize the area of temporary effects as described above, unavoidable temporary habitat disturbance could result in long-term effects on the plant Covered Species in the absence of AMMs. Soil disturbance, including ground clearing, excavation, and grading, can provide opportunities for colonization by invasive plants that compete with native vegetation, reducing the long-term value of the recovered habitat for the plant Covered Species and potentially reducing the plant Covered Species population sizes. Excavation and grading in plant Covered Species habitat also have the potential to alter soil properties, topography, or hydrology, creating conditions unsuitable for the growth of some species. The following AMMs, however, will result in the avoidance of long-term effects of temporary disturbance of Modeled Habitat.

- G-AMM11, *Stabilization of Disturbed Areas,* avoids long-term effects on plant Covered Species Modeled Habitat from temporarily disturbed areas by requiring SMUD field crews to remove temporarily fill or construction debris, backfill excavation sites, stabilize and compact soils, and return the project to pre-project contours.
- G-AMM12, *Excess Soil*; G-AMM13, *Soil Management*; and G-AMM16, *Chipped Plant Material Management,* will avoid or minimize temporary habitat disturbance of plant Covered Species Modeled Habitat by requiring SMUD field crews to avoid Open Water/Fringe; Other Depressional Wetlands; or Vernal Pool, Seasonal Wetland, and Swale land cover types or in Covered Species Modeled Habitat with burrows when spreading excess soil or chipped plant material around a work site.
- G-AMM14, *Revegetation of Work Areas,* avoids long-term effects on plant Covered Species Modeled Habitat from temporarily disturbed areas by requiring temporary disturbances of 0.1 acre or more of Modeled Habitat for Covered Species that contains herbaceous vegetation to be revegetated. SMUD expects temporary disturbances of less than 0.1 acre of herbaceous vegetation to recover passively, and to not require active revegetation.

Table 5-1 describes the AMMs listed above in greater detail.

4.4.2.1.4 Habitat Disturbance in the Vicinity of Covered Activities

Habitat Disturbance in the Vicinity of Covered Activities, SMUD could disturb an average of less than 0.1 acre of slender Orcutt grass and Sacramento Orcutt grass Modeled Habitat in the vicinity of Covered Activities annually, and up to 2.7 acres over 30 years (Table 4-8).

Stressors that could lead to habitat disturbance in the vicinity of Covered Activities include dust generated from vehicle access, dust generated from construction, increased temporary runoff, permanent change in hydrology or runoff, spread of invasive or nonnative plants, hazardous materials exposure, and placement of materials. Table 4-3 lists the Covered Activities associated with each of these stressors.

Excavation and grading can change surface drainage patterns or break through hardpan or claypan restrictive soil layers and alter the hydrology of vernal pools or swales. Also, chemicals, fuels, and lubricants that might be used during Covered Activities could accidentally enter Modeled Habitat and reduce water quality. Covered Activities could cause erosion or turbidity that degrades nearby habitat. Sidecast soil from excavation, spilled materials, and other substances (such as oil leaked from a transformer) could be carried by ditches or swales to nearby sensitive areas, causing physical or physiological damage to the plants there. Discharge of water from hydrostatic testing could also flow into Modeled Habitat and alter its hydrology, cause erosion or sedimentation, or introduce contaminants. Hydrology could also be altered or habitat contaminated with bentonite or polymer material as a result of horizontal directional drilling if drilling fluids are unintentionally returned to the surface, and these fluids enter the Modeled Habitat.

Altered hydrology, erosion, sedimentation, or contamination may reduce plant fitness or render the wetlands unsuitable for supporting the species, thereby affecting the species by reducing population size. The following AMMs, however, will result in the minimization or avoidance of hydrologic alteration, erosion, sedimentation, or contamination from Covered Activities in the vicinity of plant Covered Species Modeled Habitat.

- G-AMM6, *Erosion Control Measures,* will utilize standard erosion and sediment control BMPs (pursuant to the most current version of the *California Stormwater Best Management Practices Handbook*) to prevent construction site runoff into SMUD HCP Riverine; Open Water/Fringe; Other Depressional Wetland; and Vernal Pool, Seasonal Wetland, and Swale land cover types when Covered Activities are the source of potential erosion.
- G-AMM7, *Equipment Refueling,* and G-AMM8, *Hazardous Material Clean Up,* will avoid or minimize Covered Activity related fuel spills that could affect plant Covered Species Modeled Habitat and ensure that any hazardous materials that could adversely affect the plants are removed.
- G-AMM9, *HDD Drilling Fluids Management,* will prevent adverse effects from horizontal directional drilling by requiring SMUD field crews conducting this activity within 50 feet of aquatic Modeled Habitat to install containment measures such as secondary containment to avoid run-off into aquatic Modeled Habitat.
- G-AMM11, *Stabilization of Disturbed Areas,* requires SMUD to stabilize temporarily disturbed areas and return them to pre-project contours, thus avoiding long-term hydrologic alterations in nearby Modeled Habitat or in Covered Species Modeled Habitat with burrows.
- G-AMM13, *Soil Management,* requires SMUD to locate stockpiles in areas that will not enter wetland Modeled Habitat for plant Covered Species, and to cover stockpiles prior to precipitation events, thus avoiding run-off and sedimentation from stockpiles into the wetland Modeled Habitat or in Covered Species Modeled Habitat with burrows.
- G-AMM19, *Discharge of Hydrostatic Test Water,* will ensure that hydrostatic test water does not enter any Vernal Pool, Seasonal Wetland, or Swale land cover type.
- VP-AMM7, *Vernal Pool Biological Monitor*, will require that a qualified biologist be present for Covered Activities directly impacting Vernal Pool, Seasonal Wetland, and Swale land cover, to ensure the AMMs outlined above will be implemented and that SMUD field crew conducts activities that could result in take beyond what has been analyzed in the SMUD HCP.

Table 5-1 describes the AMMs listed above in greater detail.

Table 4-3. Potential Stressors Associated with Covered Activities for Plant Covered Species

Covered Activity Number	Covered Activity Title	Temporary Disturbance of Vegetation (Trimming or Removal)	Temporary Ground Disturbance (Work Area)	Permanent Vegetation Loss	Permanent Ground Disturbance (Habitat Loss)	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite—Small Hand or Truck-Mounted (low noise threshold)[1,2]	Equipment Noise Onsite—Large or Truck-Mounted (high noise threshold)[2]	Helicopter Disturbance[1]	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area	Laydown of Vegetation	Ground Vibration[3]	Electrocution[1]	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff	Permanent Change in Hydrology or Runoff	Spread of Invasive or Nonnative Plants	Hazardous Materials Exposure	Placement of Materials
E1a	Ground-Based Overhead Line Inspection					✓								✓								✓	
E1b	Air-Based Overhead Facilities Inspection					✓																✓	
E2a	Underground Subtransmission and Distribution Components (Inspection)					✓								✓								✓	
E2b	Underground Transmission Lines (Inspection)					✓																✓	
E3	Substation Insulator Washing																					✓	
E4	Substation Inspection, Maintenance and Minor Upgrades					✓																✓	
E5	Emergency Outage Inspection and Minor Repair					✓								✓								✓	
E6a, E6b	Wood Pole Testing and Treatment—Testing, and Fiber Wrapping	✓	✓			✓								✓								✓	✓
E6c	Wood Pole Testing and Treatment—Pole Repair—Trussing	✓	✓	✓	✓	✓								✓								✓	✓
E7	Overhead Component Repair and Replacement					✓								✓								✓	
E8	Pole Replacement	✓	✓			✓								✓								✓	✓
E9a	Underground Component Repair and Replacement—Cable Replacement in Conduit					✓								✓								✓	
E9b	Pad-Mounted Transformer Repair and Replacement	✓	✓		✓	✓								✓								✓	
E9c	Direct-Buried Cable Replacement—Trenching	✓	✓		✓	✓								✓								✓	✓
E9d	Direct-Buried Cable Replacement—Horizontal Directional Drilling (HDD)	✓	✓		✓	✓								✓								✓	✓
E9e	Cable Repair (Third Party Damage/Dig In)	✓	✓			✓								✓								✓	✓
E10a	Steel Lattice Tower Repair and Replacement—Steel Lattice Tower Superstructure Repair					✓								✓								✓	
E10b	Steel Lattice Tower Repair and Replacement—Lattice Tower Foundation Repair	✓	✓	✓	✓	✓								✓								✓	✓
E10c	Steel Lattice Tower Repair and Replacement—Steel Lattice Tower Replacement with a Tubular Steel Pole	✓	✓			✓								✓								✓	✓
E10d	Steel Lattice Tower Repair and Replacement—Lattice Tower Replacement—with a New Lattice Tower	✓	✓			✓								✓								✓	✓
E11	Overhead Reconstruction and Reconductoring	✓	✓			✓								✓								✓	✓
E13	New and Relocated Overhead Subtransmission and Distribution Line Construction	✓	✓	✓	✓	✓								✓								✓	
E14a	New Underground Subtransmission and Distribution Line Construction—Trenching	✓	✓		✓	✓								✓								✓	✓

Covered Activity Number	Covered Activity Title	Temporary Disturbance of Vegetation (Trimming or Removal)	Temporary Ground Disturbance (Work Area)	Permanent Vegetation Loss	Permanent Ground Disturbance (Habitat Loss)	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite—Small Hand or Truck-Mounted (low noise threshold)[1,2]	Equipment Noise Onsite—Large or Truck-Mounted (high noise threshold)[2]	Helicopter Disturbance[1]	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area	Laydown of Vegetation	Ground Vibration[3]	Electrocution[1]	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff	Permanent Change in Hydrology or Runoff	Spread of Invasive or Nonnative Plants	Hazardous Materials Exposure	Placement of Materials
E14b	New Underground Subtransmission and Distribution Line Construction—Horizontal Directional Drilling	✓	✓		✓	✓								✓								✓	✓
E15	Existing Substation Expansion	✓	✓	✓	✓	✓														✓		✓	✓
E16	New Substation Construction	✓	✓	✓	✓	✓								✓					✓	✓		✓	✓
G1a	Pipeline Inspections—Abnormal Operation Conditions Inspections					✓								✓								✓	
G1b	Pipeline Inspections— Gas Leak Inspections					✓								✓								✓	
G1c	Pipeline Inspections— Storm-Related Inspections					✓								✓								✓	
G2	Pipeline Valve Station Inspections					✓																✓	
G3	Pipeline Cathodic Protection Test Station Inspection					✓								✓								✓	
G4[1]	Internal Pipeline Inspection	✓	✓			✓																✓	✓
G5a	Pipeline Maintenance and Repair—Aboveground Pipeline Maintenance and Repair	✓	✓		✓	✓								✓								✓	✓
G5b	Pipeline Maintenance and Repair— Underground Pipeline Maintenance and Repair	✓		✓	✓	✓								✓								✓	✓
G6	Pipeline Cathodic Protection Test Station Installation	✓	✓	✓	✓	✓								✓								✓	✓
G7	Pipeline Anode Bed Replacement	✓	✓			✓								✓								✓	✓
G8	Pipeline Valve Repair or Replacement	✓	✓			✓								✓								✓	✓
G9	New Construction for Valve Stations and Pressure-Limiting Stations	✓	✓		✓	✓													✓	✓		✓	✓
G10a	New Construction for Realigned Pipelines—Trenching	✓	✓		✓	✓								✓					✓			✓	✓
G10b	New Construction for Realigned Pipelines—Horizontal Directional Drilling	✓	✓		✓	✓																✓	✓
G10c	New Construction for Realigned Pipelines—Directional Boring	✓	✓		✓	✓																✓	✓
G10d	New Construction for Realigned Pipelines— Hydrostatic Testing	✓	✓			✓								✓					✓			✓	✓
V1	Electrical Subtransmission and Distribution Easement Vegetation Management Inspections					✓								✓								✓	
V2	Electrical Subtransmission and Distribution Easement Vegetation Management	✓				✓								✓								✓	✓
V3a	Transmission Easement Vegetation Management—Inspections					✓								✓								✓	
V3b	Transmission Easement Vegetation Management—Tree Trimming	✓		✓		✓								✓								✓	✓
V3c	Transmission Easement Vegetation Management—Brushy Vegetation	✓		✓		✓								✓								✓	✓
V4	Tree Removal Projects	✓		✓		✓								✓								✓	✓
V5a	Elderberry Shrub Trimming and Removal—Trimming Stems	✓		✓		✓								✓								✓	✓
V5b	Elderberry Shrub Trimming and Removal—Removal by Transplantation	✓	✓	✓		✓								✓					✓			✓	
V5c	Elderberry Shrub Trimming and Removal—Removal by Cutting																						

Covered Activity Number	Covered Activity Title	Temporary Disturbance of Vegetation (Trimming or Removal)	Temporary Ground Disturbance (Work Area)	Permanent Vegetation Loss	Permanent Ground Disturbance (Habitat Loss)	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite—Small Hand or Truck-Mounted (low noise threshold)[1,2]	Equipment Noise Onsite—Large or Truck-Mounted (high noise threshold)[2]	Helicopter Disturbance[1]	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area	Laydown of Vegetation	Ground Vibration[3]	Electrocution[1]	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff	Permanent Change in Hydrology or Runoff	Spread of Invasive or Nonnative Plants	Hazardous Materials Exposure	Placement of Materials
V6	Pole Vegetation Clearing[5]			✓	✓	✓								✓								✓	✓
V7	Vegetation Management on Natural Gas Easement	✓	✓	✓		✓								✓								✓	✓
T1	Telecommunication Tower Maintenance	✓				✓																✓	
T2	New Construction of Telecommunication Tower(s)		✓			✓													✓	✓		✓	✓
T3	Electrical Telecommunications Overhead Fiber-Optic Replacement and New Installation		✓			✓								✓								✓	
T4	Electrical Telecommunications Underground Fiber-Optic Replacement and New Installation	✓				✓								✓								✓	✓
C1	SMUD Bank Oak Tree Planting[5]	✓	✓		✓	✓								✓					✓			✓	✓
C2	SMUD Bank Management and Monitoring	✓	✓			✓								✓								✓	✓
M1	Operation of the Cosumnes Power Plant (CPP)[5]																						
M2a	Cathodic Protection Installation[5]																						
M2b	Water Pipeline Valve Installation[5]	✓	✓		✓	✓								✓									
M2c	Water Pipeline Segment Replacement[5]	✓	✓	✓	✓	✓								✓					✓				
M3	Rancho Seco Property Operation and Maintenance	✓	✓			✓								✓									

Notes: Temporary impacts assume habitat recovery within 1 year. Permanent loss assumes no habitat recovery within 1 year.

[1] Less than 80 dBA at 50 feet (pumps, air compressors, tractors, backhoes) —assumes short duration (less than 30 minutes); dBA = decibels using A-weighting scale

[2] Greater than 80 dBA at 50 feet (front end loaders, graders, bull dozers, hydraulic excavators, chainsaws, pneumatic tools)

[3] Greater than 60 VdB at 25 feet (large bulldozer, jack hammer); VdB = Vibration velocity in decibels

[4] These Covered Activities are specific to site locations. If no impacts are checked, then the Covered Activity is in a location that does not currently overlap with Modeled Habitat for the Covered Species and/or no potential adverse effects from this Covered Activity are associated with the Covered Species.

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4.4.2.1.5 Impact of the Take on the Species

As described in Section 4.2, *Methods for Analysis,* the SMUD HCP quantifies take in terms of the acres of Modeled Habitat lost or disturbed. The take limit for Sacramento Orcutt grass and slender Orcutt grass is provided in Table 4-8. This level of take is not expected to have an adverse impact on the long-term survival or recovery of the species for the following reasons.

- Only an estimated 0.22 percent of the Modeled Habitat for these species in the Plan Area will be disturbed.
- Most of SMUD's Covered Activities are of short duration (less than 1 week) and involve the disturbance of small areas scattered across the entire Plan Area; therefore, these disturbances are likely to have only negligible population effects, if any.

4.4.2.1.6 Critical Habitat Impacts

Critical habitat was designated in 2003, and revised in 2006 (USFWS 2006), and there is designated critical habitat for both slender and Sacramento Orcutt grasses in the Permit Area. One unit of critical habitat (Mather Field) is designated for both species, and there are two additional units for Sacramento Orcutt grass in the Permit Area. The primary constituent elements (PCEs) are the same for both species and are described below.

- PCE1. Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools described in paragraph (2)(ii) of this section, providing for dispersal and promoting hydroperiods of adequate length in the pools; and
- PCE2. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and nonnative upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

AMMs described previously for the Orcutt grasses would be implemented for Covered Activities in critical habitat (which is also Modeled Habitat) to avoid and minimize impacts to critical habitat.

4.4.2.1.6.1 Slender Orcutt Grass

There are six units of designated critical habitat that encompass 94,731 acres for slender Orcutt grass, and only Unit 6, 1,161 acres, is within the Permit Area. Of the 1,161 acres of critical habitat, there are 49 acres of SMUD Modeled Habitat. Covered Activities would

permanently affect 0.3602 acre and temporarily affect 0.004 acre of Modeled Habitat within the Unit 6 over the permit term, and 0.9 acres of SMUD Grasses and Forbs land cover type within the critical habitat unit. This represents less than 0.1 percent of SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type in designated critical habitat units in the Permit Area, and less than 0.1 percent of all land cover types within designated critical habitat units in the Permit Area.

4.4.2.1.6.2 Sacramento Orcutt Grass

There are three units of designated critical habitat encompassing 33,273 acres for Sacramento Orcutt grass, two of which are entirely within the Permit Area and one of which is in the Permit Area and extends into Amador County beyond the Permit Area. The three units are located at Phoenix Field, Mather Field, and Rancho Seco. There are 31,079 acres of non-urban land cover types within Sacramento Orcutt grass critical habitat units in the Permit Area, 1,474.7 acres of which are SMUD HCP Modeled Habitat (Vernal Pool, Seasonal Wetland, and Swale). Of this 1,474.7 acres, Covered Activities could permanently affect an estimated 2.88 acres (0.2 percent of the total 1,474.7 acres) and temporarily affect an estimated 0.011 acres (<0.01 percent of the total 1,474.7 acres) over the permit term.

Appendix H provides a breakdown of effects within each critical habitat unit in the Permit Area.

4.4.3 Invertebrates

4.4.3.1 Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

The Covered Activities and stressors that could affect vernal pool fairy shrimp and vernal pool tadpole shrimp are indicated in Table 4-4.

Table 4-4. Potential Stressors Associated with Covered Activities for Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Covered Activity Number	Covered Activity Title	Temporary Disturbance of Vegetation (Trimming or Removal)	Temporary Ground Disturbance (Work Area)	Permanent Ground Disturbance (Habitat Loss)	Permanent Vegetation Loss	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite–Small Hand or Truck Mounted (low noise threshold)[1,2]	Equipment Noise Onsite – Large or Truck Mounted (high noise threshold) [2]	Helicopter Disturbance	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area	Laydown of Vegetation	Ground Vibration[3]	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff	Permanent Change in Hydrology or Runoff	Spread of Invasive or Non-Native Plants	Hazardous Materials Exposure	Placement of Materials
E1a	Ground-Based Overhead Line Inspection					✓														✓		
E1b	Air-Based Overhead Facilities Inspection																					
E2a	Underground Subtransmission and Distribution Components (Inspection)					✓														✓		
E2b	Underground Transmission Lines (Inspection)					✓														✓		
E3	Substation Insulator Washing																					
E4	Substation Inspection, Maintenance and Minor Upgrades																					
E5	Emergency Outage Inspection and Minor Repair					✓														✓		
E6a, E6b	Wood Pole Testing and Treatment—Testing, and Fiber Wrapping		✓			✓														✓	✓	
E6c	Wood Pole Testing and Treatment—Wood Pole Repair—Trussing		✓	✓		✓														✓	✓	
E7	Overhead Component Repair and Replacement					✓														✓		
E8	Pole Replacement		✓			✓							✓							✓	✓	
E9a	Underground Component Repair and Replacement—Cable Replacement in Conduit					✓														✓		
E9b	Pad-Mounted Transformer Repair and Replacement		✓	✓		✓														✓		
E9c	Direct-Buried Cable Replacement—Trenching		✓	✓		✓							✓						✓	✓	✓	
E9d	Direct-Buried Cable Replacement—Horizontal Directional Drilling (HDD)		✓	✓		✓							✓						✓	✓	✓	
E9e	Cable Repair (Third Party Damage/Dig In)		✓			✓							✓						✓	✓	✓	
E10a	Steel Lattice Tower Repair and Replacement—Steel Lattice Tower Superstructure Repair					✓														✓		
E10b	Steel Lattice Tower Repair and Replacement—Lattice Tower Foundation Repair		✓	✓		✓							✓						✓	✓	✓	
E10c	Steel Lattice Tower Repair and Replacement—Steel Lattice Tower Replacement with a Tubular Steel Pole		✓			✓							✓						✓	✓	✓	
E10d	Steel Lattice Tower Repair and Replacement—Lattice Tower Replacement—with a New Lattice Tower		✓			✓							✓						✓	✓	✓	
E11	Overhead Reconstruction and Reconductoring		✓			✓							✓								✓	✓

Covered Activity Number	Covered Activity Title	Temporary Disturbance of Vegetation (Trimming or Removal)	Temporary Ground Disturbance (Work Area)	Permanent Ground Disturbance (Habitat Loss)	Permanent Vegetation Loss	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite–Small Hand or Truck Mounted (low noise threshold)[1,2]	Equipment Noise Onsite – Large or Truck Mounted (high noise threshold)[2]	Helicopter Disturbance	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area	Laydown of Vegetation	Ground Vibration[3]	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff	Permanent Change in Hydrology or Runoff	Spread of Invasive or Non-Native Plants	Hazardous Materials Exposure	Placement of Materials
E13	New and Relocated Overhead Subtransmission and Distribution Line Construction		✓	✓		✓							✓							✓		
E14a	New Underground Subtransmission and Distribution Line Construction—Trenching		✓	✓		✓							✓						✓	✓	✓	
E14b	New Underground Subtransmission and Distribution Line Construction—Horizontal Directional Drilling		✓	✓		✓							✓						✓	✓	✓	
E15	Existing Substation Expansion		✓	✓		✓							✓					✓		✓	✓	
E16	New Substation Construction		✓	✓		✓							✓					✓		✓	✓	✓
G1a	Pipeline Inspections—Abnormal Operation Conditions Inspections					✓														✓		
G1b	Pipeline Inspections—Gas Leak Inspections					✓														✓		
G1c	Pipeline Inspections—Storm-Related Inspections					✓														✓		
G2	Pipeline Valve Station Inspections																					
G3	Pipeline Cathodic Protection Test Station Inspection					✓														✓		
G4	Internal Pipeline Inspection																					
G5a	Pipeline Maintenance and Repair—Aboveground Pipeline Maintenance and Repair		✓	✓		✓							✓						✓	✓	✓	
G5b	Pipeline Maintenance and Repair—Underground Pipeline Maintenance and Repair		✓	✓		✓							✓						✓	✓	✓	
G6	Pipeline Cathodic Protection Test Station Installation		✓	✓		✓							✓						✓	✓	✓	
G7	Pipeline Anode Bed Replacement		✓			✓							✓						✓	✓	✓	
G8	Pipeline Valve Repair or Replacement		✓			✓							✓						✓	✓	✓	
G9	New Construction for Valve Stations and Pressure-Limiting Stations		✓	✓		✓							✓					✓	✓	✓	✓	✓
G10a	New Construction for Realigned Pipelines—Trenching		✓			✓							✓						✓	✓	✓	✓
G10b	New Construction for Realigned Pipelines—Horizontal Directional Drilling		✓	✓		✓							✓						✓	✓	✓	
G10c	New Construction for Realigned Pipelines—Directional Boring		✓	✓		✓							✓						✓	✓	✓	
G10d	New Construction for Realigned Pipelines—Hydrostatic Testing		✓			✓							✓							✓	✓	✓

Covered Activity Number	Covered Activity Title	Temporary Disturbance of Vegetation (Trimming or Removal)	Temporary Ground Disturbance (Work Area)	Permanent Ground Disturbance (Habitat Loss)	Permanent Vegetation Loss	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite–Small Hand or Truck Mounted (low noise threshold)[1,2]	Equipment Noise Onsite – Large or Truck Mounted (high noise threshold)[2]	Helicopter Disturbance	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area	Laydown of Vegetation	Ground Vibration[3]	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff	Permanent Change in Hydrology or Runoff	Spread of Invasive or Non-Native Plants	Hazardous Materials Exposure	Placement of Materials
V1	Electrical Subtransmission and Distribution Easement Vegetation Management Inspections					✓														✓		
V2	Electrical Subtransmission and Distribution Easement Vegetation Management					✓							✓							✓	✓	
V3a	Transmission Easement Vegetation Management—Inspections					✓														✓		
V3b	Transmission Easement Vegetation Management—Tree Trimming					✓							✓							✓	✓	
V3c	Transmission Easement Vegetation Management—Brushy Vegetation		✓	✓		✓							✓							✓	✓	
V4	Tree Removal Projects					✓							✓							✓	✓	
V5a	Elderberry Shrub Trimming and Removal—Trimming Stems					✓							✓							✓	✓	
V5b	Elderberry Shrub Trimming and Removal—Removal by Transplantation		✓	✓		✓							✓						✓	✓		✓
V5c	Elderberry Shrub Trimming and Removal—Removal by Cutting		✓	✓		✓							✓							✓	✓	
V6	Pole Vegetation Clearing		✓	✓		✓														✓	✓	
V7	Vegetation Management on Natural Gas Easement		✓			✓													✓	✓	✓	
T1	Telecommunication Tower Maintenance																					
T2	New Construction of Telecommunication Tower(s)		✓			✓							✓					✓		✓	✓	✓
T3	Electrical Telecommunications Overhead Fiber-Optic Replacement and New Installation		✓			✓														✓		
T4	Electrical Telecommunications Underground Fiber-Optic Replacement and New Installation					✓														✓	✓	
C1	SMUD Bank Oak Tree Planting[5]		✓	✓		✓							✓						✓	✓	✓	✓
C2	SMUD Bank Management and Monitoring		✓								✓		✓								✓	✓
M1	Operation of the Cosumnes Power Plant (CPP)[4]																					
M2a	Cathodic Protection Installation[4]																					
M2b	Water Pipeline Valve Installation[4]												✓									
M2c	Water Pipeline Segment Replacement[4]		✓	✓		✓							✓						✓			✓
M3	Rancho Seco Property Operation and Maintenance	✓	✓			✓						✓										

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4.4.3.1.1 Injury or Mortality of Individuals within Covered Activities Footprint

Covered Activities could result in injury or mortality of vernal pool fairy shrimp or vernal pool tadpole shrimp within the Covered Activity footprint (injury or mortality in the vicinity of the Covered Activities are described below). Stressors that could result in injury or mortality include temporary ground disturbance, permanent ground disturbance, vehicle and equipment movement, hazardous materials exposure, and placement of materials. Table 4-4 lists the specific Covered Activities associated with each of these stressors.

Injury or mortality of vernal pool tadpole shrimp or vernal pool fairy shrimp could occur at any life history stage, from cyst or eggs to adults. Shrimp cysts could be buried by the inadvertent deposition of soil into or near vernal pools or swales during ground-disturbing activities, such as augering or trenching, thus possibly preventing these cysts from hatching the following wet season(s). Adult shrimp could also be buried. Shrimp could be injured by vehicle and equipment movement. SMUD will implement the AMMs outlined in Section 4.4.1.1, *Direct Injury or Mortality,* however, to minimize the injury or mortality of Covered Species. Additionally, SMUD will implement the AMMs outlined below to further minimize direct injury or mortality of vernal pool tadpole shrimp or vernal pool fairy shrimp.

- VP-AMM1, *Avoid Driving through Vernal Pools* and VP-AMM2, *Minimize Vehicle Impacts on Vernal Pools,* will minimize mortality of vernal pool crustaceans by requiring SMUD field crews to evaluate site conditions and determine if moisture is present when a work area or access to the work area is located on SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover. If soil moisture is present, the field crew will coordinate with the Environmental Services team to identify alternative measures to minimize disturbance of Covered Species Modeled Habitat. Alternative measures may include laying down rubber matting, creating temporary bridges over swales, or using alternate access routes as prescribed by SMUD Environmental Services to minimize impacts. If it is not feasible for SMUD to avoid driving through Vernal Pool, Seasonal Wetland, and Swale land cover while moisture is present, SMUD will track the acres of disturbance, and those acres will count toward take limits provided in Chapter 4, *Impact Analysis and Levels of Take*, and mitigated consistent with Section 5.4, *Mitigation*.

- VP-AMM3, *Vernal Pool Covered Species Stockpile,* will minimize mortality of vernal pool invertebrates by requiring SMUD field crews to stockpile topsoil from Vernal Pool, Seasonal Wetland, and Swale land cover prior to disturbance and replace the topsoil in temporarily disturbed aquatic habitat. Erosion control measures determined by a qualified biologist will be implemented where necessary to protect topsoil stockpiles and keep the seed bank and/or cysts in the stockpiled soil viable (see also G-AMM6 regarding standard erosion control measures).

- VP-AMM5, *Avoid Vernal Pools during Trenching,* will minimize injury or mortality of vernal pool invertebrates by requiring that SMUD field crews avoid trenching through Vernal Pool, Seasonal Wetland, and Swale land cover.

- VP-AMM6, *Covered Vernal Pool Invertebrate Work Window,* will minimize injury or mortality of vernal pool invertebrates by requiring that SMUD field crews limit disturbance to the dry season, or when the activity cannot occur during the dry season, implementing alternative measures detailed in Table 5-1.
- VP-AMM7, *Vernal Pool Biological Monitor,* will require a qualified biologist be present for Covered Activities that directly impact Vernal Pool, Seasonal Wetland, and Swale land cover, to ensure the AMMs outlined above will be implemented.

With implementation of these measures, direct injury or mortality of shrimp is expected to be limited to the areas of permanent or temporary habitat disturbance described in the following sections.

4.4.3.1.2 Permanent Habitat Loss

Covered Activities could lead to permanent loss of vernal pool fairy shrimp and vernal pool tadpole shrimp Modeled Habitat through permanent ground disturbance. Table 4-4 lists the Covered Activities associated with permanent ground disturbance. Section 4.4.1.2, *Permanent Habitat Loss,* describes how permanent habitat loss affects Covered Species and the AMMs SMUD will implement to avoid or minimize these effects. After the implementation of these AMMs, Covered Activities are anticipated to permanently remove an average of 0.5 acre of vernal pool fairy shrimp and vernal pool tadpole shrimp Modeled Habitat in the Permit Area annually and no more than 14.1 acres over 30 years (Table 4-9).

4.4.3.1.3 Temporary Habitat Disturbance

Covered Activities could lead to temporary disturbance of vernal pool fairy shrimp and vernal pool tadpole shrimp habitat through temporary ground disturbance. Table 4-4 lists the Covered Activities associated with these stressors for vernal pool tadpole shrimp and vernal pool fairy shrimp. Section 4.4.1.3, *Temporary Habitat Disturbance,* describes how temporary habitat disturbance affects Covered Species and the AMMs SMUD will implement to avoid or minimize these effects. After the implementation of these AMMs, Covered Activities could temporarily affect an average of 0.06 acre of vernal pool fairy shrimp and vernal pool tadpole shrimp Modeled Habitat annually, and no more than 1.8 acres over 30 years, through temporary ground disturbance (Table 4-9).

4.4.3.1.4 Habitat Disturbance in the Vicinity of Covered Activities

Covered Activities in the vicinity of Modeled Habitat could reduce habitat suitability for vernal pool tadpole shrimp and vernal pool fairy shrimp. Stressors that could lead to habitat disturbance in the vicinity of Covered Activities include dust generated from vehicle access, dust generated from construction, increased temporary runoff, permanent change in hydrology or runoff, spread of invasive or nonnative plants, increased human activities, hazardous materials exposure, and placement of materials. Table 4-4 lists the Covered Activities associated with each of these stressors.

Water quality could be altered by sediment transport into vernal pools or swales during ground-disturbing activities such that vernal pool crustaceans die or have reduced survivorship or reproductive output. Also, chemicals inadvertently released (e.g., fuel, lubricants, degreasers) during construction and subsequently deposited in vernal pools near or adjacent to work areas could affect water quality and result in mortality, injury, or reduced reproductive success. Covered activities could also indirectly affect vernal pool invertebrates by altering the hydrology that supports this habitat (e.g., altering surface runoff patterns, breaking through hardpan or claypan restrictive layers), increasing human intrusion, introducing invasive species, and causing pollution (U.S. Fish and Wildlife Service 1996). SMUD will implement the measures below to avoid or minimize these effects. These measures are described in greater detail in Table 5-1.

The following AMMs will result in the minimization or avoidance of hydrologic alteration, erosion, sedimentation, or contamination from Covered Activities in the vicinity of plant Covered Species Modeled Habitat.

- G-AMM6, *Erosion Control Measures,* will utilize standard erosion and sediment control BMPs (pursuant to the most current version of the *California Stormwater Best Management Practices Handbook*) to prevent construction site runoff into SMUD HCP Riverine; Open Water/Fringe; Other Depressional Wetland; and Vernal Pool, Seasonal Wetland, and Swale land cover types when Covered Activities are the source of potential erosion.

- G-AMM7, *Equipment Refueling,* and G-AMM8, *Hazardous Material Clean Up,* will prevent Covered Activity related fuel spills that could affect vernal pool invertebrate Covered Species Modeled Habitat and ensure that any hazardous materials that could adversely affect the plants are removed.

- G-AMM9, *HDD Drilling Fluids Management,* will prevent adverse effects from horizontal directional drilling by requiring SMUD field crews conducting this activity within 50 feet of Modeled Habitat to install containment measures such as secondary containment and following a contingency plan to avoid run-off into Modeled Habitat.

- G-AMM11, *Stabilization of Disturbed Areas,* requires SMUD to stabilize temporarily disturbed areas and return them to pre-project contours, thus avoiding long-term hydrologic alterations in nearby Modeled Habitat.

- G-AMM13, *Soil Management,* requires SMUD to locate stockpiles in areas that will not enter wetland Modeled Habitat for Covered Species, and to cover stockpiles prior to precipitation events, thus avoiding run-off and sedimentation from stockpiles into the wetland Modeled Habitat or Covered Species Modeled Habitat with burrows.

- G-AMM19, *Discharge of Hydrostatic Test Water,* will ensure that following hydrologic testing, SMUD field crews will avoid discharging water into Vernal Pool, Seasonal Wetland, or Swale land cover type. For discharge of hydrostatic test water within 250 feet of Vernal Pool, Seasonal Wetland, or Swale land cover type, a biological monitor will be present to ensure that the hydrostatic test water discharged does not enter any Vernal Pool, Seasonal Wetland, or Swale land cover type.

After the implementation of the AMMs, and based on the methods described above, SMUD could disturb an average of 0.1 acre of vernal pool fairy shrimp and vernal pool tadpole shrimp Modeled Habitat in the vicinity of Covered Activities annually, and up to 3.9 acres over 30 years (Table 4-9).

4.4.3.1.5 Impact of the Take on the Species

As described in Section 4.2, *Methods for Analysis,* the SMUD HCP quantifies take in terms of the acres of Modeled Habitat lost or disturbed. The impact of this take on each of the vernal pool crustacean Covered Species is described below.

4.4.3.1.5.1 Vernal Pool Fairy Shrimp

The take limit for vernal pool fairy shrimp is provided in Table 4-9. This level of take is not expected to have an adverse impact on the long-term survival or recovery of the species for the following reasons.

- Only an estimated 0.25 percent of the Modeled Habitat for this species in the Plan Area will be disturbed.
- Most of SMUD's Covered Activities are of short duration (less than 1 week) and involve the disturbance of small areas scattered across the entire Plan Area; therefore these disturbances are likely to have only negligible population effects, if any.

4.4.3.1.5.2 Vernal Pool Tadpole Shrimp

As described in Section 4.2, the SMUD HCP quantifies take in terms of the acres of Modeled Habitat lost or disturbed. The take limit for vernal pool tadpole shrimp is provided in Table 4-9. This level of take is not expected to have an adverse impact on the long-term survival or recovery of the species for the following reasons.

- Only an estimated 0.15 percent of the Modeled Habitat for this species in the Plan Area will be disturbed.
- Most of SMUD's Covered Activities are of short duration (less than 1 week) and involve the disturbance of small areas scattered across the entire Plan Area; therefore, these disturbances are likely to have only negligible population effects, if any.

4.4.3.1.6 Critical Habitat Impacts

Critical habitat impacts are described below for each of the covered vernal pool crustacean species.

4.4.3.1.6.1 Vernal Pool Fairy Shrimp

There are 37,350 acres of non-urban land cover within critical habitat units in the Permit Area. The Permit Area contains all or a portion of critical habitat Units 13 and 14A and 14B. Unit 13 is in the Mather Field area, and Units 14A and 14B are in the Rancho Seco

area in southeastern Sacramento County and into western Amador County. Of the 37,350 acres of non-urban land cover types within designated critical habitat units in the Permit Area, there are an estimated 1,699.3 acres of vernal pool fairy shrimp Modeled Habitat (Vernal Pool, Seasonal Wetland, and Swale land cover type).

The primary constituent elements of critical habitat for vernal pool fairy shrimp are described below, followed by descriptions of how the covered activities will affect each primary constituent element.

PCE 1. Topographic features characterized by mounds and swales, and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described in PCE 2, providing for dispersal and promoting hydroperiods of adequate length in the pools.

PCE 2. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days (Helm 1998), in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

PCE 3. Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter.

PCE 4. Structure within the pools described in PCE 2, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

The Vernal Pool, Seasonal Wetland, and Swale land cover type and associated uplands correspond with PCEs 1 and 2, whereas PCEs 3 and 4 relate to the function and quality of these land cover types for sustaining vernal pool fairy shrimp. Covered activities will permanently affect an estimated 3.6 acres and temporarily affect an estimated 0.01 acre Vernal Pool, Seasonal Wetland, and Swale land cover type (PCEs 1 and 2) over the 30 year permit term. Additionally, an estimated 0.28 acres of upland land cover types would be permanently affected and 8.67 acres would be temporarily affected within designated critical habitat units (this includes all non-urban uplands within the critical habitat unit, regardless of distance from vernal pools). PCEs 1 through 4 would be removed from these affected areas, although only an unknown portion of the upland area affected is expected to support the hydrology and source of food and structure for vernal pools within the grassland matrix. Appendix H provides a breakdown of effects by critical habitat unit.

The amount to be affected represents less than 0.1 percent of SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type in designated critical habitat units in the Permit Area, and less than 0.1 percent of all land cover types within vernal pool fairy shrimp designated critical habitat units in the Permit Area. The removal of these elements from less than 0.1 percent of the vernal pool fairy shrimp critical habitat in the Permit Area would not appreciably diminish the value of the remaining critical habitat for the conservation of the species. Furthermore, SMUD will offset this loss through restoration and protection of vernal pool fairy shrimp aquatic habitat and protection of the supporting watershed within critical habitat, to the extent that no net loss of PCEs 1 through 4 within designated critical habitat is anticipated.

Without implementation of appropriate AMMs, Covered Activities could also affect critical habitat in the vicinity of the activities by disrupting flows that would otherwise distribute food (PCE3) or important vernal pool structural material (PCE4) into the pools, or sources of food or vernal pool structural elements could be damaged as a result of vehicles and equipment entering pools. SMUD will implement VP-AMM1 through VP-AMM7 to avoid these effects on vernal pool fairy shrimp critical habitat.

4.4.3.1.6.2 Vernal Pool Tadpole Shrimp

There are 37,350 acres of non-urban land cover within critical habitat units in the Permit Area. The Permit Area contains all or a portion of critical habitat Units 13 and 14A and 14B. Unit 13 is in the Mather Field area, and Units 14A and 14B are in the Rancho Seco area in southeastern Sacramento County and into western Amador County. Of the 37,350 acres of non-urban land cover types within designated critical habitat units in the Permit Area, there are an estimated 7,689.5 acres of vernal pool tadpole shrimp Modeled Habitat (Vernal Pool, Seasonal Wetland, and Swale land cover type).

The primary constituent elements of critical habitat for vernal pool tadpole shrimp are described below, followed by descriptions of how the covered activities will affect each primary constituent element.

PCE 1. Topographic features characterized by mounds and swales, and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described in PCE 2, providing for dispersal and promoting hydroperiods of adequate length in the pools.

PCE 2. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 41 days (Helm 1998), in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

PCE 3. Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding.

PCE 4. Structure within the pools described in PCE 2, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

The Vernal Pool, Seasonal Wetland and Swale land cover type and associated uplands correspond with PCEs 1 and 2, whereas PCEs 3 and 4 relate to the function and quality of these land cover types for sustaining vernal pool tadpole shrimp.

The Vernal Pool, Seasonal Wetland, and Swale land cover type and associated uplands correspond with PCEs 1 and 2, whereas PCEs 3 and 4 relate to the function and quality of these land cover types for sustaining vernal pool tadpole shrimp. Covered activities will permanently affect an estimated 3.6 acres and temporarily affect an estimated 0.01 acre Vernal Pool, Seasonal Wetland, and Swale land cover type (PCEs 1 and 2) over the 30 year permit term. Additionally, an estimated 0.28 acres of upland land cover types would be permanently affected and 8.67 acres would be temporarily affected within designated critical habitat units (this includes all non-urban uplands within the critical habitat unit, regardless of distance from vernal pools). PCEs 1 through 4 would be removed from these affected areas, although only an unknown portion of the upland area affected is expected to support the hydrology and source of food and structure for vernal pools within the grassland matrix. Appendix H provides a breakdown of effects by critical habitat unit.

The removal of these elements from less than 1 percent of the vernal pool tadpole shrimp critical habitat in the Permit Area would not appreciably diminish the value of the remaining critical habitat for the conservation of the species. Furthermore, SMUD will offset this loss through restoration and protection of vernal pool tadpole shrimp habitat within critical habitat, to the extent that no net loss of PCEs 1 through 4 within designated critical habitat is anticipated.

Without implementation of appropriate AMMs, Covered Activities could also affect critical habitat in the vicinity of the activities by disrupting flows that would otherwise distribute food (PCE3) or important vernal pool structural material (PCE4) into the pools, or sources of food or vernal pool structural elements could be damaged as a result of vehicles and equipment entering pools. SMUD will implement VP-AMM1 through VP-AMM7 to avoid these effects on vernal pool tadpole shrimp critical habitat.

4.4.3.2 Valley Elderberry Longhorn Beetle

4.4.3.2.1 Injury or Mortality of Individuals within Covered Activity Footprint

Vegetation clearance and other Covered Activities may include disturbance of occupied elderberry shrubs, leading to injury or death of individuals (Table 4-9). Trimming elderberry shrubs may result in injury or death of eggs, larva, or adults depending on the timing and extent of the trimming. Because the larva feed on the elderberry pith while they are developing, trimming activities could affect the health of the plant and cause the loss of stems which may kill larva in those stems (U.S. Fish and Wildlife Service 2017).

SMUD will avoid and minimize injury or mortality of valley elderberry longhorn beetle by implementing the AMMs described in Section 4.4.1.1, *Direct Injury or Mortality,* and the following species-specific AMMs (described in detail in Table 5-1).

- SMUD will minimize direct injury or mortality from trimming activities by implementing; VELB-AMM1, *Park outside the Drip Zone*; and VELB-AMM2, *Avoid Trimming during Valley Elderberry Longhorn Beetle Active Period*.
- SMUD will minimize direct injury or mortality of valley elderberry longhorn beetle during shrub removal by implementing VELB-AMM3, *Follow Shrub Removal Protocols,* which involves elderberry shrub removal. If SMUD determines that the shrub is habitat for valley elderberry longhorn beetle because they have stems greater than 1 inch in diameter, then the 2017 *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (USFWS 2017) or the currently approved protocol will be followed for any shrubs to be removed.
- SMUD will minimize direct injury or mortality of valley elderberry longhorn beetle during all other Covered Activities by implementing VELB-AMM4*, Preconstruction Elderberry Survey*; VELB-AMM5, *Elderberry Exclusion Buffer*; VELB-AMM6*, Fencing*; VELB-AMM7*, Mowing*; and VELB-AMM8, *Chemical Usage*

4.4.3.2.2 Permanent Habitat Loss

The Covered Activities could lead to permanent habitat loss through temporary or permanent ground disturbance that removes shrubs, or through direct shrub removal. Shrub loss could occur as a direct result of ground disturbance or shrub removal, or it could occur indirectly (i.e., later in time) as a result of shrub mortality resulting from trimming activity. During the permit term, up to 100 shrubs would be permanently removed and up to 200 shrubs would be trimmed. Trimming could also lead to permanent habitat loss through removal of elderberry shrub branches, which provide foraging and breeding habitat for valley elderberry longhorn beetle. Trimming results in less habitat loss than shrub removal, however, because most of the shrub will normally remain. Where trimming of elderberry shrubs is required, SMUD anticipates that shrubs would be pruned down to a height of 12 feet (measured from ground height) unless site-specific safety conditions warrant pruning less than 12 feet. Table 4-5 lists the Covered Activities associated with stressors that result in permanent habitat loss.

Section 4.4.1.1, *Direct Injury or Mortality,* describes how permanent habitat loss affects Covered Species and the AMMs SMUD will implement to avoid or minimize these effects. Additionally, SMUD will implement the following AMMs to minimize permanent loss of valley elderberry longhorn beetle habitat

- VELB-AMM4, *Preconstruction Elderberry Survey,* states that for Covered Activities occurring in valley elderberry longhorn beetle Modeled Habitat, SMUD Environmental Services or a qualified biologist will survey proposed project sites for the presence of elderberry shrubs. If elderberry shrubs are found on or within 165 feet of the project site, the habitat will be assessed to determine if the project area is in riparian or non-riparian habitat. Depending on the size, duration, and/or type of proposed project, the larger area surrounding the project site may also be surveyed for the presence and number of elderberry shrubs. If the project site is non-riparian and contains elderberry shrubs, exit hole surveys will be used to evaluate the site for potential occupancy.
- VELB-AMM5*, Elderberry Exclusion Buffer* and VELB-AMM6*, Fencing*, will require establishing exclusion buffers around potentially affected elderberry shrubs where possible (a qualified biologist will monitor any activity within 20 feet of an elderberry shrub, work with personnel to minimize effects on the shrub, report on any potential effects on the shrub, and report the number of times this AMM is implemented) and establishing fencing around the exclusion zone.
- VELB-AMM8, *Chemical Usage*, excludes the use of herbicides within the drip-line of an elderberry shrub and insecticides will not be used within 98 feet (30 meters) of an elderberry shrub.

With implementation of the AMMs, Covered Activities are anticipated to permanently remove an average of 3.3 elderberry shrubs in the Permit Area every year and no more than 100 elderberry shrubs over 30 years (this does not count the 200 shrubs that will be trimmed but mitigated as if they were permanently removed). For this effects analysis, SMUD is assuming that all 100 of these elderberry shrubs are occupied by valley elderberry longhorn beetle.

4.4.3.2.3 Temporary Habitat Disturbance

All valley elderberry longhorn beetle habitat disturbance is considered permanent, as described above. Therefore, no temporary disturbance of valley elderberry longhorn beetle habitat would occur.

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Table 4-5. Potential Stressors Associated with Covered Activities for Valley Elderberry Longhorn Beetle

Covered Activity Number	Covered Activity Title	Vegetation Trimming	Temporary Ground Disturbance (Work Area)	Permanent Vegetation Removal	Permanent Ground Disturbance (Habitat Loss)	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite–Small Hand or Truck Mounted (low noise threshold)[1]	Equipment Noise Onsite – Large or Truck Mounted (high noise threshold) [2]	Helicopter Disturbance	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area	Laydown of Vegetation	Ground Vibration [3]	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff	Permanent Change in Hydrology or Runoff	Spread of Invasive or Non-Native Plants[1]	Hazardous Materials Exposure	Placement of Materials
E1a	Ground-Based Overhead Line Inspection					✓					✓	✓										
E1b	Air-Based Overhead Facilities Inspection					✓					✓											
E2a	Underground Subtransmission and Distribution Components (Inspection)					✓					✓	✓										
E3	Substation Insulator Washing										✓											
E4	Substation Inspection, Maintenance and Minor Upgrades					✓					✓											
E5	Emergency Outage Inspection and Minor Repair					✓					✓											
E6a, E6b	Wood Pole Testing and Treatment—Testing, and Fiber Wrapping					✓					✓	✓										
E6c	Wood Pole Testing and Treatment—Wood Pole Repair—Trussing	✓	✓			✓					✓	✓										
E7	Overhead Component Repair and Replacement	✓		✓	✓						✓											
E8	Pole Replacement					✓					✓	✓										
E9a	Underground Component Repair and Replacement—Cable Replacement in Conduit	✓	✓	✓	✓	✓					✓	✓	✓									✓
E9b	Pad-Mounted Transformer Repair and Replacement											✓										
E9c	Direct-Buried Cable Replacement—Trenching	✓	✓			✓					✓	✓										
E9d	Direct-Buried Cable Replacement—Horizontal Directional Drilling (HDD)	✓	✓	✓	✓	✓					✓	✓	✓									✓
E9e	Cable Repair (Third Party Damage/Dig In)	✓	✓	✓	✓	✓					✓	✓	✓									✓
E10a	Steel Lattice Tower Repair and Replacement—Steel Lattice Tower Superstructure Repair	✓	✓			✓					✓	✓	✓									✓
E10b	Steel Lattice Tower Repair and Replacement—Lattice Tower Foundation Repair					✓					✓	✓										
E10c	Steel Lattice Tower Repair and Replacement – Steel Lattice Tower Replacement with a Tubular Steel Pole	✓	✓	✓	✓	✓					✓	✓	✓									✓
E10d	Steel Lattice Tower Repair and Replacement—Lattice Tower Replacement—with a New Lattice Tower	✓	✓	✓	✓	✓					✓	✓	✓									✓
E11	Overhead Reconstruction and Reconductoring	✓	✓	✓	✓	✓					✓	✓	✓									✓
E13	New and Relocated Overhead Subtransmission and Distribution Line Construction																					
E14a	New Underground Subtransmission and Distribution Line Construction—Trenching	✓	✓	✓	✓	✓					✓	✓	✓									✓

Covered Activity Number	Covered Activity Title	Vegetation Trimming	Temporary Ground Disturbance (Work Area)	Permanent Vegetation Removal	Permanent Ground Disturbance (Habitat Loss)	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite–Small Hand or Truck Mounted (low noise threshold)[1]	Equipment Noise Onsite – Large or Truck Mounted (high noise threshold) [2]	Helicopter Disturbance	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area	Laydown of Vegetation	Ground Vibration [3]	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff	Permanent Change in Hydrology or Runoff	Spread of Invasive or Non-Native Plants[1]	Hazardous Materials Exposure	Placement of Materials
E14b	New Underground Subtransmission and Distribution Line Construction—Horizontal Directional Drilling	✓	✓	✓	✓	✓					✓	✓	✓									✓
E15	Existing Substation Expansion	✓	✓	✓	✓	✓					✓	✓	✓									✓
E16	New Substation Construction	✓	✓	✓	✓	✓					✓		✓					✓				✓
G1a	Pipeline Inspections—Abnormal Operation Conditions Inspections	✓	✓	✓	✓	✓					✓	✓	✓									✓
G1b	Pipeline Inspections—Gas Leak Inspections					✓					✓											
G1c	Pipeline Inspections—Storm-Related Inspections					✓					✓											
G2	Pipeline Valve Station Inspections					✓					✓											
G3	Pipeline Cathodic Protection Test Station Inspection					✓					✓											
G4	Internal Pipeline Inspection					✓					✓	✓										
G5a	Pipeline Maintenance and Repair—Aboveground Pipeline Maintenance and Repair	✓	✓			✓					✓	✓										✓
G5b	Pipeline Maintenance and Repair—Underground Pipeline Maintenance and Repair	✓	✓	✓	✓	✓					✓	✓										✓
G6	Pipeline Cathodic Protection Test Station Installation	✓	✓	✓	✓	✓					✓											✓
G7	Pipeline Anode Bed Replacement	✓	✓	✓	✓	✓					✓	✓										✓
G8	Pipeline Valve Repair or Replacement	✓	✓	✓	✓	✓					✓											✓
G9	New Construction for Valve Stations and Pressure-Limiting Stations	✓	✓	✓	✓	✓					✓	✓	✓					✓				✓
G10a	New Construction for Realigned Pipelines—Trenching	✓	✓	✓	✓	✓					✓	✓	✓					✓				✓
G10b	New Construction for Realigned Pipelines—Horizontal Directional Drilling	✓	✓	✓	✓	✓					✓	✓	✓									✓
G10c	New Construction for Realigned Pipelines—Directional Boring	✓	✓	✓	✓	✓					✓	✓	✓									✓
G10d	New Construction for Realigned Pipelines—Hydrostatic Testing	✓	✓	✓	✓	✓					✓		✓					✓				✓
V1	Electrical Subtransmission and Distribution Easement Vegetation Management Inspections	✓	✓			✓					✓		✓									✓
V2	Electrical Subtransmission and Distribution Easement Vegetation Management					✓					✓		✓									
V3a	Transmission Easement Vegetation Management—Inspections	✓				✓					✓	✓	✓									✓
V3b	Transmission Easement Vegetation Management—Tree Trimming					✓					✓	✓	✓									
V3c	Transmission Easement Vegetation Management—Brushy Vegetation					✓					✓	✓										✓
V4	Tree Removal Projects					✓					✓	✓										✓
V5a	Elderberry Shrub Trimming and Removal—Trimming Stems					✓					✓	✓	✓									✓

Covered Activity Number	Covered Activity Title	Vegetation Trimming	Temporary Ground Disturbance (Work Area)	Permanent Vegetation Removal	Permanent Ground Disturbance (Habitat Loss)	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite–Small Hand or Truck Mounted (low noise threshold)[1]	Equipment Noise Onsite – Large or Truck Mounted (high noise threshold) [2]	Helicopter Disturbance	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area	Laydown of Vegetation	Ground Vibration [3]	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff	Permanent Change in Hydrology or Runoff	Spread of Invasive or Non-Native Plants[1]	Hazardous Materials Exposure	Placement of Materials
V5b	Elderberry Shrub Trimming and Removal—Removal by Transplantation					✓					✓	✓						✓				✓
V5c	Elderberry Shrub Trimming and Removal—Removal by Cutting					✓					✓	✓	✓									
V6	Pole Vegetation Clearing		✓	✓	✓	✓					✓	✓	✓									✓
V7	Vegetation Management on Natural Gas Easement			✓	✓	✓					✓	✓	✓									
T1	Telecommunication Tower Maintenance	✓	✓			✓					✓	✓	✓									
T2	New Construction of Telecommunication Tower(s)					✓					✓	✓	✓					✓				
T3	Electrical Telecommunications Overhead Fiber-Optic Replacement and New Installation	✓	✓			✓					✓	✓	✓									✓
T4	Electrical Telecommunications Underground Fiber-Optic Replacement and New Installation	✓	✓			✓					✓	✓	✓									
C1	SMUD Nature Preserve Mitigation Bank Oak Tree Planting[4]																					
C2	SMUD Bank Management and Monitoring																					
M1	Operation of the Cosumnes Power Plant (CPP)[4]																					
M2a	Cathodic Protection Installation[4]																					
M2b	Water Pipeline Valve Installation[4]																					
M2c	Water Pipeline Segment Replacement[4]																					
M3	Rancho Seco Property Operation and Maintenance	✓										✓	✓									

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4.4.3.2.4 Habitat Disturbance in the Vicinity of Covered Activities

Elderberry shrubs in the vicinity of Covered Activities could be disturbed by these activities, adversely affecting valley elderberry longhorn beetles occupying the shrubs. Stressors that could result in this disturbance include dust and ground disturbance. Table 4-5 lists the specific Covered Activities associated with these stressors. Dust could adversely affect valley elderberry longhorn beetle by reducing transpiration in elderberry shrubs and thereby killing the shrubs or reducing their ability to support valley elderberry longhorn beetle. Ground disturbance in the immediate vicinity of elderberry shrubs could expose roots and adversely affect the shrubs. SMUD will implement the following AMMs, described in greater detail in Table 5-1, to minimize these effects.

- VELB-AMM4*, Preconstruction Elderberry Survey,* requiring SMUD Environmental Services or qualified biologist to survey proposed sites for presence of elderberry shrubs for Covered Activities occurring in valley elderberry longhorn beetle Modeled Habitat.
- VELB-AMM5, *Elderberry Exclusion Buffer,* which requires that activities that may damage or kill an elderberry shrub (e.g., trenching, paving) may need an avoidance area of at least 20 feet from the drip-line, depending on the type of activity. A qualified biologist will monitor any activity within 20 feet of an elderberry shrub, work with personnel to minimize effects on the shrub, report on any potential effects on the shrub, and report the number of times this AMM is implemented.

With implementation of these AMMs, SMUD will be able to minimize indirect disturbance of shrubs from the Covered Activities.

Dust generated from vehicle access to and from work areas or generated during construction at work areas could coat the leaves of elderberry shrubs, reducing the health and vigor of the shrub and thereby making the habitat less suitable for valley elderberry longhorn beetle. Implementation of G-AMM1*, Annual Environmental Training*; G-AMM2, *Minimize Impacts of Work Area*; G-AMM3*, Work Area Access*; G-AMM4*, Off-Road Speed Limit*; and VELB-AMM5*, Elderberry Exclusion Buffer,* will avoid and minimize impacts on valley elderberry longhorn beetle Modeled Habitat from dust produced by vehicles and equipment.

Increase in runoff from a work area due to loss of vegetation could alter the suitability of the habitat for the elderberry shrub, thereby reducing its health and vigor. Over time, this reduced health could cause complete or partial shrub die-off, which could reduce the amount of suitable habitat for valley elderberry longhorn beetle and could result in mortality to individuals living in the shrub. Implementation of G-AMM1*, Annual Environmental Training*; G-AMM2, *Minimize Impacts of Work Area*; G-AMM6*, Erosion Control Measures*; G-AMM11*, Stabilization of Disturbed Areas*; G-AMM12*, Excess Soil*; G-AMM13*, Soil Management*; G-AMM14*, Revegetation of Work Areas*; and VELB-AMM5*, Elderberry Exclusion Buffer,* would avoid and minimize these impacts on valley elderberry longhorn beetle and its Modeled Habitat.

Most of SMUD's Covered Activities only involve the disturbance of small acreages. SMUD assumes that the general AMMs (G-AMM1–G-AMM19) and valley elderberry longhorn beetle-specific AMMs would be implemented during all applicable Covered Activities, and work practices associated with environmental review, planning, and screening (described in Section 7.2.2, *Conduct Environmental Review, Planning, and Screening)* would avoid or minimize effects on valley elderberry longhorn beetle to the maximum extent practicable.

4.4.3.2.5 Impact of the Take on the Species

As described in Section 4.2, *Methods for Analysis,* the SMUD HCP quantifies take in terms of the acres of Modeled Habitat lost or disturbed. The take limit for valley elderberry longhorn beetle is provided in Table 4-9. This level of take is not expected to have an adverse impact on the long-term survival or recovery of the species for the following reasons.

- Most of the shrubs affected would involve trimming shrubs rather than removing them, so valley elderberry longhorn beetle habitat will remain.
- Most of SMUD's Covered Activities are of short duration (less than 1 week) and involve the disturbance of small areas scattered across the entire Plan Area; therefore, these disturbances are likely to have only negligible population effects, if any.

4.4.3.2.6 Critical Habitat Impacts

There are 514 acres of total land cover within valley elderberry longhorn beetle designated critical habitat units in the Permit Area, and range-wide. Of this, 160.1 acres consist of Modeled Habitat for the species. Covered Activities would result in removal of an estimated one shrub and trimming of an estimated five shrubs. Assuming an average of 121 square feet (11-foot crown diameter) per shrub, this represents effects on 0.018 acre or less than 0.001 percent of Modeled Habitat within valley elderberry longhorn beetle designated critical habitat units in the Permit Area and range-wide.

4.4.4 Amphibians

4.4.4.1 Effects Common among Amphibians

4.4.4.1.1 Direct Injury or Mortality

Stressors that could lead to direct injury or mortality of amphibian Covered Species include temporary and permanent ground disturbance, vehicle and equipment movement, disturbance from human presence, hazardous materials exposure, and placement of materials. Table 4-6 lists the specific Covered Activities associated with these stressors for amphibian Covered Species.

Covered Activities such as grading, trenching, or excavation in uplands could result in direct mortality or injury of adults (e.g., those occupying burrows or soil crevices),

particularly when these activities are implemented close to wetland habitats such as vernal pools and stock ponds. The parking of vehicles and/or the placement of equipment and staging materials may injure or kill individuals. Vehicles and equipment traveling to and from work areas within upland habitat could potentially take adult amphibians when they are active on the surface. The movement of vehicles and equipment could also crush or injure amphibian Covered Species in occupied burrows. Humans could trample individuals or crush burrows. Ground disturbance such as blading and excavation can injure or kill individuals. Placement of stockpiled or excess soil or chipped plant material could also bury individuals. Pets in work areas could injure or kill amphibians. Generally, SMUD will not conduct work within a water body, so injury or killing of eggs or larvae resulting from in-water work is expected to be very rare. Individuals could also be injured or killed as a result of being entrapped in trenches or holes created during pole or line installation.

Except in emergency conditions, crews perform Covered Activities during daytime hours, so the potential for death or injury of dispersing amphibian Covered Species is low because this species is nocturnal. A storm-related emergency would be an exception, when construction crews could be active at night and could encounter amphibian Covered Species individuals that happen to be dispersing through the work area.

The AMMs discussed in Section 4.4.1.1, *Direct Injury and Mortality* and those listed below will minimize injury of mortality of amphibian Covered Species.

- G-AMM4, *Off Road Speed Limit*, will minimize amphibian vehicle strikes by requiring vehicles to observe a 15 mile-per-hour speed limit when driving off paved roads.
- G-AMM5, *Work Area General Guidelines,* will minimize the risk of pets associated with workers injuring or killing amphibians by prohibiting pets from Covered Activity areas.
- G-AMM10*, Covered Species Entrapment Prevention,* will minimize the risk of amphibians being entrapped in trenches and holes at Covered Activity sites by requiring SMUD fied crews to cover any open trenches and holes at the end of the work day, and related measures described in Table 5-1. SMUD field crews will inspect any open trench, hole, or pipe for trapped Covered Species.
- G-AMM12, *Excess Soil;* G-AMM13*, Soil Management*; and G-AMM16, *Chipped Plant Material Management,* will avoid or minimize injury or mortality of amphibian Covered Species individuals by requiring SMUD field crews to avoid Open Water/Fringe; Other Depressional Wetlands; or Vernal Pool, Seasonal Wetland, and Swale land cover types or Modeled Habitat with burrows, when spreading excess soil around a work site or when creating stock piles or spreading chipped plant material.

SMUD may occasionally need to implement Covered Activities in breeding areas where there is the potential for death or injury of eggs, larvae, or adults. However, G-AMM13*, Soil Management;* VP-AMM1, *Avoid Driving Through Vernal Pools;* and VP-AMM2*, Minimize Vehicle Impacts on Vernal Pools,* will keep vehicles and stockpiled soil out of aquatic habitat.

The SMUD Covered Activities will typically disturb only small areas, take place over short time frames (1 to fewer than 10 days), occur during daylight hours, and involve few personnel and vehicles. Furthermore, most of the time, Covered Activities will not typically take place near breeding habitat for amphibian Covered Species. Accordingly, the likelihood of encountering amphibian Covered Species individuals while conducting Covered Activities is low. Large-scale Covered Activities involving more heavy equipment, personnel, and ground disturbance pose greater potential for injury or morality of amphibian Covered Species. However, planning and coordination requires siting facilities and locating work areas away from sensitive habitat, and with implementation of the AMMs described above, injury or mortality will be minimized.

Section 4.4.4.2, *California Tiger Salamander* lists additional, species-specific AMMs to minimize risk of injuring or killing individuals of this species.

4.4.4.1.2 Permanent Habitat Loss

Permanent ground disturbance will lead to permanent loss of Modeled Habitat for amphibian Covered Species. Table 4-6 lists the Covered Activities associated with this stressor. Section 4.4.1.2, *Permanent Habitat Loss,* describes how permanent habitat loss affects Covered Species and the AMMs SMUD will implement to avoid or minimize these effects.

4.4.4.1.3 Temporary Habitat Disturbance

Temporary ground disturbance and placement of materials could result in temporary disturbance of amphibian Covered Species Modeled Habitat within the Covered Activity footprint. Table 4-6 lists the Covered Activities associated with each of these stressors.

Section 4.4.1.3, *Temporary Habitat Disturbance,* describes how temporary habitat disturbance affects Covered Species and the AMMs SMUD will implement to avoid or minimize these effects. Additionally, SMUD will minimize these effects on amphibian Covered Species through the following measure.

- G-AMM13, *Soil Management,* will avoid or minimize temporary habitat disturbance of amphibian Covered Species Modeled Habitat by requiring SMUD field crews to avoid Open Water/Fringe; Other Depressional Wetlands; or Vernal Pool, Seasonal Wetland, and Swale land cover types or Modeled Habitat with burrows when stockpiling soil at work site.

While SMUD will minimize the area of temporary effects as described above, unavoidable temporary habitat disturbance could result in long-term effects on the amphibian Covered Species in the absence of AMMs. Excavation and grading in amphibian Covered Species habitat also have the potential to alter soil properties, topography, or hydrology, creating conditions unsuitable for the growth, survival and reproduction of some species. The following AMMs, however, will result in the avoidance of long-term effects of temporary disturbance of Modeled Habitat.

- G-AMM11, *Stabilization of Disturbed Areas,* avoids long-term effects on amphibian Covered Species Modeled Habitat from temporarily disturbed areas by requiring SMUD field crews to remove temporarily fill or construction debris, backfill excavation sites, stabilize and compact soils, and return the project to pre-project contours.

- G-AMM12, *Excess Soil*; G-AMM13, *Soil Management*; and G-AMM16, *Chipped Plant Material Management,* will avoid or minimize temporary habitat disturbance of amphibian Covered Species Modeled Habitat by requiring SMUD field crews to avoid Open Water/Fringe; Other Depressional Wetlands; or Vernal Pool, Seasonal Wetland, and Swale land cover types or Modeled Habitat with burrows when spreading excess soil or chipped plant material around a work site.

- G-AMM14, *Revegetation of Work Areas,* avoids long-term effects on amphibian Covered Species Modeled Habitat from temporarily disturbed areas by requiring temporary disturbances of 0.1 acre or more of Modeled Habitat for Covered Species that contains herbaceous vegetation to be revegetated. SMUD expects temporary disturbances of less than 0.1 acre of herbaceous vegetation to recover passively, and to not require active revegetation.

Table 5-1 describes the AMMs listed above in greater detail. The species-specific sections below provide the estimated amounts of Modeled Habitat to be temporarily disturbed for each amphibian Covered Species

4.4.4.1.4 Habitat Disturbance in the Vicinity of Covered Activities

Stressors that could lead to amphibian Covered Species habitat disturbance in the vicinity of Covered Activities include disturbance from human presence, ground vibration, temporary and permanent night lighting, increased temporary runoff, permanent change in hydrology or runoff, spread of invasive or nonnative plants, and hazardous materials exposure. Table 4-6 lists the Covered Activities associated with each of these stressors.

Some of the stressors associated with Covered Activities will only have potential to affect the species in the vicinity during the covered operation, maintenance, or construction activity. Workers in the vicinity of Covered Activities could stress individuals and/or cause them to leave the area. Ground vibrations during Covered Activities could cause individuals to emerge from their burrows, thereby exposing them to heat, desiccation, trampling, crushing, or predation. Temporary night lighting could expose amphibians that emerge from their burrows at night, exposing them to trampling, crushing, or predation.

Some of the stressors associated with Covered Activities may have adverse effects on species in the vicinity during the activity, and in the absence of AMMs could result in longer-term effects. Excavation and grading can change surface drainage patterns or break through hardpan or claypan restrictive soil layers and alter the hydrology of vernal pools or swales that provide aquatic habitat for the amphibian Covered Species. Also, chemicals, fuels, and lubricants that might be used during Covered Activities could accidentally enter Modeled Habitat and reduce water quality. Covered Activities could cause erosion or turbidity that degrades nearby habitat. Sidecast soil from excavation, spilled materials, and other substances (such as oil leaked from a transformer) could be

carried by ditches or swales to nearby sensitive areas, causing habitat degradation. Discharge of water from hydrostatic testing could also flow into Modeled Habitat and alter its hydrology, cause erosion or sedimentation, or introduce contaminants. Hydrology could also be altered or habitat contaminated with bentonite or polymer material as a result of horizontal directional drilling if drilling fluids are unintentionally returned to the surface, and these fluids enter the Modeled Habitat.

Altered hydrology, erosion, sedimentation, or contamination may reduce amphibian fitness or render the wetlands unsuitable for supporting the species, thereby affecting the species by reducing population size. The following AMMs, however, will result in the minimization or avoidance of hydrologic alteration, erosion, sedimentation, or contamination from Covered Activities in the vicinity of amphibian Covered Species Modeled Habitat.

- G-AMM6, *Erosion Control Measures,* will ensure measures are in place to prevent erosion in nearby habitat.
- G-AMM7, *Equipment Refueling,* and G-AMM8, *Hazardous Material Clean Up,* will prevent Covered Activity related fuel spills that could affect amphibian Covered Species Modeled Habitat and ensure that any hazardous materials that could adversely affect the amphibians are removed.
- G-AMM9, *HDD Drilling Fluids Management,* will prevent adverse effects from horizontal directional drilling by requiring SMUD field crews conducting this activity within 50 feet of aquatic Modeled Habitat to install containment measures such as secondary containment and following a contingency plan to avoid run-off into aquatic Modeled Habitat.
- G-AMM11, *Stabilization of Disturbed Areas,* requires SMUD to stabilize temporarily disturbed areas and return them to pre-project contours, thus avoiding long-term hydrologic alterations in nearby Modeled Habitat.
- G-AMM13, *Soil Management,* requires SMUD to locate stockpiles in areas that will not enter wetland Modeled Habitat for Covered Species, and to cover stockpiles prior to precipitation events, thus avoiding run-off and sedimentation from stockpiles into the wetland Modeled Habitat or Modeled Habitat with burrows.
- G-AMM19, *Discharge of Hydrostatic Test Water,* will ensure that hydrostatic test water does not enter any Vernal Pool, Seasonal Wetland, or Swale land cover type.

Permanent lighting is a potential long-term stressor that would occur after the Covered Activity is completed. Covered Activities that could result in this stressor are indicated in Table 4-6. Lighting could affect amphibians in nearby habitat by disrupting their diurnal activities or making them more vulnerable to predators when they emerge from their burrows at night. SMUD will minimize this effect by implementing G-AMM17, *Night Lighting,* which requires that lighting will be oriented away from habitat.

The following sections address additional, species-specific effects for the amphibian Covered Species.

Table 4-6. Potential Stressors Associated with Covered Activities for California tiger salamander

Covered Activity Number	Covered Activity Title	Modeled Habitat Impacts				Other Effects																	
		Temporary Disturbance of Vegetation (Trimming or Removal)	Temporary Ground Disturbance (Work Area)	Permanent Vegetation Loss	Permanent Ground Disturbance (Habitat Loss)	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite–Small Hand or Truck Mounted (low noise threshold)[1]	Equipment Noise Onsite – Large or Truck Mounted (high noise threshold) [2]	Helicopter Disturbance	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area[1]	Laydown of Vegetation	Ground Vibration [3]	Electrocution	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff	Permanent Change in Hydrology or Runoff	Spread of Invasive or Non-Native Plants	Hazardous Materials Exposure	Placement of Materials
E1a	Ground-Based Overhead Line Inspection					✓					✓											✓	
E1b	Air-Based Overhead Facilities Inspection[5]					✓					✓											✓	
E2a	Underground Subtransmission and Distribution Components (Inspection)					✓					✓											✓	
E2b	Underground Transmission Lines (Inspection)					✓					✓											✓	
E3	Substation Insulator Washing										✓											✓	
E4	Substation Inspection, Maintenance and Minor Upgrades[5]					✓					✓						✓					✓	
E5	Emergency Outage Inspection and Minor Repair					✓					✓											✓	
E6a, E6b	Wood Pole Testing and Treatment—Testing, and Fiber Wrapping		✓			✓					✓											✓	
E6c	Wood Pole Testing and Treatment—Wood Pole Repair—Trussing				✓						✓											✓	
E7	Overhead Component Repair and Replacement					✓					✓						✓					✓	
E8	Pole Replacement		✓		✓	✓					✓				✓		✓					✓	✓
E9a	Underground Component Repair and Replacement—Cable Replacement in Conduit																✓					✓	
E9b	Pad-Mounted Transformer Repair and Replacement		✓			✓					✓											✓	
E9c	Direct-Buried Cable Replacement—Trenching		✓		✓	✓					✓				✓						✓	✓	✓
E9d	Direct-Buried Cable Replacement—Horizontal Directional Drilling (HDD)		✓		✓	✓					✓				✓		✓				✓	✓	✓
E9e	Cable Repair (Third Party Damage/Dig In)		✓			✓					✓				✓						✓	✓	✓
E10a	Steel Lattice Tower Repair and Replacement—Steel Lattice Tower Superstructure Repair					✓					✓											✓	
E10b	Steel Lattice Tower Repair and Replacement—Lattice Tower Foundation Repair		✓		✓	✓					✓				✓		✓				✓	✓	✓
E10c	Steel Lattice Tower Repair and Replacement—Steel Lattice Tower Replacement with a Tubular Steel Pole		✓		✓	✓					✓				✓						✓	✓	✓
E10d	Steel Lattice Tower Repair and Replacement—Lattice Tower Replacement—with a New Lattice Tower		✓		✓	✓					✓				✓						✓	✓	✓
E11	Overhead Reconstruction and Reconductoring		✓		✓	✓					✓											✓	✓

Covered Activity Number	Covered Activity Title	Modeled Habitat Impacts				Other Effects																	
		Temporary Disturbance of Vegetation (Trimming or Removal)	Temporary Ground Disturbance (Work Area)	Permanent Vegetation Loss	Permanent Ground Disturbance (Habitat Loss)	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite–Small Hand or Truck Mounted (low noise threshold)[1]	Equipment Noise Onsite – Large or Truck Mounted (high noise threshold) [2]	Helicopter Disturbance	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area[1]	Laydown of Vegetation	Ground Vibration [3]	Electrocution	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff	Permanent Change in Hydrology or Runoff	Spread of Invasive or Non-Native Plants	Hazardous Materials Exposure	Placement of Materials
E13	New and Relocated Overhead Subtransmission and Distribution Line Construction		✓		✓	✓					✓				✓							✓	✓
E14a	New Underground Subtransmission and Distribution Line Construction—Trenching		✓		✓	✓					✓				✓						✓	✓	✓
E14b	New Underground Subtransmission and Distribution Line Construction—Horizontal Directional Drilling		✓		✓	✓					✓				✓						✓	✓	✓
E15	Existing Substation Expansion		✓		✓	✓					✓				✓				✓	✓		✓	✓
E16	New Substation Construction		✓		✓	✓					✓				✓			✓	✓	✓		✓	✓
G1a	Pipeline Inspections—Abnormal Operation Conditions Inspections					✓					✓											✓	
G1b	Pipeline Inspections—Gas Leak Inspections					✓					✓											✓	
G1c	Pipeline Inspections—Storm-Related Inspections					✓					✓											✓	
G2	Pipeline Valve Station Inspections					✓					✓												
G3	Pipeline Cathodic Protection Test Station Inspection					✓					✓											✓	
G4	Internal Pipeline Inspection		✓			✓					✓											✓	✓
G5a	Pipeline Maintenance and Repair—Aboveground Pipeline Maintenance and Repair		✓		✓	✓					✓				✓						✓	✓	✓
G5b	Pipeline Maintenance and Repair—Underground Pipeline Maintenance and Repair		✓		✓	✓					✓				✓		✓				✓	✓	✓
G6	Pipeline Cathodic Protection Test Station Installation		✓		✓	✓					✓				✓						✓	✓	✓
G7	Pipeline Anode Bed Replacement		✓		✓	✓					✓				✓						✓	✓	✓
G8	Pipeline Valve Repair or Replacement		✓		✓	✓					✓				✓						✓	✓	✓
G9	New Construction for Valve Stations and Pressure-Limiting Stations		✓		✓	✓					✓				✓			✓	✓	✓	✓	✓	✓
G10a	New Construction for Realigned Pipelines—Trenching		✓		✓	✓					✓				✓				✓		✓	✓	✓
G10b	New Construction for Realigned Pipelines—Horizontal Directional Drilling		✓		✓	✓					✓				✓						✓	✓	✓
G10c	New Construction for Realigned Pipelines—Directional Boring		✓		✓	✓					✓				✓						✓	✓	✓
G10d	New Construction for Realigned Pipelines—Hydrostatic Testing		✓			✓					✓								✓			✓	✓
V1	Electrical Subtransmission and Distribution Easement Vegetation Management Inspections					✓					✓											✓	
V2	Electrical Subtransmission and Distribution Easement Vegetation Management					✓					✓											✓	✓
V3a	Transmission Easement Vegetation Management—Inspections					✓					✓											✓	

Covered Activity Number	Covered Activity Title	Modeled Habitat Impacts				Other Effects																	
		Temporary Disturbance of Vegetation (Trimming or Removal)	Temporary Ground Disturbance (Work Area)	Permanent Vegetation Loss	Permanent Ground Disturbance (Habitat Loss)	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite–Small Hand or Truck Mounted (low noise threshold)[1]	Equipment Noise Onsite – Large or Truck Mounted (high noise threshold) [2]	Helicopter Disturbance	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area[1]	Laydown of Vegetation	Ground Vibration [3]	Electrocution	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff	Permanent Change in Hydrology or Runoff	Spread of Invasive or Non-Native Plants	Hazardous Materials Exposure	Placement of Materials
V3b	Transmission Easement Vegetation Management—Tree Trimming					✓					✓											✓	✓
V3c	Transmission Easement Vegetation Management—Brushy Vegetation					✓					✓											✓	✓
V4	Tree Removal Projects					✓					✓											✓	✓
V5a	Elderberry Shrub Trimming and Removal—Trimming Stems					✓					✓											✓	✓
V5b	Elderberry Shrub Trimming and Removal—Removal by Transplantation					✓					✓								✓		✓	✓	
V5c	Elderberry Shrub Trimming and Removal—Removal by Cutting					✓					✓											✓	✓
V6	Pole Vegetation Clearing				✓	✓					✓											✓	
V7	Vegetation Management on Natural Gas Easement		✓		✓	✓					✓										✓	✓	
T1	Telecommunication Tower Maintenance																✓					✓	
T2	New Construction of Telecommunication Tower(s)		✓		✓	✓					✓									✓		✓	✓
T3	Electrical Telecommunications Overhead Fiber-Optic Replacement and New Installation		✓		✓	✓					✓											✓	
T4	Electrical Telecommunications Underground Fiber-Optic Replacement and New Installation		✓			✓					✓											✓	
C1	SMUD Bank Oak Tree Planting[4]																				✓	✓	✓
C2	SMUD Bank Management and Monitoring		✓			✓	✓				✓											✓	
M1	Operation of the Cosumnes Power Plant (CPP)[4]					✓	✓	✓	✓		✓						✓						✓
M2a	Cathodic Protection Installation[4]																				✓		
M2b	Water Pipeline Valve Installation[4]																				✓		
M2c	Water Pipeline Segment Replacement		✓			✓					✓				✓				✓		✓		
M3	Rancho Seco Property Operation and Maintenance		✓			✓		✓	✓		✓										✓		

Notes: Temporary impacts assume habitat recovery within 1 year. Permanent impacts assume no habitat recovery within 1 year.

[1] Less than 80 dBA at 50 feet (pumps, air compressors, tractors, backhoes) – assumes short duration (less than 30 minutes) dBA = decibels using A-weighting scale

[2] Greater than 80 dBA at 50 feet (front end loaders, graders, bull dozers, hydraulic excavators, chainsaws, pneumatic tools)

[3] Greater than 60 VdB at 25 feet (large bulldozer, jack hammer) VdB = Vibration velocity in decibels

[4] These Covered Activities are specific to site locations. If no impacts are checked, then the Covered Activity is in a location that does not currently overlap with Modeled Habitat for the species and/or no potential adverse impacts/effects from this Covered Activity are associated with the Covered Species.

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4.4.4.2 California Tiger Salamander

Potential stressors related to Covered Activities, effects on California tiger salamander, and AMMs to avoid or minimize these effects, are as described in Section 4.4.4.1., *Effects Common among Amphibians.* Additional species-specific effects and AMMs to avoid and minimize these effects are provided below.

4.4.4.2.1 Direct Injury or Mortality

Section 4.4.4.1.1, *Direct Injury of Mortality,* describes how the Covered Activities could result in direct injury or mortality of the amphibian Covered Species. Additionally, California tiger salamanders could be injured or killed as a result of getting caught in monofilament used for erosion control, or as a result of handling and relocating individuals to move out of harm's way. SMUD will implement the AMMs described above for amphibian Covered Species and the species-specific AMMs outlined below to avoid and minimize risk of injuring or killing California tiger salamander individuals. Table 5-1 describes the AMMs in detail.

- When it is not feasible to avoid refugia, SMUD will minimize risk or injury or mortality through CTS-AMM2*, Pre-Work Clearance Survey*; and CTS-AMM3*, California Tiger Salamander Biological Monitor,* by conducting pre-work clearance surveys, requiring a biological monitor during the Covered Activity that occurs between October 15 and July 15 in California tiger salamander Modeled Habitat within Conservation Lands or for activities greater than 0.1 acre, and relocating any California tiger salamanders found. CTS-AMM7, *California Tiger Salamander Handling,* will avoid the risk of California tiger salamanders being injured or killed during handling by requiring qualified biologists to follow the handling protocol. Table 5-1 provides additional details on these measures.

- CTS-AMM1*, Daily California Tiger Salamander Work Windows,* will minimize risk of injuring or killing foraging and dispersing California tiger salamanders, which are nocturnally active, by limiting construction activities that occur within suitable tiger salamander habitat during the wet season. Such construction will avoid all suitable aquatic habitat. No construction activities will be conducted in upland habitat areas where tiger salamanders may occur if there is a greater than 70 percent chance of rain based on the National Oceanic and Atmospheric Administration's National Weather Service forecast or within 48 hours following a rain event greater than 0.25 inch, unless approved by the monitor. Earthmoving and construction activities will cease no less than 30 minutes before sunset and will not begin again until no less than 30 minutes after sunrise. Except when necessary for driver or pedestrian safety, artificial lighting at a worksite will be prohibited during the hours of darkness. Where lighting is necessary, lighting will be directed inwards towards the construction footprint and will not be cast on California tiger salamander habitat outside of the construction area. CTS-AMM5*, California Tiger Salamander Exclusion Fencing,* will further minimize this risk by requiring placement of exclusion fencing around work areas when California tiger salamanders are likely to be moving through these areas (October 15 through July 15).

- CTS-AMM4, *Avoid Inundated California Tiger Salamander Habitat,* will avoid injury or mortality of California tiger salamander eggs, larvae, juveniles, or adults in aquatic habitat by avoiding Covered Activities in aquatic Modeled Habitat when water is present.
- CTS-AMM6, *Avoid Usage of Plastic Mono-Filament Erosion Control Materials in California Tiger Salamander Modeled Habitat*, will avoid risk of California tiger salamander becoming entangled in plastic mono-filament.
- CTS-AMM8, describes how SMUD will install and maintain a permanent California tiger salamander exclusion fence around the perimeter of the Cosumnes Power Plant to avoid impacting California tiger salamander during operation and maintenance of CPP. The fencing would be at least 2 feet tall above the soil surface and buried to a minimum depth of 4 inches below the soil surface. The barrier would be designed to prevent California tiger salamander from climbing over it or under it through burrows or cracks. SMUD would monitor the exclusion fencing and maintain it for the life of CPP, checking it annually prior to each rainy season.

With the implementation of AMMs, direct injury or mortality of California tiger salamander is expected to be rare.

4.4.4.2.2 Permanent Habitat Loss

Covered Activities could result in permanent loss of an average of less than 0.2 acre of breeding Modeled Habitat annually, and no more than 5 acres of breeding Modeled Habitat would be permanently lost over 30 years (Table 4-9). Covered Activities could permanently affect 1.9 acres of upland Modeled Habitat annually and no more than 24.6 acres of upland Modeled Habitat over 30 years (Table 4-9).

4.4.4.2.3 Temporary Habitat Disturbance

Covered Activities will temporarily result in temporary disturbance of an estimated average of less than 0.1 acre of breeding Modeled Habitat annually. Covered Activities would temporarily affect an estimated average of 3.6 acres of upland Modeled Habitat annually. Covered Activities could temporarily affect a total of up to 0.5 acre of aquatic Modeled Habitat and 109.5 acres of upland Modeled Habitat over 30 years (Table 4-9).

4.4.4.2.4 Habitat Disturbance in the Vicinity of the Covered Activities

Section 4.4.1.4, *Habitat Disturbance in the Vicinity of the Covered Activities*, describes how the Covered Activities could affect amphibian Covered Species by disturbing habitat in the vicinity. SMUD will implement the AMMs described above for amphibian Covered Species. Table 5-1 describes the AMMs in detail.

Based on the methods described in Section 4.2.2.2, *Estimating Disturbance of Modeled Habitat in the Vicinity of Covered Activities,* and with implementation of the AMMs described in Section 4.4.4.1.4, *Habitat Disturbance in the Vicinity of Covered Activities*, SMUD could disturb an average of less than 0.1 acre of California tiger salamander

breeding Modeled Habitat in the vicinity of Covered Activities annually, and up to 3.2 acres over 30 years (Table 4-9).

4.4.4.2.5 Impact of the Take on the Species

As described in Section 4.2, *Methods for Analysis,* the SMUD HCP quantifies take in terms of the acres of Modeled Habitat lost or disturbed. The take limit for California tiger salamander is provided in Table 4-9. This level of take is not expected to have an adverse impact on the long-term survival or recovery of the species for the following reasons.

- Only an estimated 0.14 percent of the Modeled Habitat for this species in the Plan Area will be disturbed.
- Covered Activities could result in permanent loss of an average of less than 0.2 acre of breeding Modeled Habitat and 1.9 acres of upland Modeled Habitat annually within the 102,731-acre range of California tiger salamander Central California distinct population segment (DPS) in the Permit Area. As such, permanent loss of breeding Modeled Habitat would be rare and consist of very small losses dispersed over a large geographic area. Permanent loss of upland dispersal Modeled Habitat would result mainly from siting new facilities in an area where none currently exist, and these areas would be 0.25 acre or less, geographically dispersed over 95,327 acres of Permit Area upland Modeled Habitat. The small amount of permanent loss of Modeled Habitat is not expected to significantly impair the life history requirements of California tiger salamander Central California DPS or reduce the population.
- The temporary disturbance of any given Modeled Habitat area would generally be less than 0.1 acre (4,356 square feet, or a 66-foot square). In cases where the temporary disturbance is greater than 0.1 acre, AMMs require that the impact area be recontoured and restored to encourage the restoration of the habitat. The temporary loss of small amounts of upland Modeled Habitat across a large area is not expected to significantly impair essential behavioral patterns for California tiger salamander. For instance, it is unlikely that individuals of the species occupying Modeled Habitat in and around work areas would be unable to find prey or shelter, or that such small temporary Modeled Habitat impacts would impair dispersal between breeding and upland Modeled Habitat. Further, such small temporary effects on Modeled Habitat are not expected to fragment habitat areas or impair genetic exchange between populations.

4.4.4.2.6 Critical Habitat Impacts

There are 199,108 acres of total land cover within California tiger salamander designated critical habitat units, 7,926 acres of which are in the Permit Area. Modeled Habitat in the Permit Area is expected to contain all the PCEs for this species' critical habitat. Covered Activities could permanently affect an estimated 2.14 acres and temporarily affect an estimated 6.01 acres of California tiger salamander Modeled Habitat within critical habitat units 3 and 4 (Appendix H) . This represents less than 0.1 percent of the aquatic habitat in designated critical habitat units in the Permit Area and less than 0.1 percent of all land

cover types within California tiger salamander designated critical habitat units in the Permit Area.

4.4.5 Reptiles

4.4.5.1 Effects Common Among Reptiles

4.4.5.1.1 Direct Injury or Mortality

Stressors that could lead to direct injury or mortality include temporary and permanent ground disturbance, vehicle and equipment movement, disturbance from human presence, hazardous materials exposure, and placement of materials. Table 4-7 lists the specific Covered Activities associated with these stressors for reptile Covered Species.

Covered Activities such as grading, trenching, or excavation in uplands could result in direct mortality or injury of individuals (e.g., those occupying burrows), particularly when these activities are implemented close to aquatic habitats. The parking of vehicles and/or the placement of equipment and staging materials may injure or kill individuals. Vehicles and equipment traveling to and from work areas within upland habitat could potentially take adults. Ground disturbance such as blading and excavation can injure or kill individuals. Placement of stockpiled or excess soil or chipped plant material could also bury individuals. Pets in work areas could injure or kill individuals. Individuals could also be injured or killed as a result of being entrapped in trenches or holes created during pole or line installation.

The AMMs discussed in Section 4.4.1.1, *Direct Injury and Mortality,* and those listed below will minimize injury of mortality of reptile Covered Species.

- G-AMM4*, Off Road Speed Limit*, will minimize reptile vehicle strikes by requiring vehicles to observe a 15 mile-per-hour speed limit when driving off paved roads.
- G-AMM5*, Work Area General Guidelines,* will minimize the risk of pets associated with workers injuring or killing reptiles by prohibiting pets from Covered Activity areas.
- G-AMM10*, Covered Species Entrapment Prevention,* will minimize the risk of reptiles being entrapped in trenches and holes at Covered Activity sites by requiring SMUD filed crews to cover any open trenches and holes at the end of the work day, and related measures described in Table 5-1.
- G-AMM12*, Excess Soil;* G-AMM13, *Soil Management*; and G-AMM16, *Chipped Plant Material Management,* will avoid or minimize injury or mortality of reptile Covered Species individuals by requiring SMUD field crews to avoid Open Water/Fringe land cover types and Modeled Habitat with burrows when spreading excess soil around a work site or when creating stockpiles or spreading chipped plant material.

The SMUD Covered Activities will typically disturb only small areas, take place over short time frames (1 to several days), and involve few personnel and vehicles. Accordingly, the likelihood of encountering reptile Covered Species individuals while conducting

Covered Activities is low. Large-scale Covered Activities involving more heavy equipment, personnel, and ground disturbance pose greater potential for injury or morality of reptile Covered Species. However, planning and coordination requires siting facilities and locating work areas away from sensitive habitat, and with implementation of the AMMs described above, injury or mortality will be minimized.

Section 4.4.5.2, *Giant Garter Snake,* lists additional, species-specific AMMs to minimize risk of injuring or killing individuals of this species.

4.4.5.1.2 Permanent Habitat Loss

Permanent ground disturbance will lead to permanent loss of Modeled Habitat for reptile Covered Species. Table 4-7 lists the Covered Activities associated with this stressor.

Section 4.4.1.2, *Permanent Habitat Loss,* describes how permanent habitat loss affects Covered Species and the AMMs SMUD will implement to avoid or minimize these effects. The amounts of permanent habitat loss estimated for each species are described in the species-specific section below.

4.4.5.1.3 Temporary Habitat Disturbance

Covered Activities could result in temporary disturbance of reptile Covered Species Modeled Habitat within the Covered Activity footprint through temporary ground disturbance. Table 4-7 lists the Covered Activities associated with this stressor. Section 4.4.1.3, *Temporary Habitat Disturbance,* describes the effects of temporary habitat disturbance on Covered Species and AMMs relevant to all species, including reptile Covered Species.

4.4.5.1.4 Habitat Disturbance in the Vicinity of Covered Activities

Stressors that could lead to reptile Covered Species habitat disturbance in the vicinity of Covered Activities include disturbance from human presence, ground vibration, increased temporary runoff, permanent change in hydrology or runoff, spread of invasive or nonnative plants, and hazardous materials exposure. Table 4-6 lists the Covered Activities associated with each of these stressors.

Some of the stressors associated with Covered Activities will only have potential to affect the species in the vicinity during the covered operation, maintenance, or construction activity. Workers in the vicinity of Covered Activities could stress individuals and/or cause them to leave the area. Ground vibrations during Covered Activities could cause individuals to move out of the disturbed area.

Some of the stressors associated with Covered Activities may have adverse effects on species in the vicinity and could result in longer-term effects in the absence of AMMs. Chemicals, fuels, and lubricants that might be used during Covered Activities could accidentally enter Modeled Habitat and reduce water quality. Covered Activities could cause erosion or turbidity that degrades nearby habitat. Hydrology could also be altered

or habitat contaminated with bentonite or polymer material as a result of horizontal directional drilling if drilling fluids are unintentionally returned to the surface, and these fluids enter the Modeled Habitat.

SMUD's Covered Activities could result in an increase in runoff from a work area, due to loss of vegetation. Increased runoff could affect the water levels in aquatic features and/or degrade water quality through increases in erosion, water turbidity, and sedimentation or nutrient loading. These could diminish the potential of an aquatic feature to support giant garter snakes. This change in habitat could result in a reduction in basking areas, or disrupt the species' normal foraging and breeding activities.

The following AMMs, in addition to those described in Section 4.4.1.4, *Habitat Disturbance in the Vicinity of Covered Activities*, will result in the minimization or avoidance of disturbances from Covered Activities in the vicinity of reptile Covered Species Modeled Habitat.

- G-AMM6*, Erosion Control Measures,* will ensure measures are in place to prevent erosion in nearby habitat.
- G-AMM7*, Equipment Refueling,* and G-AMM8*, Hazardous Material Clean Up,* will prevent Covered Activity related fuel spills that could affect reptile Covered Species Modeled Habitat and ensure that any hazardous materials that could adversely affect the amphibians are removed.
- G-AMM9*, HDD Drilling Fluids Management,* will prevent adverse effects from horizontal directional drilling by requiring SMUD field crews conducting this activity within 50 feet of aquatic Modeled Habitat to install containment measures such as secondary containment and to follow a contingency plan to avoid run-off into aquatic Modeled Habitat.
- G-AMM11*, Stabilization of Disturbed Areas,* requires SMUD to stabilize temporarily disturbed areas and return them to pre-project contours, thus avoiding long-term hydrologic alterations in nearby Modeled Habitat.
- G-AMM13, *Soil Management,* requires SMUD to locate stockpiles in areas that will not enter wetland Modeled Habitat for Covered Species, and to cover stockpiles prior to precipitation events, thus avoiding run-off and sedimentation from stockpiles into the wetland Modeled Habitat and Modeled Habitat with burrows.

Table 5-1 describes the AMMs listed above in greater detail. The following sections address additional, species-specific effects for the reptile Covered Species.

4.4.5.2 Giant Garter Snake

4.4.5.2.1 Direct Injury or Mortality

Ground-disturbing activities (grading, trenching, or excavating) could crush or bury newborns, juveniles, and adult giant garter snakes in upland areas as well as snakes

using adjacent aquatic areas for dispersal, basking, foraging, or sheltering. Vehicles and equipment traveling to and from work areas also could potentially take newborn, juveniles, and adults when traveling through upland habitats while the species is using these areas for cover or dispersal. Moving vehicles can kill or injure snakes when they are active in the uplands or crush them while they seek refuge in small burrows that collapse from the weight of vehicles and equipment.

In addition to the AMMs described above in Section 4.4.4.1.1, *Direct Injury or Mortality,* SMUD will implement species-specific measures to avoid and minimize the risk of injuring or killing giant garter snake individuals as follows.

- SMUD will detect giant garter snake habitat or giant garter snakes potentially in harm's way, and by implementing GGS-AMM1*, GGS Biological Monitor*, will avoid injury or mortality of giant garter snakes where possible on Conservation Lands or for activities greater than 0.1 acre in Modeled Habitat or for Covered Activities initiated in the inactive season, and avoid individuals or facilitate their movement out of harm's way.
- GSS-AMM2, *Giant Garter Snake Seasonal Work Windows,* will minimize injuring or killing giant garter snakes by limiting Covered Activities (work period limited from May 1 to October 1) in giant garter snake Modeled Habitat to the active period (when snakes can move out of harm's way) or implementing alternative measures as detailed in Table 5-1.
- GGS-AMM3, *Minimize Vegetation Clearing,* will minimize injury or mortality by requiring that SMUD field crews use hand tools to remove vegetation and debris from dewatered habitat.
- GSS-AMM4*, Dewatering,* will minimize injuring or killing giant garter snakes by limiting required dewatering in advance of ground disturbance, so giant garter snakes will leave the aquatic habitat prior to the activities that could resulting in injury or mortality.

4.4.5.2.2 Permanent Habitat Loss

In addition to the measures described in Section 4.4.1.2, *Permanent Habitat Loss,* SMUD will implement the following AMMs to minimize permanent loss of giant garter snake Modeled Habitat.

- GGS-AMM3, *Minimize Vegetation Clearing,* SMUD field crews will minimize vegetation clearing to the minimal area necessary to facilitate Covered Activities within Modeled Habitat.

SMUD anticipates that Covered Activities could result in permanent loss of no more than 0.05 acre of aquatic Modeled Habitat and 24.1 acres of upland Modeled Habitat (approximately 1.9 acres annually) for giant garter snake in the Permit Area over 30 years (Table 4-9). By permanently affecting the upland Modeled Habitat, Covered Activities could potentially result in the loss of areas used for overwintering and dispersal.

4.4.5.2.3 Temporary Habitat Disturbance

In addition to the measures described in Section 4.4.1.3, *Temporary Habitat Disturbance,* SMUD will implement the following AMM to minimize permanent loss of giant garter snake Modeled Habitat.

- GGS-AMM3, *Minimize Vegetation Clearing,* will minimize temporary habitat disturbance by requiring that SMUD field crews minimize vegetation clearing to the minimum area necessary to facilitate Covered Activities.

Covered Activities would temporarily disturb an average of 0.3 acre of aquatic Modeled Habitat and 3.4 acres of upland Modeled Habitat annually, and no more than 10.4 acres of aquatic Modeled Habitat and 102.2 acres of upland Modeled Habitat over 30 years (Table 4-9).

4.4.5.2.4 Habitat Disturbance in the Vicinity of Covered Activities

Potential disturbance of giant garter snake habitat in the vicinity of the Covered Activities and the measures SMUD will implement to avoid and minimize effects on the species are as described in Section 4.4.5.1.4, *Habitat Disturbance in the Vicinity of Covered Activities*.

4.4.5.2.5 Impact of the Take on the Species

As described in Section 4.2, *Methods for Analysis,* the SMUD HCP quantifies take in terms of the acres of Modeled Habitat lost or disturbed. The take limit for giant garter snake is provided in Table 4-9. This level of take is not expected to have an adverse impact on the long-term survival or recovery of the species for the following reasons.

- Only an estimated 0.33 percent of the Modeled Habitat for this species in the Plan Area will be disturbed.
- Covered Activities would result in permanent loss of an average of less than 0.1 acre of Modeled Habitat annually, of the 22,171 acres of giant garter snake Modeled Habitat within the Permit Area. As such, permanent loss of Modeled Habitat would be rare and consist of very small areas dispersed over a large geographic area. The small amount of permanent loss of Modeled Habitat is not expected to significantly impair the life history requirements of giant garter snake or reduce the population. Most permanent loss of upland Modeled Habitat would be 0.25 acre or less and would be geographically dispersed over the Permit Area. Such small losses of upland Modeled Habitat are not expected to fragment habitat areas or impair genetic exchange between populations.

Given the relatively small areas of habitat loss, the short duration of SMUD's Covered Activities, and the implementation of AMMs, SMUD does not expect the Covered Activities to adversely affect populations of this species in the Permit Area.

4.4.5.2.6 Critical Habitat Impacts

No critical habitat has been designated for giant garter snake.

Table 4-7. Potential Stressors Associated with Covered Activities for Giant Garter Snake

Covered Activity Number	Covered Activity Title	Modeled Habitat Impacts				Other Effects																		
		Temporary Disturbance of Vegetation (Trimming or Removal)	Temporary Ground Disturbance (Work Area)	Permanent Vegetation Loss	Permanent Ground Disturbance (Habitat Loss)	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite–Small Hand or Truck Mounted (low noise threshold)[1]	Equipment Noise Onsite – Large or Truck Mounted (high noise threshold) [2]	Helicopter Disturbance	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area	Laydown of Vegetation	Ground Vibration [3]	Electrocution	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff[1]	Permanent Change in Hydrology or Runoff	Spread of Invasive or Non-Native Plants[1]	Hazardous Materials Exposure	Placement of Materials
E1a	Ground-Based Overhead Line Inspection					✓					✓											✓	
E1b	Air-Based Overhead Facilities Inspection[5]																						
E2a	Underground Subtransmission and Distribution Components (Inspection)					✓					✓											✓	
E2b	Underground Transmission Lines (Inspection)					✓					✓												
E3	Substation Insulator Washing							✓	✓		✓											✓	
E4	Substation Inspection, Maintenance and Minor Upgrades[5]					✓		✓			✓											✓	
E5	Emergency Outage Inspection and Minor Repair					✓		✓			✓											✓	
E6a, E6b	Wood Pole Testing and Treatment—Testing, and Fiber Wrapping	✓	✓			✓		✓			✓											✓	
E6c	Wood Pole Testing and Treatment—Wood Pole Repair—Trussing	✓		✓	✓						✓											✓	
E7	Overhead Component Repair and Replacement					✓		✓	✓		✓											✓	
E8	Pole Replacement	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
E9a	Underground Component Repair and Replacement—Cable Replacement in Conduit																					✓	
E9b	Pad-Mounted Transformer Repair and Replacement	✓	✓			✓		✓			✓											✓	
E9c	Direct-Buried Cable Replacement—Trenching	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
E9d	Direct-Buried Cable Replacement—Horizontal Directional Drilling (HDD)	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
E9e	Cable Repair (Third Party Damage/Dig In)	✓	✓			✓		✓	✓		✓				✓							✓	✓
E10a	Steel Lattice Tower Repair and Replacement—Steel Lattice Tower Superstructure Repair					✓		✓	✓		✓											✓	
E10b	Steel Lattice Tower Repair and Replacement—Lattice Tower Foundation Repair	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
E10c	Steel Lattice Tower Repair and Replacement—Steel Lattice Tower Replacement with a Tubular Steel Pole	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
E10d	Steel Lattice Tower Repair and Replacement—Lattice Tower Replacement—with a New Lattice Tower	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
E11	Overhead Reconstruction and Reconductoring	✓	✓	✓	✓	✓		✓	✓		✓											✓	✓
E13	New and Relocated Overhead Subtransmission and Distribution Line Construction	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
E14a	New Underground Subtransmission and Distribution Line Construction—Trenching	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓

Covered Activity Number	Covered Activity Title	Modeled Habitat Impacts				Other Effects																	
		Temporary Disturbance of Vegetation (Trimming or Removal)	Temporary Ground Disturbance (Work Area)	Permanent Vegetation Loss	Permanent Ground Disturbance (Habitat Loss)	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite–Small Hand or Truck Mounted (low noise threshold)[1]	Equipment Noise Onsite – Large or Truck Mounted (high noise threshold) [2]	Helicopter Disturbance	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area	Laydown of Vegetation	Ground Vibration [3]	Electrocution	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff[1]	Permanent Change in Hydrology or Runoff	Spread of Invasive or Non-Native Plants[1]	Hazardous Materials Exposure	Placement of Materials
E14b	New Underground Subtransmission and Distribution Line Construction—Horizontal Directional Drilling	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
E15	Existing Substation Expansion	✓	✓	✓	✓	✓		✓	✓		✓				✓					✓		✓	✓
E16	New Substation Construction	✓	✓	✓	✓	✓		✓	✓		✓				✓				✓	✓		✓	✓
G1a	Pipeline Inspections—Abnormal Operation Conditions Inspections					✓					✓											✓	
G1b	Pipeline Inspections—Gas Leak Inspections					✓					✓											✓	
G1c	Pipeline Inspections—Storm-Related Inspections					✓					✓											✓	
G2	Pipeline Valve Station Inspections					✓					✓											✓	
G3	Pipeline Cathodic Protection Test Station Inspection					✓					✓											✓	
G4	Internal Pipeline Inspection	✓	✓			✓		✓	✓		✓											✓	✓
G5a	Pipeline Maintenance and Repair—Aboveground Pipeline Maintenance and Repair	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
G5b	Pipeline Maintenance and Repair—Underground Pipeline Maintenance and Repair	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
G6	Pipeline Cathodic Protection Test Station Installation	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
G7	Pipeline Anode Bed Replacement	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
G8	Pipeline Valve Repair or Replacement	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
G9	New Construction for Valve Stations and Pressure-Limiting Stations	✓	✓	✓	✓	✓		✓	✓		✓				✓				✓	✓		✓	✓
G10a	New Construction for Realigned Pipelines—Trenching	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
G10b	New Construction for Realigned Pipelines—Horizontal Directional Drilling	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
G10c	New Construction for Realigned Pipelines—Directional Boring	✓	✓	✓	✓	✓		✓	✓		✓				✓							✓	✓
G10d	New Construction for Realigned Pipelines—Hydrostatic Testing	✓	✓			✓		✓	✓		✓											✓	✓
V1	Electrical Subtransmission and Distribution Easement Vegetation Management Inspections					✓					✓											✓	
V2	Electrical Subtransmission and Distribution Easement Vegetation Management	✓				✓		✓	✓		✓											✓	✓
V3a	Transmission Easement Vegetation Management—Inspections					✓			✓		✓											✓	
V3b	Transmission Easement Vegetation Management—Tree Trimming					✓		✓	✓		✓											✓	✓
V3c	Transmission Easement Vegetation Management—Brushy Vegetation					✓		✓	✓		✓											✓	✓
V4	Tree Removal Projects					✓		✓	✓		✓											✓	✓
V5a	Elderberry Shrub Trimming and Removal—Trimming Stems					✓		✓	✓		✓											✓	✓

Covered Activity Number	Covered Activity Title	Modeled Habitat Impacts				Other Effects																		
		Temporary Disturbance of Vegetation (Trimming or Removal)	Temporary Ground Disturbance (Work Area)	Permanent Vegetation Loss	Permanent Ground Disturbance (Habitat Loss)	Vehicle and Equipment Movement	Vehicle Noise (Driving)	Equipment Noise Onsite–Small Hand or Truck Mounted (low noise threshold)[1]	Equipment Noise Onsite – Large or Truck Mounted (high noise threshold) [2]	Helicopter Disturbance	Disturbance from Human Presence	Dust Generated from Vehicle Access to and from Work Area	Dust Generated During Construction on Work Area	Laydown of Vegetation	Ground Vibration [3]	Electrocution	Temporary Night Lighting	Permanent Night Lighting	Increased Temporary Runoff[1]	Permanent Change in Hydrology or Runoff	Spread of Invasive or Non-Native Plants[1]	Hazardous Materials Exposure	Placement of Materials
V5b	Elderberry Shrub Trimming and Removal—Removal by Transplantation					✓		✓	✓		✓								✓			✓	
V5c	Elderberry Shrub Trimming and Removal—Removal by Cutting					✓		✓	✓		✓											✓	✓
V6	Pole Vegetation Clearing			✓	✓	✓		✓	✓		✓											✓	
V7	Vegetation Management on Natural Gas Easement	✓	✓	✓	✓	✓		✓	✓		✓											✓	✓
T1	Telecommunication Tower Maintenance							✓	✓													✓	
T2	New Construction of Telecommunication Tower(s)	✓	✓	✓	✓	✓		✓	✓		✓								✓	✓		✓	
T3	Electrical Telecommunications Overhead Fiber-Optic Replacement and New Installation	✓	✓	✓	✓	✓		✓	✓		✓											✓	
T4	Electrical Telecommunications Underground Fiber-Optic Replacement and New Installation	✓	✓	✓		✓		✓	✓		✓											✓	
C1	SMUD Bank Oak Tree Planting[4]																						
C2	SMUD Bank Management and Monitoring																						
M1	Operation of the Cosumnes Power Plant (CPP)[4]																						
M2a	Cathodic Protection Installation[4]																						
M2b	Water Pipeline Valve Installation[4]																						
M2c	Water Pipeline Segment Replacement	✓	✓	✓		✓		✓	✓		✓				✓				✓			✓	✓
M3	Rancho Seco Property Operation and Maintenance																						

Notes: Temporary impacts assume habitat recovery within 1 year. Permanent impacts assume no habitat recovery within 1 year.

[1] Less than 80 dBA at 50 feet (pumps, air compressors, tractors, backhoes) – assumes short duration (less than 30 minutes) dBA = decibels using A-weighting scale

[2] Greater than 80 dBA at 50 feet (front end loaders, graders, bull dozers, hydraulic excavators, chainsaws, pneumatic tools)

[3] Greater than 60 VdB at 25 feet (large bulldozer, jack hammer) VdB = Vibration velocity in decibels

[4] These Covered Activities are specific to site locations. If no impacts are checked, then the Covered Activity is in a location that does not currently overlap with Modeled Habitat for the species and/or no potential adverse impacts/effects from this Covered Activity are associated with

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4.5 Summary of Impacts and Requested Incidental Take Authorization

Although take of plant species is not prohibited under the ESA and, therefore, cannot be authorized under an incidental take permit, plant species described in this HCP would be included on the permits in recognition of the conservation benefits provided to the species. Table 4-8 addresses the amount of Modeled Habitat (acres) that would be affected over the term of the HCP. Impacts on the plant Covered Species would mostly be avoided because SMUD would follow the Green Zone[1] process (Section 5.3.1, *Pre-Project Planning*), implement species-specific AMMs, and, if necessary, work with the USFWS to ensure protection measures are feasible and can be successfully implemented. Impacts on plant Covered Species also would be avoided, minimized, and offset through the environmental review and screening process.

Table 4-9 provides requested incidental take authorization based on Modeled Habitat acres for the wildlife Covered Species' under this plan. The amount of incidental take in Table 4-9 reflects the maximum allowable take under the permit.

[1] The Green Zone is an area located on a map that depicts the locations of biological resources (based on available data, such as the California Natural Diversity Database). The Green Zone will include the area supporting Modeled Habitat for one or more Covered Species. Covered Activities taking place within the Green Zone will be subject to AMMs.

Table 4-8. Limits to Disturbance of Modeled Habitat for Plant Covered Species

	Total Acres of Modeled Habitat in Permit Area	Permit Term Covered Activities					Percent of Total Modeled Habitat Disturbed
		Temporary Modeled Habitat Disturbance (acres)	Permanent Modeled Habitat Disturbance (acres)	Total Disturbance in Footprint (acres)	Total Disturbance in Vicinity (acres)	Total Impacts (acres)	
Slender Orcutt Grass							
Total	**3,273.1**	**0.1**	**4.3**	**4.4**	**2.7**	**7.1**	**0.22%**
Sacramento Orcutt Grass							
Total	**3,273.1**	**0.1**	**4.3**	**4.4**	**2.7**	**7.1**	**0.22%**

Table 4-9. Modeled Habitat Based Take Limits for Wildlife Covered Species

	Modeled Habitat in Permit Area (acres)	Direct Impacts			Indirect Impacts	Total	
		Temporary Modeled Habitat Disturbance (acres)	Permanent Modeled Habitat Disturbance (acres)	Total Direct Disturbance (acres)	Total Indirect Disturbance (acres)	Total Effects (acres)	Percent of Total Modeled Habitat Affected
Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp							
Total	**7,784.1**	**1.8**	**14.1**	**15.9**	**3.9**	**19.8**	**0.25%**
Valley Elderberry Longhorn Beetle							
Total	**Unknown number of shrubs**	**0 shrubs**	**300 shrubs (100 permanently removed, 200 pruned)**	**300 shrubs**	**--**	**8.1 acres**	**Unknown**
California Tiger Salamander							
Aquatic	7,404.0	0.5	5.0	5.5	3.2		
Upland	95,327.0	109.5	24.6	134.1	N/A		
Total	**102,731.0**	**110.0**	**29.6**	**139.6**	**3.2**	**142.8**	**0.14%**
Giant Garter Snake							
Aquatic	19,344.4	10.4	0.05	10.5	N/A		
Upland	22,170.5	102.2	24.1	126.3	N/A		
Total	**41,514.9**	**112.6**	**24.2**	**136.8**	**N/A**	**136.8**	**0.33%**

5 Conservation Strategy

5.1 Introduction

The conservation strategy is an integrated program of avoidance, minimization, and mitigation designed to offset impacts from projects and activities described in Chapter 2, *Covered Activities*. Monitoring and adaptive management are addressed separately in Chapter 6, *Monitoring, Reporting, and Adaptive Management Program*. The conservation strategy is built on the goals and objectives listed below in Section 5.2, *Biological Goals and Objectives,* and was prepared to meet the regulatory requirements of the federal Endangered Species Act and the California Endangered Species Act.

HCPs must fully offset take to the maximum extent practicable as described in the *Habitat Conservation Planning and Incidental Take Permit Processing Handbook* (HCP Handbook) (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016). This is done by avoiding impacts where possible and subsequently minimizing impacts that cannot be avoided. Impacts that remain after avoidance and minimization measures (AMMs) are implemented must be mitigated. Impacts can be direct, indirect, temporary, or permanent as defined in the HCP Handbook glossary.

The conservation strategy for this HCP reduces or eliminates impacts through pre-project planning, AMMs including pre-activity surveys, and worker training. Specific conservation measures are proposed to mitigate unavoidable impacts. These conservation measures will offset the impacts of the taking of the Covered Species and contribute to their long-term conservation.

The conservation strategy addresses direct, indirect, temporary, and permanent impacts based on the biological needs of Covered Species. The chapter is organized as follows.

- Introduction
- Biological Goals and Objectives
- Avoidance and Minimization
- Mitigation
- Summary of Conservation Strategy by Species

5.1.1 Definitions

The following definitions are provided to facilitate review of the conservation strategy.

Avoidance and Minimization Measure: A measure implemented during the course of implementing a Covered Activity that will avoid or reduce potential impacts of the activity on a Covered Species or community.

Biological Goal: A broad, guiding principle that identifies expected outcomes of a conservation plan. Biological goals describe the desired future conditions, which are expected to be achieved through HCP implementation.

Biological Objective: A measurable commitment that when combined with other objectives will collectively achieve a biological goal.

Conservation Measures: A prescribed action designed to achieve the biological goals and objectives of the HCP and to satisfy state and federal regulatory requirements. Conservation measures identified in an HCP, its accompanying incidental take permit, and/or Implementing Agreement, if used, provide the means for achieving the biological goals and objectives.

Green Zone: The Green Zone is an area located on a map that depicts the locations of biological resources (based on available data, such as the California Natural Diversity Database). The Green Zone also will include the area supporting Modeled Habitat for one or more Covered Species. Covered Activities taking place within the Green Zone will be subject to AMMs. Figure 5-1 shows the Green Zone as of the time the SMUD HCP was prepared. The Green Zone map is expected to change somewhat during plan implementation, however, as updated occurrence data and Modeled Habitat is incorporated.

Ground-Disturbing Activity: Ground-disturbing activities are those activities that break the ground surface. Use of backhoes, drilling rigs, scrapers, bulldozers, or graders to alter natural terrain constitutes ground-disturbing activities. Use of hand tools, such as shovels and pick axes, does not constitute a ground-disturbing activity for the purposes of the HCP. Similarly, vehicle tracks do not constitute a ground-disturbing activity for the purposes of the HCP. Only ground-disturbing activities are assessed for the purposes of mitigating the effects of take.

***Habitat Creation*.** The establishment of habitat in an area that did not previously support it.[1] The SMUD HCP mitigation strategy uses habitat creation or restoration credits from wetlands previously created or restored at the SMUD Bank or other mitigation banks.

Habitat Enhancement: The improvement of an existing degraded habitat. Enhancement involves improving the function of specific constituent elements of a species habitat that have been degraded or lost, typically due to human actions.

Habitat Restoration: The establishment of a species' habitat in an area that historically supported it, but no longer does so because of the loss of one or more required ecological factors. Restoration typically involves altering the substrate or physical features of land to improve a site's ability to support the historical natural community or habitat.[1] The

[1] This HCP uses the term *restoration/creation* when either restoration or creation will be implemented to mitigate for impacts on Covered Species habitat.

SMUD HCP mitigation strategy uses habitat creation or restoration credits from habitat created or restored prior to impacts.

Work Flow Integration: A process SMUD uses for environmental review, planning, and screening. Using the Green Zone map (defined above), this process identifies if a project or activity has the potential to affect sensitive biological resources.

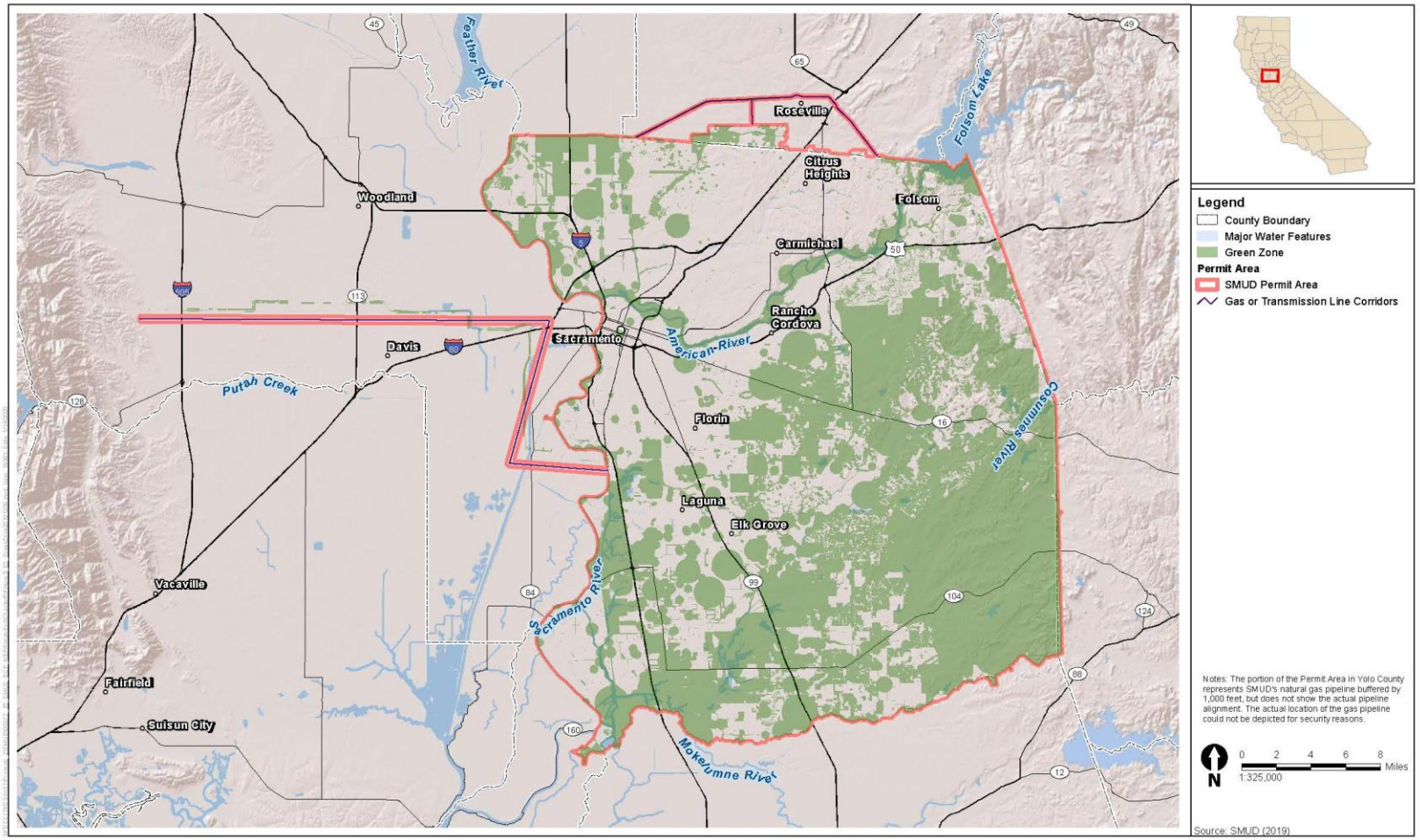

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Figure 5-1
Green Zone Map
SMUD HCP

5.1.2 Conservation Strategy Overview

The purpose of the HCP is to enable SMUD to continue to conduct Covered Activities while avoiding, minimizing, and mitigating for impacts on Covered Species and their habitats (see Chapter 1, *Introduction*, Table 1-1, for a full list of Covered Species).

Five key principles guide the conservation strategy.

1. The avoidance and minimization of impacts from Covered Activities are ensured through environmental review and pre-project planning.
2. Avoiding impacts on habitat (i.e., implementing AMMs) is preferable to mitigating impacts or preserving habitat.
3. Preserving lands for Covered Species with high-quality habitat or of high conservation value helps to build on other local and regional conservation efforts.
4. Preserving large, contiguous areas of habitat is preferable to preserving a larger number of small areas.
5. Habitat mitigation lands will be protected and managed in perpetuity.

Section 5.2 provides an overview of some key elements of the conservation strategy, including goals, objectives, and conservation measures. Sections 5.3 and 5.4 describe avoidance, minimization, and mitigation. Monitoring, adaptive management, recordkeeping, and data tracking are described in Chapter 6, *Monitoring, Reporting, and Adaptive Management,* and Chapter 7*, Implementation.*

Avoidance and minimization are critical to the conservation strategy. Implementation of avoidance and minimization relies on an environmental review process summarized in Section 5.3.1, *Pre-Project Planning*, and explained in detail in Chapter 7, Section 7.2.2, *Conduct Environmental Review, Planning, and Screening,* and Section 7.2.3, *Implement Avoidance and Minimization Measures*. Avoidance and minimization efforts include the establishment and use of Green Zones to trigger implementation of AMMs. Annual training will also support efforts to avoid and minimize impacts in the Permit Area. These efforts are described in Section 5.3, *Avoidance and Minimization*.

The mitigation component of the conservation strategy for this HCP is focused on the restoration of temporarily impacted areas (for disturbances totaling over 0.1 acre per project) and the use of offsite mitigation banks to offset unavoidable impacts. A mitigation bank has been established on SMUD lands as described in Chapter 3, Section 3.7, *SMUD Bank*, and summarized below in Section 5.4.5.1, *Use Credits at the SMUD Bank*. When appropriate and desirable for the species, SMUD will use credits within the SMUD Nature Preserve Mitigation Bank (SMUD Bank) to offset take. For impacts that cannot be addressed using this bank, the conservation strategy will use other methods described in Section 5.4.5, *How SMUD Will Mitigate*.

5.2 Biological Goals and Objectives

HCPs must explicitly state their biological goals and objectives (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016). Biological goals and objectives describe the vision, commitments, and expected outcomes of the HCP as detailed in the conservation strategy. Goals are broad, guiding principles based on the conservation needs of the resources. Biological objectives express measurable conservation targets or actions. Objectives should clearly state a desired result that is measurable and achievable within a given timeframe.

Biological objectives "step down" a biological goal into manageable units (Figure 5-2). Biological objectives are expressed as a condition to be met or a change to be achieved relative to existing conditions. Biological objectives have the following components.

- A species or a habitat "indicator."
- An action or effort (e.g., restore, provide, preserve).
- A measurable quantity/state, a location, and a timeframe needed to meet the objective.

The biological goals and objectives on which this HCP is based are presented below.

- **Goal 1**: Contribute to the network of permanently protected and managed lands in the region that support populations of Covered Species.
  - **Objective 1.1**. Increase the amount of occupied habitat (or, for slender Orcutt grass, modeled habitat) protected and managed for Covered Species by purchasing preservation or restoration/creation credits in mitigation banks or through preservation or restoration/creation of lands with high-quality and Modeled Habitat for Covered Species with priority given to preserves with connectivity to other preserves.
- **Goal 2**: Maintain or improve habitat quality for Covered Species in the Permit Area by restoring areas disturbed by Covered Activities.
  - **Objective 2.1**. Restore areas of temporary habitat disturbance greater than 0.1 acre to maintain habitat for Covered Species by re-contouring and reseeding, with native seeds within 6 months and prior to the onset of the next rainy season.

Figure 5-2. Goals and Objectives (from HCP Handbook)

5.3 Avoidance and Minimization

AMMs reduce impacts from Covered Activities. To implement AMMs SMUD must integrate them into their project review process. The process for environmental review, planning, and screening is described in detail in Section 7.2.2, *Conduct Environmental Review, Planning, and Screening,* and is summarized below.

5.3.1 Pre-Project Planning

SMUD currently uses a dedicated process to conduct environmental review, planning, and screening called Work Flow Integration. Using a spatial mapping resource called the Green Zone (defined further in Section 5.1.1, *Definitions*), this process identifies if a project or activity has the potential to affect sensitive biological resources. The Green Zone map provides the foundation for identifying areas with sensitive resources prior to project initiation.

As part of HCP implementation, SMUD will add the habitat distribution models developed for the HCP into the Green Zone map (Section 3.5, Covered Species, and Appendix C, Species Accounts). The HCP implementation team, SMUD engineering designers, and planners will then utilize the Work Flow Integration process, including the Green Zone spatial resource, to identify where Covered Activities could affect Covered Species habitat. Based on this review, the environmental specialist will identify appropriate AMMs in the HCP and prescribe them to the SMUD field crews.

5.3.1.1 Erosion Control

SMUD reviews various types of erosion control and implements applicable Best Management Practices (BMPs) identified in the *California Stormwater Best Management*

Practices Handbook published by the California Stormwater Quality Association (2014). The BMPs identified and applied depend on the situation and the condition of the site. SMUD has incorporated yearly stormwater-related training for field crews and staff. It also leverages stormwater consultants for design, implementation, and monitoring of these BMPs.

5.3.2 Avoidance and Minimization Measures

AMMs have been developed to avoid or minimize potential direct and indirect impacts of the Covered Activities on Covered Species (Table 5-1). SMUD biologists worked closely with the U.S Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) to identify, describe, and define each species-specific AMM. The California tiger salamander (CTS), giant garter snake (GGS), and applicable general AMMs will be included in the State Incidental Take Permit. The AMMs are organized hierarchically beginning with "general" AMMs that are applicable to all Covered Species and habitats. Some general AMMs apply to all Covered Activities while others apply to only some Covered Activities (Applicable Covered Activities, in Table 5-1). Next, AMMs are listed by groups of Covered Species (e.g., plants) or specific Covered Species. SMUD will implement species- and habitat-specific AMMs as appropriate any time that a Covered Activity occurs within Modeled Habitat for a Covered Species. AMMs were determined to be appropriate if they can be applied to the Covered Activity. All AMMs are given a unique number code so that their implementation can be more easily tracked in implementation.

Some AMMs (specified in Table 5-1), particularly those related to biological monitors, are only required for activities that are over 0.1 acre in size, or activities on Conservation Lands. Conservation Lands are lands that are protected with a conservation easement or similar real estate protection for the purpose of conserving biological resources. Figure 5-3 shows the Conservation Lands currently in the Permit Area, but if additional lands are preserved during the permit term, they will be added to Conservation Lands.

AMMs will be implemented at each project site using the standardized protocols outlined in Table 5-1. All remaining impacts that are not avoided or minimized through the AMMs will be mitigated through implementation of the SMUD HCP conservation strategy.

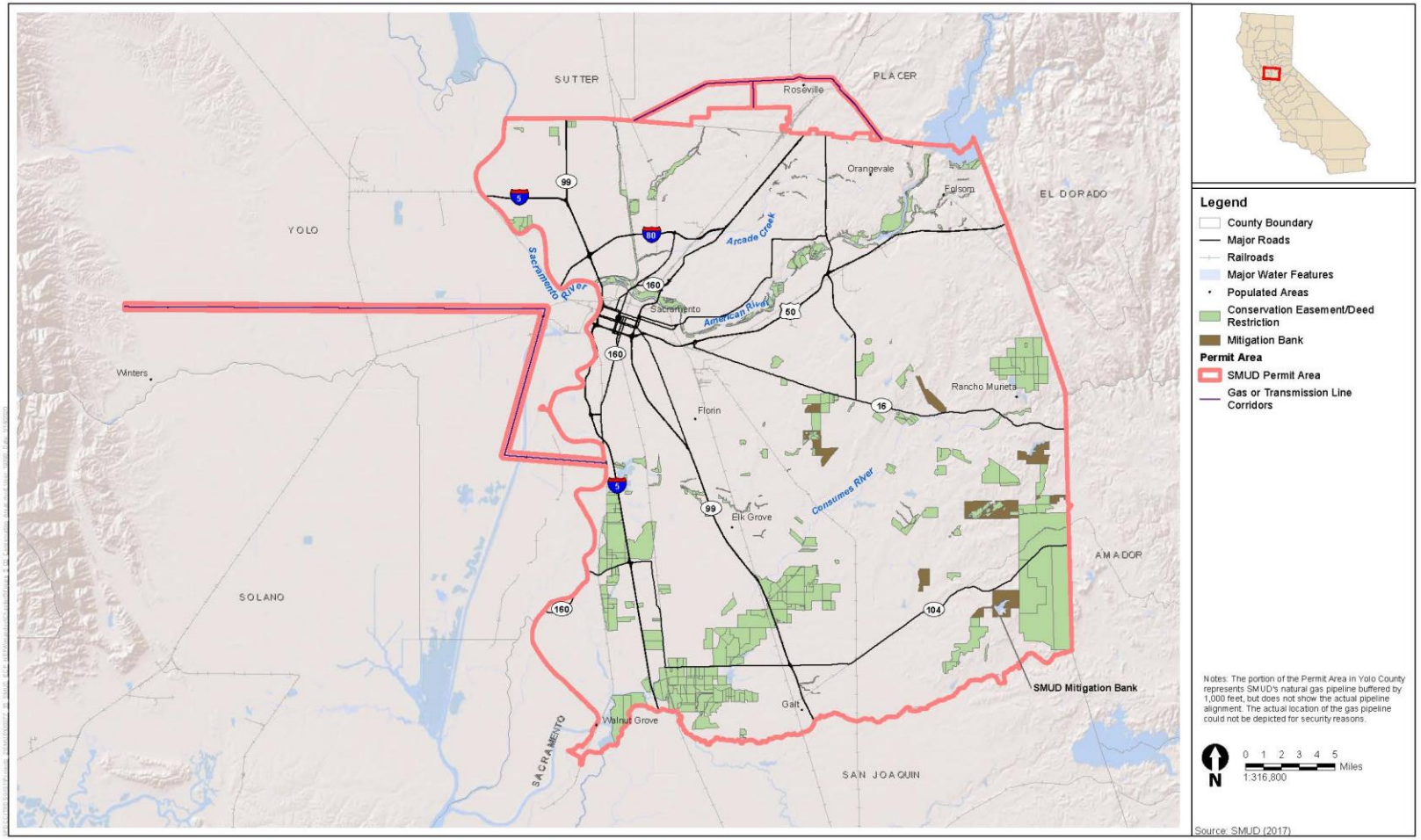

Figure 5-3
Existing Conservation Areas
SMUD HCP

Table 5-1. Avoidance and Minimization Measures

AMM Number	AMM Description		
General		**Applicable Covered Activities**	**Staff Responsible for Implementation**
G-AMM1	**Annual Environmental Training.** Employees and contractors performing Covered Activities (SMUD field crews) will receive annual environmental training on SMUD's HCP. This training will include a review of permit requirements, avoidance and minimization measures, and other relevant environmental laws and guidelines that must be followed by all personnel to avoid or minimize take of Covered Species during Covered Activities. Crews will be informed on the implementation of the HCP and conditions in the take permits, including use of SMUD's job packet[2] (or equally effective documentation) and their responsibilities to ensure compliance. Training will include the importance of the Covered Species and the purpose and necessity of protecting them, handouts or cards containing Covered Species or Modeled Habitat information, as well as penalties for non-compliance. Information will also be presented to inform personnel of methods to minimize the spread of invasive or nonnative plants during Covered Activities. New employees will receive the training prior to the start of work on Covered Activities.	All	SMUD Environmental Services
G-AMM2	**Minimize Impacts of Work Area.** To the extent possible, SMUD field crews will reduce the work area footprint and the duration of work at a work area to reduce the potential for take of Covered Species.	All	SMUD field crew
G-AMM3	**Work Area Access.** SMUD field crews will use existing paved and unpaved roads to access the work area where available. Vehicles and equipment will be parked on pavement, existing roads, or previously disturbed areas to the maximum extent feasible. When this is not feasible, SMUD will implement *G-AMM4: Off Road Speed Limit*, *VP-AMM1: Avoid Driving through Vernal Pools*, and *VP-AMM2: Minimize Vehicle Impacts on Vernal Pools*.	All	SMUD field crew
G-AMM4	**Off Road Speed Limit.** When driving off of paved roads in Covered Species habitat, vehicles will not exceed a speed limit of 15 miles per hour.	All	SMUD field crew

[2] A "job packet" is a packet of information for SMUD personnel containing relevant information about a project including, but not limited to, design plans, easement information, contact information, cost, and avoidance and minimization measures.

AMM Number	AMM Description		
General		Applicable Covered Activities	Staff Responsible for Implementation
G-AMM5	**Work Area General Guidelines.** Trash dumping, littering, open fires (such as barbecues), hunting, and pets will be prohibited in Covered Activity work areas. All garbage will be removed from the project site at the end of each workday.	All	SMUD field crew
G-AMM6	**Erosion Control Measures.** SMUD field crews will utilize standard erosion and sediment control BMPs (pursuant to the most current version of the *California Stormwater Best Management Practices Handbook*) to prevent construction site runoff into SMUD HCP Riverine; Open Water/Fringe; Other Depressional Wetland; and Vernal Pool, Seasonal Wetland, and Swale land cover types when Covered Activities are the source of potential erosion. Soil will be stockpiled within established work area boundaries, and stockpiles will be located so as not to enter water bodies, stormwater inlets, or other standing bodies of water. Stockpiled soil will be covered prior to precipitation events. Erosion control materials will be removed once the site has been stabilized.	E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M2, M4, T2, T3, T4, C1	SMUD field crew
G-AMM7	**Equipment Refueling.** SMUD field crews will not refuel or conduct equipment maintenance activities within 250 feet of SMUD HCP Vernal Pool, Seasonal Wetland, and Swale, and within 100 feet of any Riverine, Open Water/Fringe, or Other Depressional Wetlands land cover types. If refueling must be conducted closer to wetlands, SMUD field crews will construct a secondary containment area subject to review by an environmental specialist and/or biologist. SMUD field crews will maintain spill prevention and cleanup equipment in refueling areas.	All	SMUD field crew
G-AMM8	**Hazardous Materials Clean Up.** SMUD field crews will clean up any spilled oil, fuel, or other automotive fluids. SMUD field crews will ensure that all construction areas have proper spill clean-up materials (absorbent pads, sealed containers, booms, etc.) to contain the movement of any spilled substances.	All	SMUD field crew

AMM Number	AMM Description		
General		Applicable Covered Activities	Staff Responsible for Implementation
G-AMM9	**HDD Drilling Fluids Management.** For Covered Activities that require horizontal directional drilling (HDD) located in or within 50 feet of aquatic Modeled Habitats, SMUD field crews will install preventative measures such as secondary containment and follow a frac-out[3] contingency plan as directed by SMUD Environmental Services to avoid the runoff or intrusion of any drilling fluids (i.e., bentonite or polymer material) into water ways. Following the completion of Covered Activities that involve HDD, SMUD field crews will remove and properly dispose of all drilling fluids and related materials from the launching and receiving pits. Open pits will be filled with soils, and disturbed areas will be stabilized by compacting soils and returning to pre-project contours so that they are commensurate with the topography of the surrounding soil.	E9d, E14b, G10b	SMUD field crew, SMUD Environmental Services
G-AMM10	**Covered Species Entrapment Prevention.** SMUD field crews will cover any open trenches and/or holes at the end of the workday to prevent the accidental entrapment of California tiger salamander or giant garter snake. Any excavations that cannot easily be covered will be ramped and/or sloped at the end of the workday to allow trapped animals an escape route. Prior to the start of work activities and each day any trenches and/or holes are open, SMUD field crews or an approved biologist will inspect any open trench or hole for trapped Covered Species. If necessary, an approved biologist will relocate any trapped individuals.	E6, E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M1, M2, M4, T2, T3, T4, C1	SMUD field crew, qualified biologist (Section 7.1.4, *Biologists*)
G-AMM11	**Stabilization of Disturbed Areas.** SMUD field crews will remove any temporary fill or construction debris and will backfill all excavation sites with native soil, and with crushed gravel around the bases of poles for compaction, following completion of Covered Activities. Disturbed areas will be stabilized by compacting soils and returning to pre-project contours so that the areas are commensurate with the topography of the surrounding soil, or qualified stormwater personnel will prescribe BMPs to reduce or eliminate pollutants in stormwater discharges and authorized non-stormwater discharges from the site during construction. SMUD field crews will not move weed-infested gravel, rock, and other fill materials to undisturbed areas that are relatively free of weeds, but will focus fill in areas that have previously been disturbed.	E6, E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M1, M2, M4, T2, T3, T4, C1	SMUD field crew

[3] A 'frac-out' is the unintentional return of drilling fluids to the surface during horizontal directional drilling.

AMM Number	AMM Description		
General		Applicable Covered Activities	Staff Responsible for Implementation
G-AMM12	**Excess Soil.** When excess soil is spread out following an excavation activity, SMUD will not place soil in SMUD HCP Riverine; Open Water/Fringe; Other Depressional Wetlands; or Vernal Pool, Seasonal Wetland, and Swale land cover types or in Covered Species Modeled Habitat that contains burrows.	E6, E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M1, M2, M4, T2, T3, T4, C1	SMUD field crew
G-AMM13	**Soil Management.** SMUD field crews will stockpile soil within established work area boundaries and position stockpiles so as not to enter SMUD HCP Riverine; Open Water/Fringe; Other Depressional Wetlands; or Vernal Pool, Seasonal Wetland, and Swale land cover types or in Modeled Habitat with burrows. SMUD field crews will cover stockpiled soil with visquen or tarps prior to precipitation events.	E6, E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M1, M2, M4, T2, T3, T4, C1	SMUD field crew
G-AMM14	**Revegetation of Work Areas.** If a Covered Activity temporarily disturbs 0.1 acre or more of Modeled Habitat for a Covered Species that contains herbaceous vegetation, SMUD field crews will revegetate the area with a native weed free seed mix within 6 months of disturbance.	E6, E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M1, M2, M4, T2, T3, T4, C1	SMUD field crew
G-AMM15	**Temporary Vehicle Access to Work Areas.** SMUD field crews will minimize clearing vegetation and grading for temporary vehicle access to the maximum extent feasible. Any temporary road will be returned to pre-project contours and the soil compacted for stabilization, or qualified stormwater personnel will prescribe BMPs to reduce or eliminate pollutants in stormwater discharges and authorized non-stormwater discharges from the site during construction.	All	SMUD field crew
G-AMM16	**Chipped Plant Material Management.** SMUD field crews will either remove chipped plant matter created during vegetation management activities from the work area or leave it in place at the request of the landowner. If left in place, SMUD field crews will not place it in or within 100 feet of SMUD HCP Riverine; Open Water/Fringe; Other Depressional Wetland; or Vernal Pool, Seasonal Wetland, and Swale land cover types (dry or inundated).	V2, V3, V4, V5, V6, V7	SMUD field crew

AMM Number	AMM Description		
General		**Applicable Covered Activities**	**Staff Responsible for Implementation**
G-AMM17	**Night Lighting.** For Covered Activities that occur at night, SMUD field crews will position any temporary lights needed away from any Covered Species habitat. For lighting at permanent facilities, such as substations, all lighting will be oriented downward towards major equipment to minimize glare onto surrounding property.	E5, E7, E8, E9d, E14b, E15, E16, G5b, G10b, G10d	SMUD field crew
G-AMM18	**Unanticipated Covered or ESA and CESA -Listed Species.** SMUD field crews will stop work and contact SMUD Environmental Services if a species listed under the Federal Endangered Species Act (ESA) and California Endangered Species Act (CESA) or a Covered Species is found within the work area or within 100 feet of a work area. SMUD Environmental Services will have authority to stop activities, and will do so, until appropriate corrective measures have been completed or it is determined that the individual ESA and CESA-listed or Covered Species will not be taken (including harmed). If the ESA and CESA-listed or Covered Species is in immediate danger, only a qualified biologist can capture and relocate the Covered Species. The Service must be contacted if the species is ESA and CESA-listed, but is not a Covered Species.	All	SMUD field crew; SMUD Environmental Services; qualified biologist
G-AMM19	**Discharge of Hydrostatic Test Water.** Following a hydrostatic testing event SMUD field crews will not allow discharging of water into Vernal Pool, Seasonal Wetland, or Swale land cover type. For discharge of hydrostatic test water within 250 feet of Vernal Pool, Seasonal Wetland, or Swale land cover type, a biological monitor will be present to ensure that the hydrostatic test water discharged does not enter into any Vernal Pool, Seasonal Wetland, or Swale land cover type.	G10d	SMUD field crew
Vernal Pool, Seasonal Wetland, and Swale Associated Covered Species			
VP-AMM1	**Avoid Driving through Vernal Pools**. SMUD field crews will avoid driving through SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover to the maximum extent feasible. When this is not feasible, SMUD will implement *VP-AMM2: Minimize Vehicle Impacts on Vernal Pools*.	All	SMUD field crew

AMM Number	AMM Description		
General		Applicable Covered Activities	Staff Responsible for Implementation
VP-AMM2	**Minimize Vehicle Impacts on Vernal Pools**. If a Covered Activity work area or access to the work area is located on SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover, SMUD field crews will evaluate site conditions and determine if soil moisture is present. If soil moisture is present, the field crew will coordinate with the Environmental Services team to identify alternative measures to minimize disturbance of Covered Species Modeled Habitat. Alternative measures may include laying down rubber matting, creating temporary bridges over swales, or using alternate access routes as prescribed by SMUD Environmental Services to minimize impacts. If it is not feasible for SMUD to avoid driving through Vernal Pool, Seasonal Wetland, and Swale land cover while moisture is present, SMUD will track the acres of disturbance, and those acres will count toward take limits provided in Chapter 4, *Impact Analysis and Levels of Take*, and mitigated consistent with Section 5.4, *Mitigation*.	E5, E6, E7, E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, T3, T4, V2, V3, V4, V5, V6, V7	SMUD field crew; SMUD Environmental Services
VP-AMM3	**Vernal Pool Covered Species Soil Stockpile**. For Covered Activities in SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover, SMUD field crews will stockpile the upper 4 inches of topsoil from within the ordinary high water mark of any aquatic features separately during excavations. This topsoil will be replaced within the aquatic feature and manipulated so as to restore the original contours within the aquatic feature. Soil compaction will be minimized to the extent consistent with utility standards. Erosion control measures such as straw wattles, coconut fiber rolls/blankets, silt fencing, and as determined by the qualified biologist, will be implemented where necessary to protect topsoil stockpiles and keep the seed bank and/or cysts in the stockpiled soil viable.	E6, E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M2, T3, T4, C1	SMUD field crew, qualified biologist
VP-AMM4	**Avoid Occupied Orcutt Grass Habitat**. SMUD Environmental Services will review design plans to ensure that no new poles or other facilities are placed in vernal pools that are known (as noted in an up to date (current at time of project implementation) California Natural Diversity Database query) to support slender Orcutt grass or Sacramento Orcutt grass.	E8, E10, E11, E13	SMUD Environmental Services
VP-AMM5	**Avoid Vernal Pools during Trenching.** SMUD Environmental Services will review design plans to ensure that no trenching occurs in SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover. SMUD field crews will avoid trenching through SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover.	E9c, E14a, G10a	SMUD field crew, SMUD Environmental Services

AMM Number	AMM Description		
General		**Applicable Covered Activities**	**Staff Responsible for Implementation**
VP-AMM6	**Covered Vernal Pool Invertebrate Work Window.** When Vernal Pool Invertebrate Covered Species Modeled Habitat is present within 250 feet of Covered Activities, Environmental Services will schedule the Covered Activity to occur in the dry season (approximately April 15 through October 15) and prior to the first significant rain (0.25 inch in 24 hours) to the maximum extent feasible. If the Covered Activity cannot be performed in the dry season, the field crew will implement additional measures as prescribed by SMUD Environmental Services to avoid or minimize impacts. Additional measures could include, but are not limited to, directing crews on access, use of erosion/sediment fencing, use of access mats or other techniques to avoid direct or indirect effects, requiring foot access, or requiring a biological monitor during the activity. If additional measures do not result in total avoidance, SMUD will mitigate at a 0.5:1 ratio for temporary and/or 3:1 for permanent direct habitat disturbance or loss.	E5, E6, E7, E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, T3, T4, V2, V3, V4, V5, V6, V7, C1	SMUD field crew, SMUD Environmental Services
VP-AMM7	**Vernal Pool Biological Monitor.** If Covered Activities will directly impact SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover (modeled habitat), a qualified biologist will be present onsite and monitor the Covered Activity to ensure that all applicable AMMs are implemented correctly and that no unnecessary ground disturbance or take of species occurs. The qualified biologist will have the authority to stop all activities that could result in such take or destruction, and will do so, until appropriate corrective measures have been completed. SMUD will report any unauthorized take to USFWS and/or CDFW within 24 hours.	E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M1, M2, T3, T4, C1	Qualified biologist
Valley Elderberry Longhorn Beetle			
Trimming Activities			
VELB-AMM1	**Park outside the Drip Zone**. If use of a bucket truck is necessary to trim an elderberry shrub, SMUD field crews will park the bucket truck outside of the drip line of the elderberry shrub to avoid root damage.	V5a	SMUD field crew

AMM Number	AMM Description		
General		**Applicable Covered Activities**	**Staff Responsible for Implementation**
VELB-AMM2	**Avoid Trimming during Valley Elderberry Longhorn Beetle Active Period**. SMUD field crews will conduct trimming activities between November and February. If work must be done outside this period to maintain public safety, SMUD field crews will implement other measures as prescribed by SMUD Environmental Services including vegetation removal by hand, keeping off-road vehicle speeds below 15 miles per hour, and an onsite biological monitor during the activity. Impacts to the shrub will be mitigated at a permanent mitigation ratio.	V5a	SMUD field crew; SMUD Environmental Services
Shrub Removal			
VELB-AMM3	**Follow Shrub Removal Protocols**. SMUD Environmental Services will oversee elderberry shrub removal. If SMUD determines that the shrub is habitat for valley elderberry longhorn beetle because they have stems greater than 1 inch in diameter, then the 2017 *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (USFWS 2017) or the currently approved protocol will be followed for any shrubs to be removed.	V5b, V5c	SMUD Environmental Services
All Other Covered Activities			
VELB-AMM4	**Preconstruction Elderberry Survey**. For Covered Activities occurring in valley elderberry longhorn beetle Modeled Habitat, SMUD Environmental Services or a qualified biologist will survey proposed project sites for the presence of elderberry shrubs. If elderberry shrubs are found on or within 165 feet of the project site, the habitat will be assessed to determine if the project area is in riparian or non-riparian habitat. Depending on the size, duration, and/or type of proposed project, the larger area surrounding the project site may also be surveyed for the presence and number of elderberry shrubs. If the project site is non-riparian and contains elderberry shrubs, exit hole surveys will be used to evaluate the site for potential occupancy. In the absence of exit holes, a qualified biologist will evaluate the project area using the following criteria: (1) Is there a riparian area or are there elderberry shrubs or known valley elderberry longhorn beetle records within 2,526 feet of the proposed project? (2) Was the site continuous with a historical riparian corridor?	E6, E7, E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, T3, T4, V2, V3, V4, V5, V6, V7	Qualified biologist, SMUD Environmental Services

AMM Number	AMM Description		
General		Applicable Covered Activities	Staff Responsible for Implementation
VELB-AMM5	**Elderberry Exclusion Buffer.** Activities that may damage or kill an elderberry shrub (e.g., trenching, paving) may need an avoidance area of at least 20 feet from the drip-line, depending on the type of activity. A qualified biologist will monitor any activity within 20 feet of an elderberry shrub, work with personnel to minimize effects on the shrub, report on any potential effects on the shrub, and report the number of times this AMM is implemented.	E6, E7, E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, T3, T4, V2, V3, V4, V5, V6, V7	Qualified biologist
VELB-AMM6	**Fencing.** All areas to be avoided during construction activities will be fenced and/or flagged at the avoidance boundary (i.e., the distance at which adverse effects would be avoided – for example in the case of an individual shrub the drip line of that shrub)**.**	E6, E7, E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, T3, T4, V2, V3, V4, V5, V6, V7	SMUD field crew, qualified biologist
VELB-AMM7	**Mowing**. Mowing by SMUD field crews within the drip-line of the shrub will be limited to the season when adults are not active (August–February) and will avoid damaging the elderberry (e.g., stripping away bark through careless use of mowing/trimming equipment). Elderberry shrubs will be flagged and a qualified biological monitor will be present.	V2, V3, V6, V7	SMUD field crew, qualified biologist
VELB-AMM8	**Chemical Usage**. Herbicides will not be used within the drip-line of the shrub. Insecticides will not be used within 98 feet (30 meters) of an elderberry shrub. All chemicals will be applied using a backpack sprayer or similar direct application method. No take of ESA-listed or Covered Species from application of any chemical may result from pesticide use.	V2, V3, V6, V7	SMUD field crew

AMM Number	AMM Description		
General		**Applicable Covered Activities**	**Staff Responsible for Implementation**
California Tiger Salamander			
CTS-AMM1	**Daily California Tiger Salamander Avoidance Measures**. If construction activities must occur within suitable tiger salamander habitat during the Wet Season (generally November 1 - April 30), such construction will avoid all suitable aquatic habitat. No construction activities will be conducted in modeled upland habitat areas where tiger salamanders may occur regardless of the month if there is a greater than 70% chance of rain based on the National Oceanic and Atmospheric Administration's National Weather Service forecast or within 48 hours following a rain event greater than 0.25 inch, unless approved by the qualified biological monitor. Earthmoving and construction activities will cease no less than 30 minutes before sunset and will not begin again until no less than 30 minutes after sunrise. Except when necessary for driver or pedestrian safety, artificial lighting at a worksite will be prohibited during the hours of darkness. Where lighting is necessary, lighting will be directed inwards towards the construction footprint and will not be cast on California tiger salamander habitat outside of the construction area.	E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M2, T3, T4, C1	SMUD field crew
CTS-AMM2	**Pre-Work Clearance Survey**. When a Covered Activity would occur between October 15 and July 15 in California tiger salamander Modeled Habitat within Conservation Lands or for activities greater than 0.1 acre with modeled habitat, the qualified biologist will conduct a pre-work clearance survey for California tiger salamander. The clearance survey will be conducted 24 hours prior to the start of the Covered Activity. Any California tiger salamander found in the work area will be relocated, in accordance with *CTS-AMM7: California Tiger Salamander Handling*.	E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M1, M2, M4, T3, T4, C1	Qualified biologist

AMM Number	AMM Description		
General		Applicable Covered Activities	Staff Responsible for Implementation
CTS-AMM3	**California Tiger Salamander Biological Monitoring.** A qualified biologist will be onsite during Covered Activities in California tiger salamander Modeled Habitat (a) when the activities is on Conservation Lands, or (2) other locations if the activities are greater than 0.1 acre within Modeled Habitat, and will have the authority to stop work if personnel are out of compliance with the AMMs until corrective actions are taken to be in compliance with the AMMs. If a California tiger salamander is observed in the work area and there is a risk that injury or mortality may occur, the biological monitor will halt work and implement relocation protocols described in CTS-AMM7. Prior to the start of work each day the monitor will perform a preconstruction survey of the work area.	E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M2, T3, T4, C1	Qualified biologist
CTS-AMM4	**Avoid Inundated California Tiger Salamander Habitat**. SMUD field crews will not perform Covered Activities within California tiger salamander aquatic Modeled Habitat when water is present.	E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M2, T3, T4, C1	SMUD field crew, qualified biologist
CTS-AMM5	**California Tiger Salamander Exclusion Fencing**. California tiger salamanders are most likely to be dispersing between October 15 and July 15 on nights that are wet (either from rainfall or fog). If SMUD field crews must perform Covered Activities during this period in upland Modeled Habitat and the Covered Activity is going to take more than 1 week, amphibian exclusion fencing must be installed around the work area to minimize the potential for California tiger salamander to enter the work area.	E9, E10, E14, E15, E16, G5, G8, G9, G10, M1, M2, M4	SMUD field crew
CTS-AMM6	**Avoid Usage of Plastic Mono-filament Erosion Control Materials in California Tiger Salamander Modeled Habitat**. SMUD field crews will not use erosion control materials that contain plastic mono-filament in California tiger salamander Modeled Habitat. SMUD field crews will use tightly woven fiber netting (with a mesh size less than 0.25 inch) or similar material for erosion control or other purposes in California tiger salamander Modeled Habitat to ensure that California tiger salamanders do not get trapped. Coconut coir matting/rolls is an acceptable erosion control material.	E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, M2, T3, T4, C1	SMUD field crew

AMM Number	AMM Description		
General		**Applicable Covered Activities**	**Staff Responsible for Implementation**
CTS-AMM7	**California Tiger Salamander Handling**. California tiger salamanders found at Rancho Seco facilities will be relocated in accordance with a wildlife agency-approved relocation plan developed for Rancho Seco, and individuals will be relocated sites identified in the SMUD HCP CTS Relocation Plan (Appendix G). For activities greater than 0.1 acre that occur in CTS Modeled Habitat, a CTS relocation plan shall be prepared and approved by the Wildlife agencies within 30 days or it can be assumed approved. The relocation plan shall follow the format of the *SMUD HCP CTS Relocation Plan* in Appendix G. Only a qualified biologist may capture or handle California tiger salamander. Bare hands will be used to capture California tiger salamanders. Qualified biologists will not use soaps, oils, creams, lotions, repellents, or solvents of any sort on their hands within 2 hours before and during periods when they are capturing and relocating individuals. To avoid transferring disease or pathogens of handling of the amphibians, qualified biologists will follow the Declining Amphibian Populations Task Force's *Code of Practice* or currently accepted protocols. The qualified biologist will immediately relocate any California tiger salamanders found to suitable habitat a minimum of 300 feet outside of the work area but within the same habitat patch affected if feasible, at a location predetermined prior to commencement of construction. If no suitable location can be identified at least 300 feet from the Covered Activity and within the same habitat patch affected, SMUD will coordinate with the wildlife agencies prior to the activity to identify an alternative site for relocating California tiger salamanders and develop a CTS site specific relocation plan (see Appendix G, *SMUD HCP CTS Relocation Plan*).	All	Qualified biologist

AMM Number	AMM Description		
General		**Applicable Covered Activities**	**Staff Responsible for Implementation**
CTS-AMM8	SMUD would install and maintain a permanent California tiger salamander exclusion fence around the perimeter of the Cosumnes Power Plant to avoid impacting California tiger salamander during operation and maintenance of Cosumnes Power Plant (CPP). The fencing would be metal flashing at least 2 feet tall above the soil surface and buried to a minimum depth of 4 inches below the soil surface. The barrier would be designed to prevent California tiger salamander from climbing over it or under it through burrows or cracks. SMUD would monitor the exclusion fencing and maintain it for the life of CPP, checking it annually prior to each rainy season. If the metal flashing does not perform as expected, SMUD will use adaptive management to implement a more effective barrier such as a concrete curb. Cover board will be placed on the outside of the CPP fence and in areas most frequented by California tiger salamanders to provide refuge to migrating CTS that have been redirected by the fencing.	M1	SMUD field crew, Qualified biologist
CTS-AMM9	**Cover holes, trenches, and perform inspections.** All excavated steep-walled holes and trenches (more than 6 inches deep) will be covered with plywood (or similar material) and/or provided with one or more escape ramps at an angle of ≤ 30 degree, constructed of earth fill or wooden planks at the end of each workday or 30 minutes prior to sunset, whichever occurs first. All steep-walled holes and trenches will be inspected by the Qualified Biologist each morning (including non-workdays) that the trench or hole is open to ensure that no wildlife has become entrapped. All construction pipes, culverts, similar structures, construction equipment, and construction debris left overnight within California tiger salamander modeled habitat will be inspected for California tiger salamander by the qualified biologist prior to being moved.	E9, E10, E14, E15, E16, G5, G8, G9, G10, M1, M2, M4	SMUD field crew, qualified biologist

AMM Number	AMM Description		
General		**Applicable Covered Activities**	**Staff Responsible for Implementation**
Giant Garter Snake			
GGS-AMM1	**Giant Garter Snake Biological Monitor.** A qualified biologist will be on site during Covered Activities in giant garter snake Modeled Habitat on Conservation Lands or for activities greater than 0.1 acre in Modeled Habitat or for Covered Activities initiated in the inactive season. The qualified biologist will have the authority to stop work if personnel are out of compliance with the AMMs and until corrective actions are taken to be in compliance with AMMs, or if there is a risk that incidental take (mortality) of giant garter snake may occur. Prior to the start of work each day the monitor will perform a preconstruction survey of the work area and will flag burrows to avoid stockpiling soil over burrows.	E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, T3, T4, V2, V3b, V3c, V4, V5, V7	Qualified biologist
GGS-AMM2	**Giant Garter Snake Seasonal Work Windows**. Covered Activities in giant garter snake upland Modeled Habitat will be initiated between May 1 and October 1. This is the active period for giant garter snakes, and direct mortality is lessened because snakes are expected to actively move and avoid danger. If limiting work to the period from May 1 to October 1 is not feasible, new temporary and permanent impacts will be mitigated at the direct permanent impact ratio of 3:1. That is, a higher mitigation ratio will be required for areas where new ground disturbance occurs between October 2 and April 30. If limiting work to the period from May 1 to October 1, is infeasible, a qualified biologist will monitor activities in giant garter snake habitat. If a giant garter snake is encountered, construction activities shall immediately cease. SMUD will notify the Wildlife Agencies immediately. The GGS should be allowed to leave the area on its own accord and construction activities may not start back up until the GGS has safely moved out of harms way. If the GGS cannot move out of harms way on its own, then the designated biologist shall relocate individuals as necessary consistent with the Giant Garter Snake Relocation Plan (Appendix G).	E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, T3, T4, V2, V3, V4, V5, V7	SMUD field crew; SMUD Environmental Services
GGS-AMM3	**Minimize Vegetation Clearing**. SMUD field crews will minimize vegetation clearing to the minimal area necessary to facilitate Covered Activities within upland and aquatic Modeled Habitat. For work in giant garter snake aquatic Modeled Habitat, SMUD field crews will use hand tools to clear vegetation or debris.	E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, T3, T4, V2, V3b, V3c, V4, V5, V7	SMUD field crew

AMM Number	AMM Description		
General		Applicable Covered Activities	Staff Responsible for Implementation
GGS-AMM4	**Dewatering**. If dewatering of giant garter snake aquatic Modeled Habitat is necessary, the work area will remain dry for at least 15 consecutive days between March 15 and October 15, and prior to excavating or filling of the dewatered habitat. After aquatic habitat has been dewatered 15 days prior to Covered Activities, exclusion fencing will be installed extending a minimum of 300 feet into adjacent uplands to isolate both the aquatic and adjacent upland habitat. Exclusionary fencing will be erected 36 inches above ground and buried at least 6 inches below the ground to prevent snakes from attempting to move under the fence into the construction area. In addition, high-visibility fencing will be erected to identify the construction limits and to protect adjacent habitat from encroachment of personnel and equipment. GGS habitat outside construction fencing will be avoided by all construction personnel. The fencing and the work area will be inspected by the Approved Biologist to ensure that the fencing is intact and that no snakes have entered the work area before the start of each workday. The fencing will be maintained by the contractor until completion of the project.	E8, E9, E10, E11, E13, E14, E15, E16, G5, G6, G7, G8, G9, G10, T3, T4, V2, V3b, V3c, V4, V5, V7	SMUD field crew

5.3.3 Annual Training

To help ensure that the AMMs are implemented properly, SMUD will implement an annual environmental awareness training program for staff who conduct or supervise Covered Activities performed under the SMUD HCP. SMUD will provide the training both in person and online to maximize the number of staff who receive it. SMUD will also train contractors and supply all training materials to these contractors. SMUD holds its contractors responsible for complying with all applicable environmental laws and regulations as well as for implementing SMUD's environmental protection measures.

Training will include an overview of the SMUD HCP, the importance of compliance with the HCP and all environmental laws, and a summary of all AMMs outlined in the HCP. A qualified professional (e.g., environmental specialist, land planner, biologist, HCP administrator) will lead the training on Covered Species and provide specific information regarding sensitive species and their habitats. SMUD will record the names of staff members and contractors who attend the annual training to ensure they complete training requirements.

5.4 Mitigation

SMUD will provide mitigation in advance of impacts in 5-year increments. To achieve this, the conservation strategy includes a "5-year stay-ahead approach" whereby SMUD will secure mitigation for impacts on Covered Species Modeled Habitat every 5 years of the 30-year permit term. Starting in year 1 of the permit term (within 90 days of Permit issuance) and every 5 years thereafter, SMUD will provide mitigation in amounts that will meet or exceed the forecasted amounts needed to fully mitigate the impacts on Covered Species Modeled Habitat by predicted Covered Activities in the next 5-year period. Every year beginning with permit issuance, SMUD will assess the actual impacts in the field from the previous year to ensure that impacts are not exceeding the mitigation. Mitigation provided during the previous 5-year period in excess of what was needed will be deducted from the forecast for the next 5-year period. More details of the stay-ahead provision are in Section 7.4, *Mitigation Accounting and Stay-Ahead Provision.* If, during any 5-year period, or during the permit term, the amount of temporary habitat disturbance or permanent habitat loss for any Covered Species exceeds the amount of advance mitigation available to offset habitat disturbance or loss for that Covered Species, Covered Activities will not be implemented and no take will occur within Modeled Habitat for that species until SMUD provides mitigation for that species.

Impacts on Modeled Habitat for Covered Species will be mitigated with equivalent or higher-value habitat according to the mitigation ratios described in the sections below. SMUD will provide the appropriate mitigation in each 5-year time period through one or more of the mechanisms described in detail in section 5.4.5, *How SMUD Will Mitigate*.

5.4.1 Determining Mitigation for Direct Permanent Impacts

SMUD will mitigate direct permanent impacts from ground disturbance on Modeled Habitat through permanent habitat protection at a 3:1 ratio for Covered Species except Sacramento Orcutt grass and slender Orcutt grass. Sacramento Orcutt grass and slender Orcutt grass will have a different mitigation strategy because of SMUD would implement *VP-AMM4 Avoid Occupied Orcutt Grass Habitat*, and would implement the strategy described below in Section *5.4.5.4 Enhance Sacramento Orcutt Grass Population and Slender Orcutt Grass Introduction at SMUD Bank*. As described in Chapter 4, the Covered Species are affected by Covered Activities almost entirely by many very small disturbances distributed widely throughout the Permit Area. Therefore, protecting or restoring and managing 3 acres of Modeled Habitat for each acre impacted will fully offset habitat impacts. As described below, the mitigation sites will always be of high-quality habitat for the Covered Species, while impact sites will often be low-quality habitat.

Direct permanent impacts typically result from the construction of new facilities. SMUD will provide mitigation for permanent impacts on a specific location only once during the duration of the HCP even if subsequent impacts occur in the same location. For temporary disturbance, SMUD will provide mitigation at each specific location each time the impact occurs.

To ensure no net loss of vernal pool habitat, SMUD will achieve the 3:1 ratio through a combination of preservation and restoration. SMUD will use vernal pool restoration or creation credits at a 1:1 ratio (i.e., 2:1 preservation, 1:1 restoration/creation). SMUD will achieve restoration or creation through use of vernal pool restoration/creation credits at the SMUD Bank, or at another available bank within the Plan Area approved by the Wildlife Agencies. This will mitigate for direct permanent impacts on vernal pool habitat for Sacramento Orcutt grass, slender Orcutt grass, vernal pool fairy shrimp, and vernal pool tadpole shrimp. Loss of aquatic habitat for California tiger salamander will also be mitigated through vernal pool restoration or creation credits at a 1:1 ratio (i.e., 2:1 preservation, 1:1 restoration/creation). This will result in no net loss of acres of these habitat types.

5.4.2 Determining Mitigation for Temporary Habitat Disturbance

The majority of impacts from operations and maintenance activities result from disturbances that are temporary in nature. SMUD will restore sites temporarily disturbed by Covered Activities within Modeled Habitat for Covered Species (see Biological Objective 2.1). The approach to site restoration is contingent on whether Covered Activities would affect less than 0.1 acre or more than 0.1 acre. For the majority of Covered Activities that are implemented on a routine, daily basis and that affect less than 0.1 acre, SMUD will provide no active site restoration because these areas are expected to return to pre-disturbance conditions on their own, and it is not financially or logistically feasible to restore numerous small disturbance areas. For larger Covered Activities affecting more than 0.1 acre, site restoration could include soil stabilization, recontouring excavated areas to follow natural contours, reseeding areas cleared of plant cover, and

planting trees or other vegetation that occur naturally within the type of Modeled Habitat affected by the disturbance (G-AMM14). While the majority of areas that are affected by small Covered Activities would not undergo any active site restoration, mitigation for both temporary and permanent habitat disturbance will be provided as part of this HCP.

Covered Activities affecting more than 0.1 acre will be restored to pre-project conditions within 12 months of the completion of construction (see Appendix D, Table D-3 *SMUD HCP Total Land Cover Loss by Covered Activity*, for a list of projects affecting more than 0.1acre). Site restoration will not require any plans or approvals from USFWS, but will be performed in accordance with G-AMM14.

In addition to restoration of the impact site, SMUD will offset temporary disturbance of Vernal Pool, Seasonal Wetland, and Swale Modeled Habitat and associated Covered Species (i.e., vernal pool fairy shrimp, vernal pool tadpole shrimp, and California tiger salamander) by mitigating at a 0.5:1 ratio. This ratio is to account for the temporal disturbance of habitat between the time it is impacted and the time it is restored.

SMUD will mitigate temporary disturbance of Modeled Habitat for California tiger salamander (upland habitat) and giant garter snake through onsite restoration and mitigation at a 0.5:1 ratio. The rationale for this approach is provided below for each species.

- Areas of upland California tiger salamander Modeled Habitat that may be temporarily disturbed by Covered Activities are expected to recover to pre-project or ecologically improved conditions within 1 year of initiating construction. Additionally, a number of general AMMs will involve the restoration of disturbed areas (Table 5-1). Because the actual impacts on California tiger salamander expected to result from temporary disturbance of Modeled Habitat are expected to recover to pre-project or ecologically improved conditions within 1 year of initiating construction, SMUD will mitigate for temporary disturbance of California tiger salamander Modeled Habitat at a 0.5:1 ratio.
- Areas of aquatic and upland giant garter snake Modeled Habitat that may be temporarily disturbed by Covered Activities are expected to recover to pre-project or ecologically improved conditions within 1 year of initiating construction. Therefore, because impacts on giant garter snake expected to result from temporary disturbance of Modeled Habitat are expected to recover to pre-project or ecologically improved conditions within 1 year of initiating construction, SMUD will mitigate for temporary disturbance of giant garter snake Modeled Habitat at a 0.5:1 ratio.

5.4.3 Determining Mitigation for Indirect Impacts on Vernal Pool Species

SMUD will mitigate for estimated indirect impacts on covered vernal pool crustaceans at a 1:1 ratio.[4] Indirect impacts on vernal pool land cover are based on a distance of 50 feet from Covered Activity E9c, *Direct Buried Cable Replacement,* and 250 feet from other

[4] See Chapter 7, Section 7.3, *Habitat Loss and Disturbance Accounting*, for a description of how SMUD will account for and track indirect impacts.

specific Covered Activities as described in Chapter 4, Section 4.2.2.3, Estimating Vernal Pool, Seasonal Wetland, and Swale Disturbance in the Vicinity of Covered Activities. Avoidance and Minimization Measures were designed to also offset other indirect impacts that could potentially occur in association with Covered Activities but which are more difficult to quantify.

5.4.4 Determining Mitigation for Valley Elderberry Longhorn Beetle

The mitigation approach described above for Covered Species Modeled Habitat will not be sufficient to adequately mitigate for impacts on valley elderberry longhorn beetle. Therefore, for unavoidable impacts on valley elderberry longhorn beetle, SMUD will mitigate by following current USFWS mitigation ratio guidelines (U.S. Fish and Wildlife Service 2017). Required compensation ratios for loss of elderberry shrubs is illustrated in Table 5-2 and described in the paragraph below. SMUD will mitigate for trimming 200 shrubs and removing 100 shrubs over the permit term. SMUD assumes the average canopy area of elderberry shrubs to be 0.027 acres; therefore, SMUD will mitigate 0.081 acres for every shrub trimmed or removed (a total of 24.3 acres of mitigation).

During vegetation management work, SMUD aims to achieve 15 feet of clearance between vegetation and electrical equipment, unless site specific conditions warrant additional clearance. SMUD follows American National Standards Institute (ANSI) A300 concepts and utility directional pruning, which supports proper pruning/tree health while achieving and maximizing the pruning cycle. Elderberry shrubs would be pruned no lower than 6 feet in height (measured from the ground). Any shrubs trimmed below 6 feet in height would be considered permanently removed. To minimize the impact on the valley elderberry longhorn beetle to the extent feasible, SMUD would trim elderberry shrubs unless removal is necessary for the Covered Activity. Since trimming would only affect the top portion of the shrub and the lower portion would continue to provide habitat, the shrub would be mitigated once at a 3:1 ratio and would be considered permanently impacted. The shrub would be trimmed in perpetuity to maintain clearance as needed without additional mitigation. For circumstances where the entire elderberry shrub needs to be removed, such as a shrub growing within the base of a transmission lattice tower and preventing necessary inspection of the structure, the entire shrub would be permanently removed and would be mitigated at a 3:1 ratio. There may be special cases or extenuating circumstances that require alternative approaches. During these situations, a proposed plan will be submitted to the Wildlife Agencies before taking action. The Wildlife Agencies will have 30 days to respond, or it will be assumed approval is granted.

Table 5-2. Compensation for Loss of Elderberry Shrubs

Impact Type	Compensation Ratio[a]
Removal	3:1
Trimming	3:1

[a] Number of credits : number of shrubs impacted

5.4.5 How SMUD Will Mitigate

SMUD will fully mitigate its actual impacts according to the mitigation ratios and approaches described above and in the quantities described below in Sections 5.4.6, *Mitigation Summary*. SMUD will accomplish this mitigation using several approaches, as described below in order of preference.

5.4.5.1 Use Credits at SMUD Bank

SMUD's preferred approach to mitigation under this HCP is to utilize the existing SMUD Bank for as many of the Covered Species as the site supports. The SMUD Bank is approximately 1,132 acres located in the southeastern portion of the HCP Permit Area, in the eastern and southern portions of SMUD's Rancho Seco property (Figure 5-3). The SMUD Bank provides high-quality habitat for most of the Covered Species. The SMUD Bank is within the USFWS Cosumnes/Rancho Seco Vernal Pool Recovery Core Area and within a designated Critical Habitat Unit of Sacramento Orcutt grass, vernal pool fairy shrimp, vernal pool tadpole shrimp, and California tiger salamander. The existing conditions of the SMUD Bank are described in Section 3.7, *SMUD Bank.* The Final Mitigation Bank Enabling Instrument (BEI), which describes the establishment and future use, operation, and habitat monitoring and management of the SMUD Bank, was enacted in January 2014. The U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, USFWS, and CDFW are signatories to the Final BEI.

SMUD established the SMUD Bank primarily to serve SMUD's future mitigation needs. Not all credits associated with the bank will be used for the SMUD HCP. Some of the credits have been and will continue to be used by SMUD for projects not covered by the HCP. Additionally, SMUD may decide to sell some mitigation bank credits to third parties.

The SMUD Bank provides credits for the following SMUD HCP land cover types: Grasses and Forbs, Riverine, Open Water/Fringe, Other Depressional Wetland, and vernal pool habitat (Vernal Pool, Seasonal Wetland, and Swale). The bank has been approved to mitigate impacts on the following Covered Species: Sacramento Orcutt grass, vernal pool fairy shrimp, vernal pool tadpole shrimp, and California tiger salamander (Table 5-3).

Table 5-3. Summary of Mitigation Credits or Acres Available from SMUD Bank

SMUD HCP Land Cover Type	Credits or Acres Available	Species
Grasses and Forbs	281.96	California tiger salamander (upland)*
Other Depressional Wetland	0.25	Vernal pool fairy shrimp* Vernal pool tadpole shrimp* California tiger salamander (Aquatic)*
Vernal Pool, Seasonal Wetland, and Swale (preserved)	22.80	Sacramento Orcutt grass* Slender Orcutt grass Vernal pool fairy shrimp* Vernal pool tadpole shrimp* California tiger salamander (Aquatic)*

SMUD HCP Land Cover Type	Credits or Acres Available	Species
Vernal Pool, Seasonal Wetland, and Swale (created/restored)	22.64	Sacramento Orcutt grass Slender Orcutt grass Vernal pool fairy shrimp* Vernal pool tadpole shrimp* California tiger salamander (aquatic)

*Species with approved credits in the bank prior to completion of the HCP. Covered Species that are not approved for credits (i.e., slender Orcutt grass) will be mitigated in the SMUD Nature Preserve Mitigation Bank in appropriate land types through the SMUD HCP only

5.4.5.2 Purchase Credits at Other Conservation Banks

For impacts on Covered Species that cannot be mitigated at the SMUD Bank, SMUD may purchase credits from a conservation or mitigation bank that is within the SMUD HCP Plan Area. There are five approved conservation banks in northern California with service areas for one or more Covered Species that overlap with the SMUD HCP Plan Area, and that are included in the Plan Area (Table 5-4). Over the 30-year permit term additional conservation banks will likely be created and approved, and may be used to mitigate impacts from SMUD HCP Covered Activities with Wildlife Agencies' approval, if these banks are in the Plan Area and include the Permit Area in their service areas.

Table 5-4. Other Conservation Banks

Approved Conservation or Mitigation Bank	Species Service Area Overlaps with Plan Area
Bryte Ranch Conservation Bank	Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp
Clay Station Conservation Bank	Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp
French Camp Conservation Bank	Valley elderberry longhorn beetle
Nicolaus Ranch Valley Elderberry Longhorn Beetle Conservation Bank	Valley elderberry longhorn beetle
River Ranch Conservation Bank	Valley elderberry longhorn beetle

5.4.5.3 Participate in an Overlapping HCP

If full mitigation cannot be achieved for a Covered Species at the SMUD Bank or another conservation bank, SMUD may collaborate with the implementing entity of another HCP to accomplish the remaining mitigation within the SMUD Plan Area, upon wildlife agency approval (take would be authorized under the SMUD HCP, not the other HCP). Candidate HCPs include the Western Placer County HCP/NCCP, the Natomas Basin HCP, the Yolo HCP/NCCP, and the South Sacramento HCP, as well as other future HCPs that may be developed over the SMUD HCP 30-year permit term. The Natomas Basin HCP was approved in 2003. The Western Placer County HCP/NCCP was permitted in 2020. The Yolo HCP/NCCP was approved in 2018 and began implementation in early 2019. The South Sacramento HCP was also approved in 2018. Overlapping HCPs are listed in Table 5-5 with respect to overlapping covered species.

Table 5-5. SMUD HCP Covered Species that are Also Covered by Overlapping Habitat Conservation Plans

SMUD Covered Species	Species that Cannot be Fully Mitigated by SMUD Bank	Other HCPs in SMUD Plan Area			
		Western Placer County HCP/NCCP	Natomas Basin HCP	Yolo County HCP/NCCP	South Sacramento HCP
Vernal pool fairy shrimp	X	X	X		X
Vernal pool tadpole shrimp	X	X	X		X
Valley elderberry longhorn beetle	X	X	X	X	X
California tiger salamander			X	X	X
Giant garter snake	X	X	X	X	X
Slender Orcutt grass			X		X
Sacramento Orcutt grass			X		X

5.4.5.4 Enhance Sacramento Orcutt Grass Population and Slender Orcutt Grass Introduction at SMUD Bank

SMUD will offset effects on Sacramento Orcutt grass modeled habitat through enhancement of the Sacramento Orcutt grass population by implementing invasive plant management and introduction of Sacramento Orcutt grass into suitable vernal pools where it is not known to occur. SMUD will offset effects on slender Orcutt grass modeled habitat through introduction of slender Orcutt grass into suitable vernal pools at the SMUD Bank. SMUD will develop a plan to address Sacramento Orcutt grass population enhancement and slender Orcutt grass introduction for Wildlife Agencies' approval by Year Five of SMUD HCP implementation. SMUD will then implement the enhancement and introduction plan. The enhancement and introduction plan will include the following information:

- Goals and objectives for enhancing the Sacramento Orcutt grass population and introducing slender Orcutt grass on the SMUD Bank;
- Methods for enhancing the Sacramento Orcutt grass population and introducing slender Orcutt grass on the SMUD Bank, such as inoculation and invasive plant management;
- Monitoring, including a monitoring schedule, monitoring methods, performance standards, and contingency measures to implement if performance standards are not met within a designated timeframe. The plans shall describe additional Orcutt grass surveys and management in the first 5 years of enhancement, after which surveys would be conducted every 5 years to monitor the long-term progression and would be conducted concurrently with the SMUD Bank Long Term Monitoring Plan. The long term monitoring as required by the HCP is described below in Section 5.4.5.5. Any monitoring above and beyond what is required under the Bank Enabling Instrument

would be funded separately from the SMUD Bank endowments described in Chapter 8.

5.4.5.5 Long Term Monitoring at the SMUD Bank

Every five years a biologist will quantify the plant communities in the 10% of preserved and restored-established waters of the U.S., including wetlands at the SMUD Bank by collecting the following data:

- Record a list of plant species present in the pool;
- List the dominant species determined using the 50/20 Rule as described in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0), September 2008;
- Note any other information that may be relevant to the habitat suitability for vernal pool fairy shrimp, vernal pool tadpole shrimp, or California tiger salamander; and
- Include the plant list, list of dominant species, and relevant notes in the SMUD Bank annual report

The HCP Long Term Monitoring at the SMUD Bank is above and beyond what is required under the Bank Enabling Instrument for the SMUD Bank and would be recorded in conjunction with the long-term monitoring required as part of the SMUD Bank BEI (and Covered Activity C2). The monitoring would be funded separately from the SMUD Bank endowment.

5.4.6 Mitigation Summary

SMUD's mitigation is described in Table 5-6 for covered plants and Table 5-7 for covered wildlife. Specific mitigation options are highlighted in the columns on the right of Tables 5-6 and 5-7. Overall, the SMUD HCP provides a comprehensive mitigation program that mitigates impacts by contributing to regional conservation or recovery efforts.

SMUD intends to use the SMUD Bank as much as possible to offset impacts from Covered Activities. The SMUD Bank is an approved bank that provides an excellent vehicle for achieving biological Objective 1.1. In addition, SMUD will use other mitigation banks or partner with regional conservation entities to mitigate for Covered Species impacts, as described above.

Table 5-6. Mitigation Summary for Covered Plants

Covered Species	Acres			Proposed Mitigation	Notes
	Impacts on Modeled Habitat (temporary, permanent, indirect)	Modeled Habitat Preservation	Modeled Habitat Restoration/ Creation		
Slender Orcutt grass	7.1 (temporary = 0.1 permanent = 4.3 indirect = 2.7	NA	NA	SMUD will continue to manage SMUD Bank to support suitable habitat for slender Orcutt grass.	SMUD will avoid adverse effects on occupied habitat of this species.
Sacramento Orcutt grass	7.1 (temporary = 0.1 permanent = 4.3 indirect = 2.7	NA	NA	SMUD will develop and implement an enhancement plan with IRT and Wildlife Agencies approval to improve conditions for Sac Orcutt grass on SMUD Bank.	SMUD will avoid adverse effects on occupied habitat of this species.

Table 5-7. Mitigation Summary for Covered Wildlife

Covered Species	Acres			Preferred Mitigation (numbers assume all projected impacts occur)	Notes
	Impacts on Modeled Habitat (temporary, permanent, indirect)[a]	Modeled Habitat Preservation (if all projected impacts occur) [b]	Modeled Habitat Restoration/ Creation (if all projected impacts occur)		
Vernal pool fairy shrimp and vernal pool tadpole shrimp	19.8 (temporary = 1.8 permanent = 14.1 indirect = 3.9)	33.0	14.1	1. Use the SMUD Bank to preserve 33.0 acres of Modeled Habitat, purchase credits at other conservation/mitigation banks, or partner with an overlapping HCP. 2. Use 14.1 acres of vernal pool restoration/ creation on SMUD Bank (i.e., use credits from previously created habitat).	These species occur at the SMUD Bank, and the BEI provides credits for these species. SMUD's preferred strategy for meeting this objective is using SMUD Bank credits for protection and restoration/ creation of Modeled Habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp, consisting of the MUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type.

Covered Species	Acres			Preferred Mitigation (numbers assume all projected impacts occur)	Notes
	Impacts on Modeled Habitat (temporary, permanent, indirect)[a]	Modeled Habitat Preservation (if all projected impacts occur) [b]	Modeled Habitat Restoration/ Creation (if all projected impacts occur)		
Valley elderberry longhorn beetle	300 shrubs (trimmed = 200 removed = 100)	16.2 acres for trimmed, and 8.1 acres for removed	N/A	1. Purchase credits to preserve 24.3 acres at a mitigation bank for valley elderberry longhorn beetle.	SMUD will offset impacts by purchasing credits at an approved conservation bank.
California tiger salamander	142.8 (*Aquatic Habitat* temporary = 0.5 permanent = 5.0 indirect = 3.2) (*Upland Habitat* temporary = 109.5 permanent = 24.6 indirect = N/A)	142.25 (*Aquatic Habitat* = 13.7, *Upland Habitat* = 128.55)	5.0 (*Aquatic Habitat*)	1. Use mitigation credits from SMUD Bank or another Conservation Bank in the Plan Area with Wildlife Agency approval to preserve 128.55 acres of upland Modeled Habitat and 13.7 acres of aquatic Modeled Habitat. 2. Use 5.0 acre of vernal pool creation/restoration credits for California tiger salamander on SMUD Bank or another Conservation Bank in the Plan Area with Wildlife Agency approval.	California tiger salamander is known to occur at the SMUD Bank, and the BEI for the Mitigation Bank provides mitigation credit for this species. Habitat enhancements at the SMUD Bank, including the restoration/creation of wetlands and the draining of stockponds to remove nonnative fish, have resulted in the creation/ enhancement of 19.0 acres of previously unoccupied habitat that is now occupied by the species. If necessary, SMUD may use another Conservation Bank in the Plan Area with Wildlife Agency approval.

Covered Species	Acres			Preferred Mitigation (numbers assume all projected impacts occur)	Notes
	Impacts on Modeled Habitat (temporary, permanent, indirect)[a]	Modeled Habitat Preservation (if all projected impacts occur) [b]	Modeled Habitat Restoration/ Creation (if all projected impacts occur)		
Giant garter snake	136.8 (*Aquatic Habitat* temporary = 10.4 permanent = 0.1 indirect = n/a) (*Upland Habitat* temporary = 102.2 permanent = 24.1 indirect = n/a)	128.8 (*Aquatic Habitat* = 5.4) (*Upland Habitat* = 123.4)	0.10	Purchase 128.9 credits at a mitigation bank. This represents a 3:1 ratio for permanent impacts, a 0.5:1 ratio for temporary impacts, and 1:1 aquatic habitat creation credit	There is no giant garter snake habitat at the SMUD Bank. SMUD's preferred strategy for meeting this objective is to work with one of the implementing entities of an adjacent HCP (listed in 5.4.5.3) to secure mitigation in one of the following areas: the Delta or Cosumnes-Mokelumne Basins in Sacramento County; the eastern part of the Yolo Basin; or the southern American Basin in southern Sutter County, western Placer County or northwestern Sacramento County. SMUD may use another Wildlife Agencies approved mitigation program if available, or buy giant garter snake credits at a Wildlife Agencies approved mitigation bank.

[a] Acres unless otherwise noted.

[b] Habitat preservation required according to the ratios in Section 5.4, if impacts occur up to the maximum allowed under the HCP.

BEI = Bank Enabling Instrument

5.5 Summary of Conservation Strategy by Species

Tables 5-8 and 5-9 provide a species-by-species summary of how implementation of the conservation strategy will avoid, minimize, and mitigate impacts on the covered plant and wildlife species. The conservation strategy will ensure that the impacts from Covered Activities are avoided, minimized, and mitigated to the maximum extent practicable and in a way that is more efficient and effective than the current ad-hoc activity-by-activity permitting. This mitigation approach will create a more consistent program that benefits Covered Species.

Table 5-8. Conservation Strategy Summary for Covered Plant Species

Plant Species	Avoidance and Mitigation Measures	Mitigation	Conclusion
Slender Orcutt grass	G-AMM3, G-AMM6, G-AMM7, G-AMM9, G-AMM12, G-AMM16, G-AMM19, VP-AMM1, VP-AMM2, VP-AMM3, VP-AMM4, VP-AMM5, VP-AMM6, VP-AMM7,	SMUD will develop and implement an enhancement and introduction plan with the Wildlife Agencies approval.	SMUD will avoid adverse effects on occupied habitat for this species. Impacts on modeled habitat avoided or minimized with AMMs. Mitigation ensures impacts on modeled habitat will be fully offset with no net loss of modeled habitat.
Sacramento Orcutt grass	G-AMM3, G-AMM6, G-AMM7, G-AMM9, G-AMM12, G-AMM16, G-AMM19, VP-AMM1, VP-AMM2, VP-AMM3, VP-AMM4, VP-AMM5, VP-AMM6, VP-AMM7,	SMUD will develop and implement an enhancement plan will introduce Sacramento Orcutt grass to pools where it is not known to occur in consultation with the Wildlife Agencies .	SMUD will avoid adverse effects on occupied habitat for this species. Impacts on modeled habitat avoided or minimized with AMMs. Mitigation ensures impacts on modeled habitat will be fully offset with no net loss of modeled habitat.

Table 5-9. Conservation Strategy Summary for Covered Wildlife Species

Species	Avoidance and Minimization Measures	Mitigation	Conclusion
Invertebrates			
Vernal pool fairy shrimp and vernal pool tadpole shrimp	G-AMM3, G-AMM6, G-AMM7, G-AMM9, G-AMM11, G-AMM12, G-AMM13, G-AMM16, G-AMM19, VP-AMM1, VP-AMM2, VP-AMM3, VP-AMM4, VP-AMM5, VP-AMM6, VP-AMM7	Preserve 2.0 acres and restore/create 1.0 acre of Modeled Habitat for every acre of permanent direct impact. Preserve 0.5 acre for every acre of temporary direct impact. Preserve 1.0 acre for every acre of indirect impact. With maximum allowable impacts, SMUD would preserve 33.0 acres and create 14.1 acres of Modeled Habitat.	Direct impacts avoided or minimized with AMMs. Mitigation ensures impacts will be fully offset with no net loss of suitable habitat.
Valley elderberry longhorn beetle	VELB-AMM1, VELB-AMM2, VELB-AMM3, VELB-AMM4, VELB-AMM5, VELB-AMM6, VELB-AMM7, VELB-AMM8	Preserve 24.3 acres of valley elderberry longhorn beetle habitat.	Direct impacts avoided or minimized with the application of AMMs. Unavoidable impacts mitigated at a USFWS-approved conservation bank.
Amphibians			
California tiger salamander	G-AMM4, G-AMM5, G-AMM7, G-AMM9, G-AMM10, G-AMM12, G-AMM13, G-AMM16, G-AMM17, G-AMM19, CTS-AMM1, CTS-AMM2, CTS-AMM3, CTS-AMM4, CTS-AMM5, CTS-AMM6, CTS-AMM7, CTS-AMM8	Preserve 128.55 acres of upland and 13.7 acres of aquatic habitat. Create 5.0 acres of aquatic Modeled Habitat.	Direct impacts avoided or minimized with AMMs. Mitigation ensures impacts will be fully offset with no net loss of aquatic (breeding) habitat.
Reptiles			
Giant garter snake	G-AMM3, G-AMM4, G-AMM5, G-AMM7, G-AMM9, G-AMM10, G-AMM12, G-AMM13, G-AMM16, G-AMM17, G-AMM19, GGS-AMM1, GGS-AMM2, GGS-AMM3, GGS-AMM4	Preserve 123.4 acres of upland habitat and 5.5 acres of aquatic habitat. Create 0.1 acre of modeled aquatic habitat.	Direct impacts avoided or minimized with AMMs. Mitigation ensures impacts will be fully offset with no net loss of aquatic habitat.

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6 Monitoring, Reporting, and Adaptive Management Program

6.1 Introduction

This chapter describes the monitoring, reporting, and adaptive management programs of the SMUD Habitat Conservation Plan (SMUD HCP). Monitoring is an integral component of any HCP's conservation strategy and is explicitly tied to the hierarchy of the biological goals, and the measurable biological objectives described in Chapter 5, *Conservation Strategy*. The SMUD HCP monitoring, reporting, and adaptive management programs will document HCP implementation and compliance with the permit as well as collect monitoring data that SMUD will use to improve the effectiveness of the HCP conservation strategy over the entire Permit Term. Chapter 7, *Implementation,* provides details about the roles and responsibilities of SMUD staff in implementing the monitoring and adaptive management program described in this chapter.

6.1.1 Types of Monitoring

Implementation of the annual monitoring program will include:

- **Compliance monitoring** – monitoring that tracks compliance with the requirements of the HCP and Incidental Take Permit. The HCP administrator and environmental specialists will be responsible for overseeing the compliance monitoring as Covered Activities are planned and completed. (Section 6.2, *Compliance Monitoring*)
- **Effects monitoring** – monitoring that tracks and organizes the impacts of the Covered Activities on the Covered Species habitat. The HCP administrator will be responsible for ensuring that impact estimates are being evaluated and revised as necessary. (Section 6.3, *Effects Monitoring*)
- **Effectiveness monitoring** – monitoring that tracks the effectiveness of the avoidance and minimization measures (AMMs), and tracks the effectiveness of the conservation measures in meeting the HCP's biological goals and objectives. Management at SMUD and the HCP administrator will be responsible for reviewing the monitoring data and assessing whether the biological goals and objectives are being met. (Section 6.4, *AMM Effectiveness Monitoring and Adaptive Management*)

6.1.2 Adaptive Management

An HCP adaptive management program includes a decision-making process that is based on monitoring results. According the HCP Handbook (U.S. Fish and Wildlife Service [USFWS] and National Marine Fisheries Service [NMFS] 2016) adaptive management

> "*Involves exploring alternative ways to meet habitat management objectives, predicting the outcomes of alternatives based on the current state of knowledge, implementing one or more of these alternatives, monitoring to learn about the impacts of management actions, and then using the results to update knowledge and adjust management actions. Adaptive management focuses on learning and adapting, through partnerships of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable resource systems*."

The SMUD HCP adaptive management process will allow AMMs to be adjusted with concurrence from USFWS. The management of mitigation land may be adjusted as existing uncertainties become better understood or as future conditions change, in accordance with the adaptive management mechanisms in preserve management plans. Adaptive management is necessary because of the uncertainty and natural variability inherent in the Permit Area's ecosystems, uncertainty in habitat or species response to the stressors produced by different Covered Activities, and uncertainty in habitat or species response to future land management actions. SMUD expects that the SMUD HCP's conservation actions described in Chapter 5, will achieve the stated biological goals and objectives described therein.

Adaptive management is a necessary component of habitat conservation plans to ensure the effective management and protection of mitigation lands. The HCP Handbook describes adaptive management as an integrated method for addressing uncertainty in natural resource management. In the context of this HCP, natural resource management will focus on managing mitigation lands for the benefit of covered species.

Adaptive management measures will be implemented when management actions do not produce the desired outcome or when species or natural-community trends decrease. In these cases, new actions would be implemented to try to improve the outcome for species and their habitat. Such actions could include following.

- Alter the timing, location, intensity or type of grazing.
- Reduce, increase or otherwise change the pattern of management actions.
- Modify timing, location, or type of restoration.
- Modify approach to noxious weed control. Modify species-specific measures based on monitoring results (e.g., bullfrog eradication technique).

6.2 Compliance Monitoring

Compliance monitoring, also known as "implementation monitoring," is the process used to track compliance with the requirements, commitments, and terms of the HCP and the permit, and will verify that the permittee is conforming to and correctly implementing the permit and HCP. As part of required compliance monitoring, SMUD will monitor, track, and report Covered Activities that are implemented every year.

SMUD will verify that the HCP is being implemented as required. This will include collecting the following information.

- Number of each type of Covered Activity implemented each year.
- Number of times SMUD implemented each AMM each year, including the AMM requirement for annual environmental training, and the location of where the following AMMs are implemented, G-AMM-8, G-AMM9, G-AMM14, G-AMM18, VP-AMM-7, CTS-AMM7, and GGS-AMM1.
- Documentation of all biological surveys and monitoring conducted.
- Number of acres of impacts on each land cover type and acres of each Covered Species Modeled Habitat impacted each year. For valley elderberry longhorn beetle, SMUD will monitor the number of shrubs trimmed for the first time (considered permanently impacted at that time, therefore subsequent trimming need not be monitored.).
- Number of acres of mitigation obtained or credited, by land cover type and by each Covered Species Modeled Habitat.

SMUD will compile the HCP compliance monitoring information listed above and provide this information to USFWS in the SMUD HCP annual report, as described in Section 6.5, *HCP Annual Report* (a separate report will be prepared for California Department of Fish and Wildlife [CDFW] for species that are covered in the 2081 permit).

6.3 Effects Monitoring

Effects monitoring verifies that the temporary and permanent impacts of implemented Covered Activities are consistent with the assumptions and do not exceed the impact estimates (Chapter 4, *Impact Analysis and Level of Take*) used when the SMUD HCP was developed and approved.

As discussed in Section 6.5, the SMUD HCP Annual Report will include a list of all Covered Activities implemented annually. SMUD will use a combination of disturbance estimates and actual impact data (on the ground measurements) to monitor impacts from Covered Activities. SMUD will also use a combination of geographic information system (GIS) based desktop and in-the-field measurements to evaluate the impact estimates from Covered Activities during HCP implementation. Additionally, SMUD will evaluate the extent to which AMMs minimized or avoided impacts, as described in Section 6.4.1, *AMM Effectiveness Monitoring.*

SMUD will perform validation studies comparing the impact data with the impact estimates used during HCP development by reviewing Covered Activities every 5 years (years 5, 10, 15, 20, and 25) for Permit Term. To confirm that the estimates for Covered Activities are accurately portrayed and have not changed over time, SMUD will evaluate 10 percent of every Covered Activity that causes more than 0.1 acre of disturbance for the preceding 5-year period, as well as 10 percent of every Covered Activity that occurs

in modeled habitat more than 100 times per year. This study will assess small activities to verify that impacts are equal to or smaller than those predicted in the HCP, and will also verify that several key large activities' temporary impacts have not become permanent. A combination of GIS-based desktop and in-the-field measurements will be used to evaluate the disturbance area estimates from Covered Activities during HCP implementation. SMUD will compare these results with the habitat loss or disturbance estimates used during HCP development. The validation study will help ensure the habitat loss and disturbances are accounted for correctly. If SMUD determines, and USFWS concurs, that these validation efforts are not valuable (i.e., the surveys continue to demonstrate the activities are small and unchanging, or SMUD is unable to detect impacts), SMUD may reprioritize its staff time to focus on other areas of effects monitoring. Effects monitoring information will be provided in the annual report, as described in Section 6.5.

6.4 AMM Effectiveness Monitoring and Adaptive Management

6.4.1 AMM Effectiveness Monitoring

SMUD will monitor AMMs to assess their effectiveness in avoiding and minimizing effects on Covered Species. Based on documentation of the effects and AMMs implemented (Section 6.2, *Compliance Monitoring*), SMUD will answer the following questions in the SMUD HCP Annual Report:

- Is the AMM operating as anticipated? SMUD field crews will identify and report to SMUD Environmental Services, instances where AMMs were not feasible or could only be partially implemented.
- Is the AMM effectively avoiding and minimizing impacts on Covered Species? SMUD Environmental Services or qualified biologists (depending on the type of activity) will identify instances where AMMs did not avoid or minimize effects on Covered Species as described in Chapter 4.

Information gathered from AMM effectiveness monitoring may identify inconsistencies between assumptions made during the development of the SMUD HCP Conservation Strategy and actual outcomes of implementation of the Green Zone (see Chapter 7, Section 7.1.3, *Engineering Designers and Planners*) or species-specific AMMs. The results of the effectiveness monitoring program may be used to identify the need for AMM modification or additional AMMs throughout the Permit Term, as described in Section 6.4.2, *AMM Adaptive Management*.

6.4.2 AMM Adaptive Management

The results of AMM compliance and effectiveness monitoring (Sections 6.2 and 6.4.1, respectively) may be used to adaptively modify SMUD AMMs over the Permit Term if necessary to reduce adverse effects consistent with the effects assumed during preparation of the SMUD HCP. SMUD will evaluate the effectiveness of each AMM as

described in Section 6.4.1, *AMM Effectiveness Monitoring*. If SMUD deems an AMM ineffective, the following questions will be answered in the SMUD HCP Annual Report.

- Did the ineffectiveness of the AMMs result in greater effects on Covered Species than anticipated?
- Are there changes that would make the AMM more effective?
- Are changes consistent with the permits?
- Will USFWS support changes to the AMMs?

If SMUD identifies changes to the AMMs that would improve effectiveness and USFWS concurs in writing with these changes, SMUD will modify the AMMs accordingly.

If an AMM cannot be adjusted to improve its effectiveness, and if the ineffectiveness of the AMM results in greater Modeled Habitat loss or disturbance than anticipated, SMUD will track any increased habitat loss or disturbance per Covered Activity (Chapter 7, Section 7.3, *Habitat Disturbance and Loss Accounting*) and determine whether this would result in SMUD reaching its take limits sooner than anticipated. If SMUD cannot adjust the AMMs to effectively reduce effects on Covered Species, SMUD will need to apply for an amendment to the Incidental Take Permit to account for higher levels of take and adjust the mitigation accordingly.

If USFWS deems an AMM ineffective upon review of the SMUD HCP Annual Report, then USFWS will coordinate with SMUD on the steps described above to adjust the AMM, adjust the number of actions to be covered, or amend the Incidental Take Permit.

6.4.3 Mitigation Effectiveness Monitoring and Adaptive Management

Chapter 5, Section 5.4.5, *How SMUD Will Mitigate*, describes the various options SMUD may use to mitigate Covered Species impacts. The SMUD HCP conservation strategy is based on modeled habitat, therefore performance will primarily be assessed based on numbers of habitat credits used for each species at established banks. Additional effectiveness monitoring and adaptive management associated with each of the mitigation options is described below.

6.4.3.1 SMUD Bank

A monitoring program has been prepared for the SMUD Bank, pursuant to the Bank Enabling Instrument (BEI) that was approved in 2013 by USFWS, U.S. Army Corps of Engineers, and CDFW. The conservation strategy for the SMUD Bank is habitat based, as described in Objective 1.1, Section 5.2, *Biological Goals and Objectives.* As such the general approach to long-term monitoring of the SMUD Bank's biological resources is to conduct annual site examinations and monitoring of selected characteristics (e.g., hydrologic conditions, vegetative cover and conditions) to determine stability and ongoing trends of the preserved, enhanced, restored, and established habitat for Covered Species. Annual monitoring assesses the SMUD Bank's condition, water quality, degree

of erosion, infestation of nonnative invasive species, fire hazard, and other characteristics that may warrant management actions. While a need for major management actions is not anticipated, SMUD will conduct monitoring to identify any uncertainties and/or issues that may arise and, through adaptive management, determine the appropriate corrective actions. Monitoring results may identify methods or techniques that could improve management activities or enhance habitat features of the SMUD Bank. As appropriate and based on the results from monitoring, improved management and monitoring tasks that enhance habitats and promote species on the SMUD Bank may be implemented.

Monitoring of the SMUD Bank will be conducted by a qualified biologist[1] with knowledge of the site and the experience necessary to accomplish monitoring responsibilities. The overall goal of adaptive management is to provide for long-term viability of Covered Species and habitats at the SMUD Bank.

The effectiveness monitoring program established at the SMUD Bank is consistent with HCP guidelines (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016) and does the following.

- Identifies specific monitoring objectives.
- Evaluates competing hypotheses about the effectiveness of management actions where effectiveness would be highly uncertain.
- Focuses on crucial information needed to resolve uncertainty and improve management effectiveness.
- Explicitly shows monitoring data's purpose and use in the adaptive management processes established in the HCP.

The program helps SMUD and USFWS decide which management actions are most effective in meeting the HCP goals, which is done by developing competing hypotheses about how the system will respond to management actions taken through implementation of the conservation strategy. Table 6-1 provides the SMUD Bank's performance standards for Covered Species (as well as performance standards for non-SMUD banks). SMUD will monitor the SMUD Bank and, in conjunction with USFWS, will determine whether these standards are being met and adjust management actions as necessary to meet these standards.

[1] ***Qualified biologists*** are those biologists who have the experience, education, and training necessary to perform a given task described in this Plan accurately and in an unbiased fashion. Training must be in the specific field to which the task is related.

Table 6-1. Monitoring Tasks and Performance Criteria for Mitigation

Covered Species	Monitoring Action	Performance Standard
All Covered Species Habitat on the SMUD Bank	At least one annual walk-through survey will be conducted to qualitatively monitor the general condition of the SMUD Bank's habitats.	None.
Sacramento Orcutt grass	For newly enhanced habitat, a qualified biologist will monitor consistent with the Wildlife Agencies-approved enhancement plan. For existing occurrences, a qualified botanist will conduct a minimum of one survey for Sacramento Orcutt grass every 5 years (see Appendix G, *SMUD Nature Preserve Long Term Management Plan,* for details on long term monitoring). The surveys will be conducted within wetlands known to support the species and wetlands that provide suitable habitat but where the species were not previously identified. The surveys will occur during the appropriate blooming period, generally between May and July (depending on timing of the blooming period for the year).	The mitigation for Sacramento Orcutt grass consists of protection and enhancement of Sacramento Orcutt grass at the SMUD Bank, consistent with a Wildlife Agencies-approved enhancement plan as described in Section 5.4.5.4. The performance standard will be specified in the USFWS-approved enhancement plan.
Slender Orcutt grass	A qualified botanist will conduct a minimum of one survey for slender Orcutt grass on the SMUD Bank every 5 years. The surveys will be conducted within wetlands that provide suitable habitat on the SMUD Bank. The surveys will occur during the appropriate blooming period, generally between May and July (depending on timing of the blooming period for the year).	The mitigation for slender Orcutt grass is based on modeled habitat. The performance standard is continued protection and management of habitat for the species on the SMUD Bank.
Vernal pool fairy shrimp and vernal pool tadpole shrimp	On the SMUD Banks, a USFWS-permitted biologist will conduct wet season invertebrate sampling every 5 years (Appendix G, *SMUD Nature Preserve Long Term Management Plan*). Wet-season sampling will be conducted during the optimal time to observe vernal pool fairy shrimp and vernal pool tadpole shrimp, generally between February and April (depending on rainfall patterns and levels for the year) in representative (10%) preserved and restored/established wetlands on the SMUD Bank known to support vernal pool fairy shrimp and/or vernal pool tadpole shrimp. If other mitigation banks are used, monitoring will occur in accordance with the land manager's agency-approved documents (e.g., interim, long-term and site-specific management plans), unless monitoring must be enhanced to meet SMUD's needs for this HCP. Any mitigation that SMUD completes will support the biological goals and objectives described in Section 5.2 of this HCP.	On the SMUD Bank, approximately 15% of the pools sampled for vernal pool fairy shrimp will contain vernal pool fairy shrimp, and approximately 15% of the pools sampled for vernal pool tadpole shrimp will contain vernal pool tadpole shrimp in a given 5-year monitoring cycle, unless it is a drought year with 70% (or less) of the normal rainfall. On other banks, the performance standards will be as approved by USFWS for the specific bank, and will vary by site.

Covered Species	Monitoring Action	Performance Standard
Valley elderberry longhorn beetle	Monitoring will occur in accordance with the land manager's agency-approved documents (e.g., interim, long-term and site-specific management plans), unless monitoring must be enhanced to meet SMUD's needs for this HCP. Any mitigation that SMUD completes will support the biological goals and objectives described in Section 5.2 of this HCP.	Performance standards will be as approved by USFWS for the specific bank, and will vary by site.
California tiger salamander	To monitor the breeding status of California tiger salamanders on the SMUD Bank, a USFWS-permitted biologist will conduct dip-net sampling for California tiger salamander larvae every 5 years during an average rainfall year (Appendix F, *SMUD Nature Preserve Long Term Management Plan*). Sampling will be conducted during the optimal time to observe larvae, generally between March and May (after determining that rainfall levels for the year are within average levels) in all ponds/pools on the SMUD Bank known to support California tiger salamanders.	Successful breeding of California tiger salamander is documented in approximately 15% of the known breeding ponds/pools in a given 5-year monitoring cycle with average rainfall.
Giant garter snake	Monitoring will occur in accordance with the land manager's agency-approved documents (e.g., interim, long-term and site-specific management plans), unless monitoring must be enhanced to meet SMUD's needs for this HCP. Any mitigation that SMUD completes will support the biological goals and objectives described in Section 5.2 of this HCP.	Performance standards will be as approved by USFWS for the specific bank or other mitigation site (e.g., through Natomas HCP), and will vary by site.

6.4.3.2 Other Conservation Banks

As described in Chapter 5, Section 5.4.5.2, *Purchase Credits at Other Conservation Banks,* SMUD may also purchase credits from other conservation or mitigation banks within the Plan Area. During SMUD HCP implementation, if SMUD proposes to use a conservation bank other than the SMUD Bank, SMUD's proposal to USFWS, and CDFW for giant garter snake and California tiger salamander, will include a summary of the proposed bank's monitoring and adaptive management program, and an assessment as to whether the bank's program is consistent with guidance on monitoring and adaptive management as provided in USFWS' HCP Handbook (USFWS 2016) and how acquisition of credits would meet the biological goals and objectives of the SMUD HCP. SMUD will evaluate the bank's monitoring and adaptive management program to ensure it meets the SMUD HCP standards and biological goals and objectives prior to proposing it to Wildlife Agencies for approval. In particular, SMUD must demonstrate that the bank contributes to the SMUD HCP's biological goals and objectives and adequately mitigates impacts on Covered Species consistent with the SMUD HCP.

- Bryte Ranch and Clay Station Conservation Banks will help meet the Plan's biological goals and objectives by providing for the permanent protection of habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp.

- French Camp Conservation Bank, Nicolaus Ranch Valley Elderberry Longhorn Beetle Conservation Bank, and Sacramento River Conservation Bank will help meet the Plan's biological goals and objectives by providing for the permanent protection of valley elderberry longhorn beetle habitat.

6.4.3.3 Overlapping HCPs

As described in Chapter 5, Section 5.4.5.3, *Participate in an Overlapping HCP,* SMUD may also mitigate through an existing HCP that overlaps with the Permit Area. During SMUD HCP implementation, if SMUD proposes to use an overlapping HCP to mitigate impacts on Covered Species, SMUD's proposal to USFWS will include a summary of the overlapping HCP's monitoring and adaptive management program, and an assessment as to whether the program provides sufficient assurance that participation in the overlapping HCP will contribute to the SMUD HCP's biological goals and objectives and adequately mitigate impacts on Covered Species consistent with the SMUD HCP.

6.5 HCP Annual Report

The SMUD HCP will submit an annual report to USFWS and CDFW by September 30 of the subsequent year, starting after the first full calendar year of the permit issuance. Each annual report will present the results of all compliance monitoring, effects monitoring, and effectiveness monitoring collected during the previous reporting year (July 1 to June 30).

The compliance monitoring section of the annual report will present the acreage of that year's loss or disturbance of each land cover type; number of individuals of Covered Species observed to be injured, damaged, or killed, if any; and a running total of acres of permanent habitat loss, acres of temporary disturbance, acres of conservation mitigation completed, and acres of mitigation available for debit. SMUD will use the annual report process to compile effectiveness monitoring data, and then to verify whether the SMUD HCP is meeting its commitment to achieve or exceed the biological goals and objectives, management plan performance standards, and compliance commitments of the HCP.

The report delivery date may be changed with mutual agreement of SMUD and USFWS.

The annual report will present the following information.

- The number of each type of Covered Activities implemented during the reporting period, the acres of each SMUD land cover type lost and disturbed by each type of Covered Activity, and the AMMs that were implemented for individual Covered Activities.
- Total acres of Modeled Habitat loss and temporary disturbance for each Covered Species for the reporting period as well as the cumulative totals for the Permit Term.
- The amount of mitigation needed to compensate for both acres of habitat lost and acres of habitat disturbed for each Covered Species (Chapter 5, Section 5.4,

Mitigation) for the reporting period as well as the cumulative totals for the Permit Term that have occurred to date.

- Acres of mitigation procured or dedicated in that calendar year, including details of mitigation acres, and copies of deeds for all land purchases and contracts for mitigation transactions.
- An accounting of mitigation procured or dedicated relative to the 5-year stay ahead provision.
- An accounting of mitigation acres acquired in previous years and how many acres are still available at the SMUD Bank, as described in Chapter 7, Section 7.4, *Mitigation Accounting and Stay-Ahead Provision*.
- Summarized AMM monitoring results, and any suggested adaptive management changes that may improve the effectiveness of an AMM.
- Number of sites revegetated annually and the status of the revegetation efforts.
- Summarized monitoring results, and any suggested adaptive management changes that may improve the effectiveness of the mitigation lands.
- Success or any problems with implementation of each AMM and each mitigation measure.

7 Implementation

This chapter describes the implementation structure, implementation tasks, monitoring, and reporting requirements for the SMUD HCP. It builds on information provided in Chapter 5, *Conservation Strategy*, and Chapter 6, *Monitoring, Reporting, and Adaptive Management Program*, and describes how SMUD will staff, implement, monitor, and report on its Covered Activities. It also describes the regulatory assurances being sought, changed and unforeseen circumstances, and conditions for permit renewal and amendments.

7.1 Implementation Structure

SMUD will implement the HCP through a team of specialized employees. The HCP implementation team will include an HCP administrator and environmental specialists. Direct support to the HCP team will come from SMUD's engineering designers and planners, field crews, and biologists who will work with the HCP team to ensure successful implementation and compliance of the HCP. Biological monitors and field crews will have direct roles for implementing and following AMMs in the field. These roles are described in detail in the following sections.

7.1.1 HCP Administrator

The HCP administrator will manage the day-to-day implementation and oversee the compliance, monitoring, and reporting aspects of the HCP. The HCP administrator will have the following primary responsibilities.

- Serving as a point of contact with U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW).
- Supervising staff and managing contractors to ensure successful implementation of the HCP.
- Overseeing the development and delivery of HCP training materials for SMUD staff and contractors.
- Tracking and recording of data to implement the conservation strategy.
- Tracking and recording incidental take information.
- Maintaining records of available mitigation.
- Working with the HCP team to identify, document, and resolve noncompliance issues.
- Maintaining monitoring and survey data reports.
- Preparing the annual report.
- Evaluating the effectiveness of the SMUD HCP, including the effectiveness of AMMs.
- Ensuring that the HCP's biological goals and objectives are being met.

7.1.2 Environmental Specialist

The SMUD environmental specialist will organize and manage the data to directly support implementation of and compliance with the HCP. The environmental specialist will have the following responsibilities.

- Collecting data on Covered Activities from engineering designers and biologists.
- Obtaining appropriate permits and authorizations before activities start.
- Documenting and recording the effects of activities on Covered Species and their Modeled Habitat.
- Completing mitigation transactions.
- Collecting and compiling monitoring reports and survey data from designers and biologists.
- Preparing monthly and quarterly status reports for the HCP administrator.

7.1.3 Engineering Designers and Planners

SMUD's engineering designers and planners will coordinate with the HCP administrator and the environmental specialist for Covered Activities that are located in the Green Zone.[1] They will be responsible for determining when a Covered Activity will occur in the Green Zone, and receive relevant AMMs from the HCP administrator and/or environmental specialists for the Covered Activity that they will include in the job packet. Engineering designers and planners will have the following responsibilities.

- Assessing the location of Covered Activities to determine whether they will occur in the Green Zone.
- Consulting with the environmental specialist in planning and designing any Covered Activities within the Green Zone, to ensure that Covered Activities are planned and designed to avoid and/or minimize impacts consistent with the SMUD HCP.

7.1.4 Biologists

SMUD's biologists or the contractor's qualified biologists will work closely with the HCP administrator, environmental specialist, and field crews, and will have the following responsibilities.

- Reporting on activity impacts.
- Conducting environmental training and tailboard meetings with crews.
- Conducting biological surveys as directed by the HCP team.

[1] The *Green Zone* is the area supporting Modeled Habitat for Covered Species, as described in further detail in Sections 5.1.1 *Definitions* and 7.2.2, *Conduct Environmental Review, Planning, and Screening*.

- Serving as the biological monitor for Covered Activities.
- Responding to reports of death or injury of a Covered Species.
- Relocating Covered Species out of harm's way at construction sites when necessary and under the appropriate authorizations from the Wildlife Agencies.

Qualified biologists are those biologists who have the experience, education, and training necessary to perform the tasks described in the SMUD HCP accurately and in an unbiased fashion. The term *qualified biologist* is used generically to mean a biologist who is trained to perform the given task. Such a person is, more specifically, a wildlife biologist, botanist, or biological consultant who has been trained in wildlife biology or botany. Training must be in the field to which the task is related. For example, a wildlife biologist may not perform a covered plant survey or delineate land cover types for a project application unless the individual is competent in those fields.

7.1.5 Field Crews

SMUD's field crews, including contract field personnel, will follow the pertinent AMMs as directed by the HCP administrator, environmental specialist, engineering designers and planners, or biologists. Field crews at the Covered Activities work areas will work closely with biologists to ensure compliance with AMMs during their day-to-day work activities. Field crews will have the following responsibilities.

- Consulting with the environmental specialist or biologists to ensure AMMs are implemented properly.
- Ensuring activities are compliant with any and all AMMs, permits, and authorizations assigned to the Covered Activity.

7.2 Implementation Tasks

A variety of implementation tasks are associated with the SMUD HCP. These tasks are described in Chapter 5 and in the sections below.

7.2.1 Conduct Annual Environmental Training

Annual environmental trainings will be provided for staff and contractors performing Covered Activities (SMUD field crews). This training will include a review of permit requirements, avoidance and minimization measures, and other relevant environmental laws and guidelines that must be followed by all personnel to avoid or minimize take of Covered Species during Covered Activities. Crews will be informed on the implementation of the HCP, including use of SMUD's job packet (or equally effective documentation) and their responsibilities to ensure compliance. Training will include the importance of the Covered Species and the purpose and necessity of protecting them, handouts or cards containing Covered Species or Modeled Habitat information, as well as penalties for non-compliance. Information will also be presented to inform personnel

of methods to minimize the spread of invasive or nonnative plants during Covered Activities. New employees will receive the training prior to the start of work on Covered Activities.

7.2.2 Conduct Environmental Review, Planning, and Screening

SMUD currently has a Work Flow Integration process that it uses to review projects and determine if they have a potential to affect biological resources. Under this process, SMUD developed a spatial mapping resource, the Green Zone (Figure 5-1), which depicts the locations of biological resources (based on publicly available resources, like the California Natural Diversity Database). To this spatial mapping resource, SMUD will add its Modeled Habitat locations. This tool, or an equally effective tool, will be maintained and used throughout the 30-year permit term. The implementation team will be trained on the use of the Modeled Habitat data and its relationship to the conservation strategy. The implementation team will also be trained on the requirements of AMMs when Covered Activities are conducted in those areas. SMUD will use the Work Flow Integration process to implement the HCP.

- SMUD's engineer designers and planners will review the Green Zone map to determine if the project they are designing would be located in the Green Zone. If a project is located in the Green Zone, they will place a hold on the project until SMUD's HCP administrator or environmental specialist reviews it.
- The SMUD HCP administrator or environmental specialist will review the project, and if Covered Species or their Modeled Habitat could be present in the work area or if take could occur as a result of the Covered Activity, the environmental specialist will prescribe AMMs based on Table 5-1 of the SMUD HCP. The HCP implementation team will utilize Modeled Habitat data and other data sources during their respective environmental review, planning, and screening processes to determine the use of AMMs for Covered Activities. The HCP implementation team will review, confirm, or identify where Covered Activities could affect Covered Species Modeled Habitat. Implementation staff will be trained on how the models will be used to determine required mitigation for impacts unless additional site review reveals that the site or area is no longer habitat. The AMMs will be included in the job packet, which also includes design instructions and notes, for the field crews. If, when the SMUD HCP administrator or environmental specialist does the desktop review, it is clear that Modeled Habitat is no longer present at the site because it has been developed (concrete, asphalt, or landscaped), SMUD will revise the mapping accordingly with approval from USFWS. Similarly, if SMUD is aware of development that has occurred in areas of Modeled Habitat, SMUD will revise the Green Zone map to reflect the current conditions and submit these updates with the annual report to USFWS.
- SMUD's field crews will implement the AMMs during the Covered Activity.
- If determined necessary by the SMUD HCP administrator or environmental specialist, or as specified in Table 5-1, a qualified biologist will be present onsite and monitor the Covered Activities to ensure that all applicable AMMs are implemented correctly and that no unnecessary ground disturbance or take of Covered Species occurs. The

biologist has the authority to stop all activities that may result in unnecessary take or destruction until appropriate corrective measures have been completed. The biologist also will be required to report immediately any take to the SMUD HCP administrator or environmental specialist, who in turn is responsible for timely reporting to USFWS.

SMUD's Green Zone map and Work Flow Integration process provide the foundation for ensuring that work is conducted in a manner that avoids and minimizes impacts on the environment and natural resources. In addition to compliance with HCP requirements, environmental specialists, engineering designers and planners, and biologists ensure that all environmental, regulatory, and land management requirements are followed.

7.2.3 Implement AMMs

As part of the initial HCP implementation training, implementation staff will be trained on the AMMs as described under G-AMM1 in Chapter 5. SMUD will implement the conservation strategy as described in Chapter 5, including the use of AMMs described in Table 5-1. SMUD will conduct an assessment and review of its AMMs, as described under Chapter 6, Section 6.2, *Compliance Monitoring*, to determine if they are performing as anticipated, as described under Chapter 6, Section 6.4.1, *AMM Effectiveness Monitoring*. SMUD will report and track impacts on Modeled Habitat.

SMUD biologists and the environmental specialist will ensure revegetation efforts are implemented after completion of Covered Activities greater than 0.1 acre in size, as described under G-AMM14 in Chapter 5, and report this information to the SMUD HCP administrator. Information on the number of revegetation sites and the status of the revegetation efforts will be aggregated quarterly and summarized for USFWS in the annual report.

7.2.4 Fulfill Mitigation Requirements

SMUD will secure mitigation for its impacts as described in Chapter 5, Section 5.4, *Mitigation.* If SMUD implements alternative mitigation other than use of the SMUD Nature Preserve Mitigation Bank (SMUD Bank), in addition to tracking SMUD Bank credits, SMUD will keep track of the acres of habitat acquired, its location, and the species benefiting from the mitigation.

7.3 Habitat Loss and Disturbance Accounting

The HCP implementation team will keep a running total of annual Covered Activity impacts and Covered Species take, including impacts on critical habitat, over the permit term. The determination of impacts resulting from Covered Activities is based on either estimated or actual on-the-ground impacts recorded after the activity is completed, as follows.

- For the small Covered Activities affecting less than 0.1 acre, SMUD uses a Modeled Habitat approach to estimating habitat loss or disturbance as an alternative to on-the-

ground biological surveys for species occurrence and habitat suitability. For these activities, SMUD will overlay the Covered Activity footprint described in Chapter 2, *Covered Activities,* with a GIS map of the Green Zone to determine impacts to Modeled Habitat. Small activities for which SMUD will use estimated habitat loss or disturbance based on Modeled Habitat include all activities except those listed in the bullet below.

- For those Covered Activities affecting more than 0.1 acre, SMUD environmental specialists and biologists will review and utilize the modeled habitat information to plan and prepare projects that require longer lead times, planning, and coordination. For these activities, SMUD will use actual, on-the-ground information on habitat loss or disturbance as measured in the field by biologists and environmental specialists to determine the extent of permanent or temporary habitat loss or disturbance. Activities where actual habitat loss or disturbance will be confirmed include the following.
  - E15. Existing Distribution Substation Expansion
  - E16 [1]. New Transmission Substation Construction
  - E16 [2]. New Distribution Substation Construction
  - C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting

The HCP administrator is responsible for recording temporary and permanent habitat loss or disturbance as reported by the engineering designers and biologists, as well as the data collected from internal data systems (e.g., SAP). For wildlife habitat impacts, SMUD will record estimated or actual habitat losses in acreage to the nearest hundredth of an acre, or square feet, whichever is necessary to capture the entire impact. For all plant species, SMUD will record all habitat losses as acreage to the nearest hundredth of an acre, or square feet, whichever is necessary to capture the entire impact, as individual plant losses, or as both. SMUD will also record indirect impacts on Vernal Pool, Seasonal Wetland, and Swale land cover types, based on a distance of 250 feet from the Covered Activities listed in Chapter 4, Section 4.2.2, *Estimating Permanent and Temporary Habitat Disturbance,* that require trenching or excavation, and 50 feet from *Covered Activity E9c. Underground Component Repair and Replacement—Direct-Buried Cable Replacement—Trenching*. To ensure that impacts on Covered Species will not exceed take limits described in the HCP, SMUD will monitor Modeled Habitat loss or disturbance closely to ensure that the authorized take is not exhausted too early in the permit term.

7.4 Mitigation Accounting and Stay-Ahead Provision

The HCP implementation team will use the estimated habitat loss acreages in Chapter 4, *Effects Analysis and Levels of Take*, and track impacts as described in Chapter 6, Section 6.3, *Effects Monitoring,* to calculate the mitigation requirement and ensure that mitigation is staying ahead of habitat loss and disturbance. Temporary and permanent habitat loss and disturbance for the reporting year will be reported accordingly using: (1) the affected species Modeled Habitat and (2) the per-acre ratio of compensation for that species, based on the ratio of total mitigation commitment to total estimated or actual habitat loss or disturbance for the species.

SMUD will implement a 5-year stay-ahead strategy to ensure that project mitigation stays ahead of impacts. To achieve this, SMUD will implement the HCP in 5-year phases. At the beginning of each 5-year phase, SMUD will estimate the amount of habitat impact that is anticipated for each species during that phase, and will secure the total amount of mitigation necessary prior to the occurrence of any impacts for that phase. If, at any time during the 5-year phase, SMUD anticipates exceeding the estimated impact amount, SMUD will secure the necessary mitigation to ensure that the mitigation occurs ahead of the impact.

7.5 Role of USFWS in Decisions Regarding Plan Implementation

An Interagency Working Group (IAWG) will be established and will consist of representatives of the Wildlife Agencies and SMUD. The IAWG will assist in the implementation of the incidental take permits and the HCP by providing coordinated advice, recommendations, proposals, and review and approval (where required by the Plan) regarding the following:

- Application of conditions on Covered Activities (Chapter 2) to specific Covered Activities, when needed
- Monitoring and adaptive management, as described in Chapter 6
- Review of monitoring reports and other data that describe measurements of success and provide for remedial actions where necessary
- Compliance with the ESA and CESA

The IAWG will convene as needed to assist in the implementation of the Plan, but it may convene at any time at the discretion of the Wildlife Agencies. To the greatest extent practicable within the context and timeframe of the matter, the IAWG will provide its advice, recommendations, or proposals in writing to SMUD, as applicable. To ensure regular communication with the Wildlife Agencies, SMUD will meet regularly with Wildlife Agency staff to keep them apprised of implementation, such as progress toward Plan goals and objectives, compliance with the state and federal permits, funding, monitoring and adaptive management, and other relevant topics. Meeting frequency will vary but will most likely be bi-monthly or quarterly during the first several years of implementation to ensure close communication. The meetings will be with the IAWG whenever practicable, but SMUD may meet with each Wildlife Agency individually when needed to ensure timely communication. The meetings will serve as a means for the Wildlife Agencies to provide advice to SMUD prior to implementation of key conservation actions. The meetings will also serve as a forum to avoid any issues that might influence permit compliance.

For documents or decisions that require approval from the Wildlife Agencies, SMUD shall submit the document or request in writing via email. The Wildlife Agencies will provide a response within 30 calendar days or SMUD can assume approval and move forward in accordance with the HCP.

Successful implementation of the HCP relies on the participation and feedback of staff from USFWS. These regulatory agencies will participate in discussions and meetings with SMUD to ensure that the HCP is being implemented consistent with its terms. USFWS will be responsible for reviewing the annual report, reviewing and approving the acquisition of additional mitigation lands proposed by SMUD that are not already identified in the HCP, and assisting with other proposed changes or modifications to the HCP. SMUD will also coordinate with wildlife agencies on projects that are over 0.1 acre if the mapping does not match what is on the ground, unless the area is developed and no longer habitat following the process in Section 7.2.2 for revising Modeled Habitat maps. If the project is less than 0.1 acre, SMUD will count it as mapped habitat even if it is no longer habitat.

7.6 Assurances Requested by SMUD

SMUD has prepared this HCP anticipating a standard, consistent, and cost-effective way of complying with the federal Endangered Species Act (ESA). The federal No Surprises policy was established by the Secretary of the Interior on March 25, 1998. It provides assurances to Section 10 permit holders that no additional money, commitments, or restrictions of land or water will be required should unforeseen circumstances requiring additional mitigation arise after the permit is in place. The No Surprises policy states that if a Permittee is properly implementing an HCP that has been approved by USFWS, no additional commitment of resources, beyond those already specified in the plan, will be required. SMUD requests regulatory assurances (No Surprises) for all Covered Species in the SMUD HCP. In accordance with No Surprises, SMUD will be responsible for ensuring the funding and implementation of remedial measures in response to any changed circumstances as described in this chapter. SMUD will not be obligated to address unforeseen circumstances but will work with USFWS to address them within the funding and other constraints of the HCP, should they occur. SMUD understands that No Surprises assurances are contingent on the proper implementation of the permit and HCP.

SMUD proposes that all listed Covered Species be included on the federal permit. The following plant species are proposed to be included on the federal permit in recognition of the conservation benefits provided for them under the HCP and would also receive No Surprises assurances under USFWS's No Surprises Regulation (63 *Federal Register* 8859–73; see Section 7.7 *Federal Section 7 Consultations*).

- Slender Orcutt grass (*Orcuttia tenuis*)
- Sacramento Orcutt grass (*Orcuttia viscida*)

The Section 10(a)(1)(B) permit will be effective for all listed Covered Species immediately upon permit issuance.

7.6.1 Changed and Unforeseen Circumstances

Most of the mitigation associated with the SMUD HCP will be at the SMUD Bank. If SMUD uses a mitigation bank that is not the SMUD Bank to mitigate for effects of Covered Activities, the non-SMUD bank would be expected to remedy any changed circumstances affecting Covered Species at the bank. However, ultimately as the permit holder, SMUD is responsible for ensuring the mitigation identified in the SMUD HCP is successful as well as addressing any remedial measures needed to address changed circumstances identified in the SMUD HCP. Though unlikely, SMUD may purchase other lands or credits to meet its conservation strategy.

7.6.1.1 Regulatory Definition of Changed Circumstances

Changed circumstances are defined in the federal No Surprises policy[2] as those circumstances affecting a species or geographic area covered by the HCP that can be reasonably anticipated by the permittee or USFWS and that can be planned for. Section 10 regulations require that an HCP identify the changed circumstances and specify the procedures to be used for dealing with these changed circumstances that may arise during the implementation of the HCP. If a changed circumstance arises, remedial measures must be implemented. Remedial measures for changed circumstances differ from adaptive management in that remedial measures are predetermined, defined actions that must be taken in the event of a changed circumstance. Adaptive management, by definition, does not include predetermined actions, but rather identifies new responses based on the outcome of management actions and monitoring results. Remedial measures may, however, be modified based on the adaptive management procedure.

7.6.1.2 Regulatory Definition of Unforeseen Circumstances

Unforeseen circumstances are defined by federal regulation (50 Code of Federal Regulations [CFR] 17.3) as:

> changes in circumstances affecting a species or geographic area covered by a conservation plan or agreement that could not reasonably have been anticipated by plan or agreement developers and the Service at the time of the conservation plan's or agreement's negotiation and development, and that result in a substantial and adverse change in the status of the covered species.

In the event of unforeseen circumstances during the permit term, amendments to the HCP may be proposed by either SMUD or USFWS to address these circumstances. USFWS and SMUD will work together to identify opportunities to redirect resources to address unforeseen circumstances. However, the HCP provides assurances to SMUD consistent with the federal No Surprises policy (codified at 50 CFR 17.3, 17.22(b)(5), 17.32(b)(5)) that USFWS will not require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural

[2] 63 *Federal Register* 35 (1998) (amending 50 CFR 17.22(b)(5), and 222.307(g)).

resources beyond the level otherwise agreed upon for the species covered by the conservation plan without the consent of the permittee.

As described in the No Surprises policy, it is the responsibility of USFWS to demonstrate the existence of unforeseen circumstances using the best scientific and commercial data available.

The federal No Surprises policy does not limit or prevent USFWS or any federal, state, local, or tribal government agency, or private entity, from taking additional actions at its own expense to protect or conserve Covered Species. The federal No Surprises policy also does not prevent USFWS from asking the Permittees to voluntarily undertake additional mitigation on behalf of the affected species.

7.6.1.3 Changed Circumstances as Defined by SMUD HCP

This HCP recognizes the changed circumstances listed below. Remedial actions to address changed circumstance are funded by this HCP. SMUD will maintain sufficient financial reserves to fund all remedial actions, described below, as they arise. For the purposes of this HCP, changed circumstances include the following.

- Non-covered species listed
- Vandalism or other intentional, destructive human activities
- Fire
- Drought
- Flooding
- Global climate change
- Nonnative species or disease

Other potential changed circumstances were also considered, but rejected. For example, earthquakes are a rare but expected occurrence in California. The location, magnitude, and effects of an earthquake with the potential to adversely affect SMUD's service area are unknown, highly speculative, and not reasonably anticipated. Although unlikely, a strong earthquake may damage structures such as fences or pond levees. Any damage to these structures from earthquakes would be repaired by SMUD as a matter of course.

7.6.1.3.1 Non-Covered Listed Species

Over the course of HCP implementation (30 years), USFWS may list as threatened or endangered under the ESA or the CESA species that are not covered under the HCP. If a non-covered species becomes listed, the following remedial measures will be taken.

- The potential effects of Covered Activities on the newly listed species and their designated critical habitat will be evaluated, including an assessment of the presence of suitable habitat in impact areas.

- SMUD in conjunction with USFWS will develop measures to fully avoid take of the newly listed species until the Plan is amended to cover the species, or will comply with the ESA and the CESA via other means (i.e., individual Section 7 consultations, consistency determinations, etc.).

Should a species not covered by the HCP be listed, proposed, or petitioned for listing, SMUD may submit an application to USFWS to amend one or both permits to add the species. In determining whether or not to seek incidental take coverage for the species, SMUD will consider, among other things, whether the species is present in the Permit Area and if otherwise lawful activities could result in incidental take of the species. If incidental take coverage is desired, the HCP and permits could be modified or amended. Alternatively, SMUD could apply for new, separate permits. Procedures for modifications and amendments to the Plan are outlined in Section 7.8, *Permit Renewal, Plan Amendments, Permit Suspension, and Revocation* below.

7.6.1.3.2 Vandalism and Other Intentional, Destructive Human Activities

Structures in the SMUD HCP's Permit Area, such as gates, fences, or signs, could be vandalized during the permit term. Such damage is considered reasonably likely to occur during the permit term and is therefore considered changed circumstances. Remedial measures funded in this HCP include the repair or replacement of structures or facilities damaged by vandalism or other intentional, destructive human activities.

7.6.1.3.3 Fire

Fire is a natural component of many ecosystems and natural community types, including grasslands, valley foothill riparian, and oak woodlands. For each of these land cover types, fire frequency and intensity influence community regeneration, composition, and extent. However, it is possible that large, intense, and frequent fires could have a negative impact on land cover types. For example, more frequent, intense fires caused by high fuel loads and increased encroachment by woody species into grasslands could negatively affect community composition by favoring early successional species.

To determine the limits of changed circumstances, the size of fires and their frequency (i.e., return interval) were assessed for the Permit Area. This assessment considered both historic fire occurrence and the influence of climate change.

For the purposes of assessing changed circumstances, fire history data indicate that the average number of fires per year in the Permit Area for the last 30 years is 11.3 (California Department of Forestry and Fire Protection 2018). The fire history suggests that during the 30-year life of the HCP, approximately 341 fires, burning approximately 9,540 acres, will occur within the Permit Area.

During the previous 30 years, fires burning over 300 acres (but less than 999 acres) occurred nine times (approximately once every 3 years). The largest fire occurred in 1994 burning approximately 1,320 acres (California Department of Forestry and Fire Protection 2017). The 1,132-acre SMUD Bank covers approximately 0.2 percent of the 577,554-

acre Permit Area. Without taking into consideration the effects of climate change, it is assumed that three fires, burning approximately 300 acres during each event over the course of the 30-year permit term.

However, climate change must also be taken into account when predicting fire frequency in the Permit Area. Throughout California, fire occurrence can be correlated with drought, moisture availability, and biomass (fuel) accumulation (Lenihan et al. 2003). Both "wetter and warmer" and "dryer and warmer" climate change scenarios are predicted for the Permit Area (Hayhoe et al. 2004). The warmer, dryer scenario would increase the occurrence of drought, while increased biomass production would result from the warmer, wetter scenario. Both of these scenarios have the potential to increase fire frequency due to either increased drought frequency or increased biomass accumulation. For the purposes of calculating changed and unforeseen circumstances, it is assumed that fire frequency will increase in the Permit Area due to climate change.

With climate change, it is assumed that fire occurrence frequency and area burned will increase by 25 percent within the Plan Area by 2064.

The potential effects of climate change on fire frequency are anticipated to increase over the course of the permit term. At the beginning of the permit term, limited change from historic fire occurrences and burned area may be acceptable as a changed circumstance; however, the potential effects of climate change will grow over the permit term. Based on the information presented in Westerling 2018, a 25 percent increase due to climate change represents a conservative estimate for the increase in fire frequency and burned area in the Permit Area for the duration of the permit term. Based on this assumption, SMUD anticipates approximately four fires burning approximately 375 acres per event could occur at the SMUD mitigation lands.

Remedial measures apply to each of the episodes identified above. For example, if there was a grassland fire that burned 375 acres (i.e., meets the single-event burned area criteria for changed circumstance) and a portion of the same area burned again in 15 years, remedial actions for both fires would be funded. SMUD will initiate the following remedial actions.

- Initiate a post-fire damage assessment within 6 months following a fire to identify the appropriate post-fire restoration and rehabilitation actions.
- Initiate the appropriate actions, such as habitat restoration, invasive-species control, and/or erosion control, in affected reserves to ensure the reestablishment of covered plant species and other native vegetation through active or passive means, as appropriate, within 1 year of the fire.
- Ensure that appropriate erosion control structures and applications (e.g., seeding) are in place prior to the next rainy season.

7.6.1.3.4 Drought

Drought is a natural part of a Mediterranean climate system to which species have adapted. However, a prolonged drought could cause serious damage to the HCP Permit Area. The following analysis was conducted to define droughts and estimate their expected frequency of occurrence in the Permit Area. Droughts that occur at this expected frequency are considered a changed circumstance and are expected and funded over the course of HCP implementation.

To estimate how many drought[3] years might be expected during the Permit Term, annual hydrological conditions were examined within the Plan Area from 1988 through 2018 by water year (typically defined from October 1 to September 30).

From 1988 through 2018 there have been 4 droughts in the Plan Area. Of these droughts, two have lasted more than 6 years. The most recent drought, which started in 2011 and ended in 2017, was the longest period of drought in Sacramento County. While climate change is anticipated to result in increased drought potential, the extent of such change is not fully understood. On an annual basis, climate model projections do not present a strong consensus towards the whole of California “getting wetter” or “getting drier” (He et al. 2018; Pierce et al. 2018). Most climate models suggest the northern part of the state will become wetter, and the very southern portion of California, extending and intensifying in Mexico, will become drier; however, this tendency is relatively small compared to the amount of year-to-year variation in precipitation in the region. Due to large annual variation, changes in annual mean or longer-term precipitation are likely not the best metrics to understand impacts of precipitation changes, which often result from drought and shorter period extremes. Thus, the predicted drought potential during the permit term is conservative.

To account for impacts from drought, SMUD assumes droughts exceeding 3 years will occur twice and droughts exceeding 2 years, but less than 3 years, will occur two times during the term of the HCP. Droughts in either category occurring more than four times during the Permit Term will be considered an unforeseen circumstance.

The monitoring and adaptive management program includes monitoring of mitigation sites. This will minimize the risk of losing vegetation and diminished habitat value due to drought. Should damage or losses due to drought occur, SMUD will assess the drought damage and initiate the following remedial measures within 1 year of damage or loss.

- Prepare a damage assessment report.
- Implement actions to improve effects on Covered Species (e.g., reduce biomass of annual grasses in the vernal pool complex, to help extend vernal pool ponding by reducing water uptake).

[3] SMUD considers a drought year to occur when the governor of California officially declares a drought, or state water officials or Sacramento County officials make a similar proclamation and is typically defined as two or more successive water years with 75 percent or less of median inflow into natural reservoirs.

- Implement actions to improve effects on enhanced, restored, or created habitats that have not achieved their success criteria (e.g., supplemental irrigation; increase monitoring and management of invasive plant species that may have competitive advantages in drought).

7.6.1.3.5 Flooding

Flooding is a natural event in stream systems, having both beneficial and detrimental effects on natural communities. Beneficial effects include limited scouring and thinning of homogeneous stands of riparian vegetation. However, detrimental effects of floods along stream channels could include destruction of enhanced or restored sites and covered plant populations. Such flood damage would require substantial remediation. A 100-year flood event, which is a flood event that has a 1 percent probability of occurring in any given year, has a 26 percent chance of occurring during the 30-year permit term. All storms at or below the 100-year flood event on a given stream are considered a changed circumstance, and the HCP will fund remedial actions. Storms at or below the 100-year event are reasonably likely within the 30-year permit term.

Following the flood event, mitigation lands will be evaluated to determine appropriate corrective actions necessary to restore the habitat through active management or natural processes. Corrective actions will be implemented within 1 year of the failure. Measures will be implemented through the adaptive management program (Chapter 6). SMUD will have the option of implementing remedial actions onsite or in-kind. For example, if the cost to rebuild an enhancement, restoration, or creation project exceeds the cost of constructing a new project, SMUD will have the option of constructing a new project elsewhere within the HCP Permit Area of equivalent or greater biological value and will be subject to the same success criteria identified in Chapter 5.

7.6.1.3.6 Global Climate Change

Global climate change is occurring as a result of high concentrations of greenhouse gases in the Earth's atmosphere (National Research Council 2010; Intergovernmental Panel on Climate Change 2007). Greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, chlorofluorocarbons, and ozone. These gases absorb energy emitted by the Earth's surface, and then re-emit some of this energy back to Earth, warming the Earth's surface and influencing global and local climates. As more and more greenhouse gases are emitted into the atmosphere from human activities such as the burning of fossil fuels, the Earth's energy balance is disrupted, resulting in a number of changes to the historical climate.

Current global and regional trends suggest that climate change is likely to have an effect on the SMUD HCP Permit Area; however, detailed downscaled results are not consistently available for SMUD's Permit Area. For its own climate readiness planning, SMUD relies on downscaled data available for California and the broader region, where available. According to the Western Region Climate Center, the state has experienced an increase of 1.1 to 2 degrees Fahrenheit (°F) in mean temperature in the past century. Future projections of temperatures across California by Scripps Institution of

Oceanography indicate that by 2060–2069 mean temperatures will be 3.4 to 4.9 °F higher across the state than they were in the period 1985–1994. Seasonal trends indicate a greater increase in the summer months (4.1 to 6.5°F) than in winter months (2.7 to 3.6°F) by 2060–2069 (California Department of Water Resources 2015). Climate change will also lead to a number of hydrologic impacts for California. More intense dry periods are anticipated under warmer conditions, leading to extended, more frequent drought. Extremes on the wet end of the spectrum are also expected to increase because of more frequent warm, wet atmospheric river events and a higher proportion of precipitation falling as rain instead of snow. These wetter extremes are expected to impact flood protection capacity and effectiveness within the regional watershed. Most climate model precipitation projections for the state anticipate drier conditions in Southern California and heavier and warmer winter precipitation in Northern California, with the SMUD HCP Permit Area located in between these disparate climate zones. Because there is less scientific detail available describing localized precipitation changes, there is a need to adapt to this uncertainty at the regional level (California Department of Water Resources 2015).

SMUD will use a method consistent with the California Climate Action Team[4] method for measuring temperature change within the Permit Area. The baseline index, as measured from the Sacramento, Vorden, and Rio Vista weather stations, will be historic temperatures from 1966 to 1996. For the purposes of the HCP, three baseline measurement periods will be set using 1966 to 1996 historic temperatures: average annual temperature, average summer temperature (June, July, and August), and average winter temperature (December, January, and February). If California climate-change projections are applied to the Permit Area, the temperature could increase 4.4 to 5.8°F during the Permit Term (Pierce et al. 2018). Under the HCP, an increase in temperature of up to 4.4°F for any of the three baseline periods measured as a 10-year running average will be considered changed circumstances for which remedial measures will be funded.

SMUD's response to the changed circumstance of global climate change will vary according to the character and magnitude of the physical and biological changes observed. All responses will occur within 1 year of identifying changed circumstances, unless USFWS concur on a case-by-case basis that specific remedial actions would require more time to initiate. Remedial responses may include the following actions.

- Conduct enhanced monitoring to detect ecological responses to climate change.
- Identify species most vulnerable to climate change, and increase monitoring for those species.
- Make alterations to the habitat models for Covered Species as a tool to devise improved management actions.

[4] http://www.climatechange.ca.gov/climate_action_team/index.html

- Implement altered or more intensive management actions on target/vulnerable species to facilitate shifts in species distribution (e.g., more active population management of Covered Species).
- Initiate more aggressive control of nonnative species that respond positively to climate change.
- Implement other measures through the Adaptive Management Program (Chapter 6) in ways consistent with permit obligations and with the consent of SMUD.

Limits on the variation in other parameters (e.g., rainfall) are much more difficult to determine. Given the seasonality of rainfall in the Permit Area, an increase in winter precipitation may be offset by increased evapotranspiration during the summer months (Intergovernmental Panel on Climate Change 2007). A decrease in winter precipitation would be exacerbated by increased summer temperatures, leading to increased drought. Therefore, it is not possible at this time to define limits of rainfall patterns that would qualify as unforeseen circumstances. Regardless of increases or decreases in precipitation, it is anticipated that the number of strong storm events would increase during the winter season (Kim 2005). These events are more likely to result in flooding than in increased soil percolation or water storage recharge (California Natural Resources Agency 2009). Increased frequencies of flooding and drought are taken into account in the previous sections addressing these changed circumstances.

7.6.1.3.7 Nonnative Species or Disease

Nonnative species and disease currently occur in the Permit Area (e.g., bullfrogs, nonnative plants). Additionally, there are nonnative species and diseases that exist in areas outside the SMUD mitigation lands that have the potential to spread into the SMUD mitigation lands and adversely affect the Covered Species and natural communities. It is possible that new and aggressive nonnative species could invade the SMUD Bank.

Due to the nature of nonnative species and diseases, there is no unforeseen circumstance, only an upper limit to which changed circumstances will be funded. In other words, a new disease, hybrid species, or invasive species spreading throughout the Permit Area within the Permit Term is a foreseeable event. However, if a disease, hybrid species, or nonnative species spreads beyond the thresholds identified below, it would be considered a catastrophic event beyond the HCP scope and remedial actions to address it would not be required to be funded by SMUD.

Under the HCP, the following are considered changed circumstances for which remedial measures will be funded.

- Infestations of new diseases or new nonnative invasive species affecting up to 30 percent of the extent (i.e., acres) of occupied Covered Species habitat within the reserve system in any given year.
- An increase in the spread of nonnative species or diseases by 30 percent above current conditions, as documented in a baseline biological report for the site (or if a

bank the most recent annual report at the time the credits are acquired) in any given year.

When a new disease, hybrid species, or nonnative species is detected or an existing disease or nonnative species begins to spread aggressively on SMUD mitigation lands, SMUD will contact USFWS and to collaboratively determine the best method of measuring, monitoring, and eradicating or controlling the disease or species before it spreads or spreads further. Remedial measures that address the invasion of nonnative species or disease follow the steps listed below.

- Determine the best method for measurement and tracking extent within 3 months of detection.
- Prepare a damage-assessment report within 6 months of detection.
- Recommend and plan actions to address the threat within 6 months of detection.
- Respond through adaptive management in ways consistent with permit obligations and with the consent of USFWS within 1 year of detection.

Nonnative invasive plant species can displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes (California Invasive Plant Council 2006).

An invasive plant survey was conducted at the Bank on July 15, 2008 and ongoing bank monitoring has shown that invasive plant conditions have not substantially changed since the initial survey. Table 7-1 lists the nonnative invasive plant species located within the Bank as of 2008, the current California Invasive Plant Council (Cal-IPC) ratings (updated in January 2007) for each species, and the location of each species at the Bank. Nonnative annual grass species listed in Table 7-1 were introduced into the Central Valley during the early days of California's European settlement. Consequently, many of the nonnative invasive plants species in Table 7-1 are widespread throughout the Central Valley and foothills.

The ratings are from the California Invasive Plant Council (Cal-IPC), and refer to the level of concern for each species. The following are from Cal-ICP January 2007 definitions.

- High – species that have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment.
- Moderate – species have substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance.
- Limited – species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness.

- Alert – species with High or Moderate impacts that have limited distribution in California, but may have the potential to spread much further.
- Watch – species have been assessed as posing a high risk of becoming invasive in the future in California.

Table 7-1. Results of Invasive Nonnative Plants Surveys Conducted at the Bank

Common Name/ Scientific Name	Rating	Occurrence on the Bank
Barb goatgrass *Aegilops triuncialis*	High	Located on site adjacent to east end of Howard Ranch Nature Trail.
Slender wild oat *Avena barbata*	Moderate	Extant throughout the Bank. Widespread throughout the Central Valley and foothills.
Wild oat *Avena fatua*	Moderate	Extant throughout the Bank. Widespread throughout the Central Valley and foothills.
Field mustard *Brassica rapa*	Limited	Located onsite in areas that are disturbed or are associated with human activities—areas adjacent to the Howard Ranch Nature Trail, around Rancho Seco Lake, disturbed areas in the southwestern portion of the Bank. Areas along fencelines and next to access roads also may support this species.
Rip gut brome *Bromus diandrus*	Moderate	Extant throughout the Bank in drier areas. Widespread throughout the Central Valley and foothills.
Soft chess *Bromus hordeaceous*	Limited	Extant throughout the Bank, generally in drier areas bordering wetlands. Widespread throughout the Central Valley and foothills.
Bermuda grass *Cynodon dactylon*	Moderate	Found occasionally throughout the Bank in seasonally moist areas.
Red stem filaree *Erodium cicutarium*	Limited	Located throughout the Bank in dry grassland areas. A widely distributed grassland species throughout the Central Valley and foothills.
Red gum *Eucalyptus camaldulensis*	Limited	A clustered population of eucalyptus exists at the northeast end of a reservoir located in the southwest portion of the Bank.
Cut leaved geranium *Geranium dissectum*	Limited	Occurs occasionally along the edges of seasonal drainages, primarily near the PAWS area.
Mannagrass *Glyceria* sp. (likely *G. declinata*)	Moderate	Occasional to common species found in vernal pools on the Bank.
Hoary mustard *Hirschfeldia incana*	Moderate	Rare to occasional in relatively disturbed areas, such as near the Howard Ranch Nature Trail entrance and in the southwestern portion of the Bank along Clay East Road.
Velvet grass *Holcus lanatus*	Moderate	Sparsely distributed on the northeast side of a reservoir berm located in the southwestern portion of the Bank.
Mediterranean barley *Hordeum marinum* ssp. *gussonianum*	Moderate	Extant throughout the SMUD Bank as a wetland border species. Widespread throughout the Central Valley and foothills.
Hare barley *Hordeum murinum* ssp. *leporinum*	Moderate	Extant throughout the Bank. Widespread throughout the Central Valley and foothills.

Common Name/ Scientific Name	Rating	Occurrence on the Bank
Smooth cat's ear *Hypochaeris glabra*	Limited	Extant throughout the Bank in seasonally moist areas such as swales or vernal pool margins. Widespread throughout the Central Valley and foothills.
Rough cat's ear *Hypochaeris radicata*	Moderate	Extant throughout the Bank in seasonally moist areas such as swales or vernal pool margins. Widespread throughout the Central Valley and foothills.
Italian ryegrass *Lolium multiflorum*	Moderate	Extant throughout the Bank in seasonally moist areas such as swales or vernal pool margins. Widespread throughout the Central Valley and foothills.
Hyssop loosestrife *Lythrum hyssopifolium*	Limited	Extant throughout the Bank in seasonally moist areas such as swales or vernal pool margins. Widespread throughout the Central Valley and foothills.
Annual beardgrass *Polypogon monspeliensis*	Limited	Presence onsite limited to margins of open water habitats, some vernal pools, and swales.
Common sheep sorrel *Rumex acetosella*	Moderate	Rare to occasional near open water habitats on the Bank.
Curly dock *Rumex crispus*	Limited	Located throughout the Bank in seasonal wetlands. Rare in vernal pools. Widespread throughout the Central Valley and foothills in wetland areas.
Medusa grass *Taeniatherum caput-medusae*	High	Widespread throughout the Bank, although less prevalent in the southwest portion of the Bank. Widespread throughout the Central Valley and foothills grasslands.
Rose clover *Trifolium hirtum*	Moderate	Widespread throughout the Bank and within Central Valley and foothills grasslands.
Rattail fescue *Vulpia myuros*	Moderate	Widespread throughout the Bank and within Central Valley and foothills grasslands.

The SMUD Bank supports numerous native plant species along with several naturalized nonnative species. The invasive plant survey conducted at the Bank on July 15, 2008, documented existing invasive nonnative plant populations and provided a baseline for future surveys. Results of this survey determined that 25 nonnative invasive plant species (rated by the [Cal-IPC [2006]) occur on the Bank (Table 7-1, above). Due to the widespread presence of naturalized nonnative plants (e.g., soft chess, ripgut brome, wild oat, mannagrass, hare barley, and Mediterranean barley) on the SMUD Bank and throughout the Central Valley, eradication or control of these species is not practicable. Management of nonnative invasive plants on the Bank will focus on newly introduced species. Although eradication or control of these nonnative species is not currently practicable, future science may provide information that allows for their improved management. Adaptive management will be conducted as referenced in Sections 4.6 and 8.5 of the Development Plan and in Section 4.0 of the Long-Term Management Plan in the SMUD Bank Enabling Instrument.

If remedial actions are ineffective, SMUD must demonstrate in writing to USFWS all of the following criteria to justify cessation or reduction of remedial actions.

- The changed circumstance was detected as soon as feasible and USFWS was notified.
- SMUD coordinated and worked actively with USFWS and other land managers to assess the changed circumstance and determine the best course of action.
- SMUD implemented remedial measures for the changed circumstance according to the HCP but these measures failed to stop the spread of the disease or invasive species.
- The disease or invasive species is a serious problem outside the HCP Permit Area and similar control measures implemented by others also failed to control their spread.

If cessation or reduction of remedial actions is justified, but the conservation values at the site are impaired or the site no longer meets the biological goals and objectives of this HCP, then SMUD shall secure equivalent mitigation to replace what was lost as a result of the changed circumstance. However, if the conservation values for which the mitigation site was intended to satisfy have not been impaired and the site still meets the biological goals and objectives of the HCP, SMUD would not have to replace the mitigation elsewhere.

7.7 Federal Section 7 Consultations

An important goal of the SMUD HCP is to provide a framework for ESA compliance for all Covered Activities in the Plan Area. Whether a Covered Activity is implemented under Section 7 or 10 of the ESA, the HCP will provide the framework for future Section 7 consultations. For some future Covered Activities, ESA Section 7 consultation will still be required even after the HCP is complete (e.g., Covered Activities requiring Clean Water Act Section 404 authorization). The HCP does not alter the obligation of another federal agency to consult USFWS or National Marine Fisheries Service pursuant to Section 7 of the ESA. Unless otherwise required by law or regulation, USFWS will ensure that biological opinions issued for projects that are defined as Covered Activities under the HCP are consistent with the biological opinion issued for the HCP and the federal permit. Unless otherwise required by law or regulation, USFWS will not impose measures on SMUD for HCP Covered Activities in excess of those measures that have been or will be required by the HCP and the permit.

7.8 Permit Renewal, Plan Amendments, Permit Suspension, and Revocation

It may be necessary for SMUD to clarify provisions of the HCP or the Permit to address issues that arise with respect to the administration of the process, or to be more specific regarding the precise meaning and intent of the language contained in those documents. Such clarifications can take two forms: minor modifications and amendments. Any minor modifications or amendment will be in accordance with applicable legal requirements.

This HCP and federal permit may be amended only with the written consent of SMUD and USFWS.

7.8.1 Administrative Changes and Minor Modifications

It may be necessary for SMUD to clarify the HCP through administrative changes or minor modifications during the permit term. Administrative changes are internal changes or corrections that do not change the intended meaning or obligations of the HCP, and do not require authorization from USFWS. Administrative changes will be made in writing and documented by SMUD, and a summary of administrative changes will be included in the annual report. Examples of administrative changes are listed below.

- Correction of typographical, grammatical, and similar editing errors in the HCP.
- Change to any map or exhibit to correct errors in mapping.
- Day-to-day implementation decisions, such as changes in irrigation frequency at restored temporary impact sites.
- Modifications to Plan monitoring protocols to align with Wildlife Agency monitoring protocols, which may be modified in the future.
- Adoption of new monitoring protocols that may be promulgated by the Wildlife Agencies in the future.

Minor modifications are changes that do not affect the impact assessment or conservation strategy described in the HCP and do not affect SMUD's ability to achieve the biological goals and objectives of the HCP. Minor modifications do not require an amendment to the permit, but they do require written approval by USFWS before being implemented. Examples of minor modifications are listed below.

- Updates to the land cover map or species occurrence data that are consistent with the predictions and expectations of the Plan.
- Minor changes to survey or monitoring protocols that are not proposed in response to adaptive management.
- Updates to the land cover map or to species occurrence data that are consistent with the predictions and expectations of the Habitat Plan.
- Modification of the conditions on Covered Activities (AMMs) in response to adaptive management.
- Other changes that do not result in adverse effects on Covered Species beyond those analyzed in the HCP and the associated biological opinion, and do not limit the ability of SMUD to achieve the biological goals and objectives of the HCP.

SMUD may propose administrative changes and/or minor modifications by submitting the request in writing, including a description of (a) the proposed change; (b) an explanation of why the change is necessary or desirable; and (c) an explanation of why SMUD believes the effects of the proposal are not different from those described in the original

HCP. If USFWS concurs with the proposal, it will authorize the change/modification in writing; the change will be considered effective upon the date of the written authorization from USFWS.

7.8.2 Plan Amendment

An amendment is a change to the HCP that may affect the impact analysis or the conservation strategy in ways that were not analyzed in the original documents (NEPA, HCP, or biological opinion). Amendments to the HCP would also require an amendment to the permits and follow the same formal review process as the original HCP and permit, including National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) review, Federal Register notices, and an internal Section 7 consultation with USFWS. To obtain USFWS approval of a proposed amendment, SMUD must submit the proposed amendment in a report that includes a description of the need for the amendment, an assessment of its impacts, and any alternatives by which the objectives of the proposal might be achieved. Amendments of the ESA Section 10(a)(1)(B) permit would be required in the following circumstances.

- To cover any species that is newly listed under the ESA, is not currently addressed in the HCP, and that may be taken by Covered Activities.
- For the modification of any Covered Activity or mitigation component under the HCP, including funding, that may significantly affect authorized take levels, effects of the project, or the nature or scope of the mitigation program.[5]
- For any other modification of the Covered Activity likely to result in adverse effects on the Covered Species not addressed in the HCP and permit.

7.8.3 Suspension/Revocation of the Permit

USFWS may suspend or revoke permits if SMUD fails to implement the HCP in accordance with the terms and conditions of the permits or if suspension or revocation is otherwise required by law. Suspension or revocation of the Section 10(a)(1)(B) permit, in whole or in part, by USFWS shall be in accordance with 50 CFR 13.27–29, 17.32 (b)(8). The permit may be revoked for any of the following reasons:

- SMUD willfully violates any federal or state statute or regulation, or any Indian tribal law or regulation, or any law or regulation of any foreign country, which involves a violation of the conditions of the permit or of the laws or regulations governing the permitted activity.
- SMUD fails within 60 days to correct deficiencies that were the cause of a permit suspension.

[5] The Take from more or slightly different activities than those described in Chapter 2, *Covered Activities*, can be covered by the HCP permit as long as such activities and the effects of such activities are similar to these Covered Activities as described and fall within the descriptions and take limits described in Chapter 4 for each Covered Species.

- SMUD becomes disqualified to hold the permit.
- The statute or regulation authorizing the permit changes in a way that prohibits the continued implementation of the permit issued by USFWS.
- SMUD's actions are inconsistent with issuance criteria, and the inconsistency has not been rectified.

USFWS would send a letter to SMUD informing it of the issues of concern and the potential for permit suspension or revocation, and would provide an opportunity to rectify the deficiencies. If the deficiencies are not rectified within the timeframe specified, the permit may be suspended or revoked.

7.8.4 Permit Renewal

The Section 10(a)(1)(B) Permit may be renewed without the issuance of a new permit, provided that the original permit is renewable, and that biological circumstances and other pertinent factors affecting Covered Species are not significantly different than those described in the original HCP. To renew the permit, SMUD will submit to USFWS documents that provide the following specifics.

- A request to renew the permit.
- A reference to the original permit number.
- Certification that statements and information provided in the original HCP and permit application, together with approved HCP amendments, are still true and correct, and a list of changes needed to clarify or revise the HCP.
- A description of take that has occurred under the existing permit.
- A description of activities under the original HCP that are still to be completed and which the renewal is intended to cover.

If USFWS concurs with the information provided in the request, it will renew the permit consistent with permit renewal procedures required by federal regulation (50 CFR 13.22).

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8 Cost and Funding

This chapter includes information on program costs, funding, and funding assurances. The first section of the chapter provides planning-level estimates of the cost to implement the SMUD HCP over the 30-year permit term and for mitigation, in perpetuity. The second half of the chapter describes the methods SMUD will use to fund all of the HCP implementation costs.

8.1 Implementation Costs

SMUD developed its implementation cost estimate based on the following steps.

- Reviewing permitting, avoidance, minimization, and mitigation expenses from existing projects.
- Evaluating how work is reviewed, planned, and screened by existing staff, and estimating the costs of these efforts.
- Reviewing costs of mitigation credits at the SMUD Nature Preserve Mitigation Bank (SMUD Bank) and similar mitigation banks with available credits and service areas that cover the Permit Area.

The total cost to implement the SMUD HCP is estimated to average $1,245,732 per year, or $37,371,951 over the next 30 years, in constant 2020 dollars but assuming a 3% annual cost of living increase for salary. These costs are reasonable estimates based on this financial analysis; however, the cost of implementing HCP provisions, including required avoidance, minimization, mitigation, endowments, management, monitoring, and reporting, may vary from these estimates. The cost assumptions and calculations used to develop this overall estimate are divided into the following three cost categories, each of which is described below.

- Staffing costs
- Mitigation costs
- Costs of remedial actions for changed circumstances

8.1.1 Staffing Costs

Chapter 7, Section 7.1, *Implementation Structure,* describes the roles of SMUD's HCP team in implementing the program. The tasks to be implemented through these roles are described in Chapter 7, Section 7.2, *Implementation Tasks.* The following assumptions were used for the costs of staff for HCP implementation.

- HCP Administrator (Section 7.1.1): one full-time employee equivalent
- Environmental Specialist (Section 7.1.2): one quarter-time employee equivalent

Costs associated with Engineering Designers and Planners (Section 7.1.3) and SMUD Contract Biologists (Section 7.1.4) would be passed on to the projects; therefore, there would not be any HCP costs associated with their work.

As described in Section 7.1.4, SMUD will need to periodically hire contract biologists to conduct preconstruction surveys and perform construction monitoring consistent with HCP requirements. These Contract Biologist costs will be included as part of each project budget for the specific activity being conducted. Therefore, these costs are not included in the HCP. Similarly, the work of SMUD Field Crews (Section 7.1.5) will be included as part of each project budget for the specific activity being conducted. Therefore, Field Crew costs are also not included in the HCP implementation costs shown below.

All HCP staffing costs are summarized in Table 8-1 and represent approximately 42 percent of the overall cost to implement the HCP. SMUD staff attendance at environmental training courses is included in SMUD's existing staff overhead costs.

Table 8-1. Estimated Staffing Costs

Program Element	Percent Time	Annual Fulltime Salary + Benefits and Indirect[a]	Estimated Annual Costs	Total Cost	Assumptions
HCP Administrator	100	$438,068, increased 3% annually	$438,068 plus 3% annual increase	$13,142,040	One full-time equivalent employee (fully loaded annual cost with 3% annual increase)
Environmental Specialist	25	$438,068, increased 3% annually	$109,517 plus 3% annual increase	$3,285,510	One quarter-time equivalent employee (fully loaded annual cost)
Training Materials			$5,000		Production of training materials
Total			$552,585	$16,432,550	

[a] All benefits are assumed to be 50% of each salary

8.1.2 Mitigation Costs

SMUD's HCP implementation includes mitigation for the impacts of SMUD's Covered Activities on Covered Species and Modeled Habitat. Mitigation costs were estimated based on the March 2016 cost of mitigation credits at the SMUD Bank and the need for additional mitigation credits from external sources to fulfill the mitigation needs for giant garter snake and other land cover types unavailable at the SMUD Bank (Table 8-2). The estimated cost of mitigation credits external to the SMUD Bank is based on the average value that SMUD expects to pay to purchase mitigation credits or purchase and endow mitigation lands. The number of mitigation credits needed is based on the mitigation requirements in Chapter 5, Table 5-7, and the available credits at the SMUD Bank. Any

long-term monitoring of Sacramento Orcutt grass population enhancement and slender Orcutt grass introduction at the SMUD Bank as required by the HCP that is above and beyond what is required under the Bank Enabling Instrument would be funded by the HCP, separately from the SMUD Bank endowments. The total mitigation cost if SMUD uses their own SMUD Bank to fulfill as many mitigation needs as possible is estimated to be an average of $688,700per year, or a total of $20.661 million over the 30-year permit term.

Table 8-2. Habitat Preservation and Creation Costs, Including Management

SMUD HCP Land Cover Type	Preservation or Creation	Mitigation Credit Cost per Acre	Amount Needed (acres)	Amount Available (acres)	Estimated Total Cost
SMUD Bank					
Grasses and Forbs	Preservation	$10,000	128.5	128.5	$1,285,000
Vernal Pool, Seasonal Wetland, and Swale	Preservation	$200,000	33.0	22.65	$4,530,000
Vernal Pool, Seasonal Wetland, and Swale	Creation	$250,000	14.1	22.64	$5,660,000
				Total Cost at SMUD Bank	**$11,475,000**
Outside SMUD Bank					
Valley Elderberry Longhorn Beetle	Preservation	$5,000	24.3[a]	--	$900,000
Giant Garter Snake	Preservation	$60,000	128.9	--	$7,734,000
Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp	Preservation	$300,000	1.81[b]	--	$543,000
				Total Cost Outside SMUD Bank	**$9,186,000**
				GRAND TOTAL	**$20,661,000**

[a] Based on 300 elderberry plants mitigated at a 3:1 for a total of 24.3 acres, at 5 plants or 0.135 acre canopy cover per credit.

[b] Based on 47.1 acres needed and 45.29 acres available at the SMUD Bank

8.1.3 Cost of Remedial Actions for Changed Circumstances

Remedial measures may be needed to respond to one or more of the changed circumstances described in Chapter 7, Section 7.6.1, *Changed and Unforeseen Circumstances*. The cost estimate for remedial measures was assumed to be an additional 10 percent of the operational costs allocated for management activities at the SMUD Bank.

As described in Chapter 7, *Implementation,* SMUD is required to implement remedial action if any of the changed circumstances occur. The cost assumptions are made for planning purposes and will not limit SMUD's obligation to respond to these changed circumstances.

8.1.4 Summary of Total Costs

Total estimated costs for program implementation, including staffing, mitigation, and remedial actions for changed circumstances, are shown in Table 8-3.

Table 8-3. Cost Summary

Cost Category	Estimated Average Annual Cost	Total Estimated Cost over Permit Term
Staffing	$552,585[b]	$16,577,550
Mitigation	$688,700	$20,661,000
Orcutt Grass Enhancement *(To be determined)*		
Contingency [a]	$4,447	$133,401
Total Estimated Cost	**$1,245,732**	**$37,371,951**

[a] 10% of operational costs on SMUD Bank ($44,467/year)

[b] Assuming 3% annual cost of living increase.

8.2 Funding Sources and Adequacy

SMUD has the financial capacity and commits to fully fund all costs of HCP implementation, including staffing, compliance reporting, avoidance and minimization measures, surveys, and mitigation costs. SMUD's costs for implementation of the HCP will be fully covered by its utility rates. Collection of these funds is authorized by the SMUD Board of Directors and is associated with the ongoing operation, maintenance, and construction of utility facilities.

SMUD is solvent and able to meet its current financial obligations, including the conditions and obligations of the HCP. SMUD will provide adequate resources to fulfill commitments as described in the HCP. The HCP administrator will annually forecast anticipated program needs, ensuring that SMUD budgets for and implements mitigation that is consistent with the conservation strategy. Because HCP funding is rate-based, SMUD will assure that funding will keep pace with program expenditures. For many years, SMUD has addressed mitigation costs on a project-by-project basis, as well as on an annual operations basis, that is largely equivalent to or exceeds the estimated annual cost of this HCP. Therefore, SMUD's track record of paying for similar compliance tasks and mitigation demonstrates SMUD's ability to pay for ongoing HCP costs.

APPENDIX A HCP GIS LAND COVER ANALYSIS

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List of Abbreviated Terms

CDFW	California Department of Fish and Wildlife
GIS	geographic information system
HCP	Habitat Conservation Plan
NCCP	Natural Communities Conservation Plan
NWI	National Wetlands Inventory
Permit Area	SMUD HCP Permit Area
PCCP	Placer County Conservation Plan
SCARI	Six County Aquatic Resources Inventory
SMUD	Sacramento Municipal Utility District
SSHCP	South Sacramento Habitat Conservation Plan
USACE	U.S. Army Corps of Engineers

1.0 Introduction

One of the initial steps for creating Sacramento Municipal Utility District's (SMUD) Habitat Conservation Plan (HCP) was developing a detailed geographic information system (GIS)-based map of land cover types within the SMUD HCP Permit Area (Permit Area). A land cover type is defined as the dominant characteristic of the land surface as determined by vegetation, water, or human uses. Land cover types are the most widely used units in analyzing ecosystem function, habitat diversity, natural communities, wetlands and streams, and SMUD HCP Covered Species' habitat. This document discusses data sources, classification, and interpretation of land cover types used for the SMUD HCP.

SMUD reviewed existing regional land cover (primarily upland) and aquatic data sources to obtain the best scientific data available and to maintain consistency with other local HCPs.

The data sources used include:

- **Six County Aquatic Resources Inventory (SCARI) Land Cover (2012)**[1]**:** The SCARI Land Cover dataset was created by the U.S. Army Corps of Engineers (USACE) to help streamline future Clean Water Act, Section 404 permits. The dataset covered the entire Permit Area and included both upland and aquatic resources. The dataset was created from source data gathered from Placer County (2007), South Sacramento HCP (SSHCP) (2009), Yolo County Natural Communities Conservation Plan (NCCP)/HCP Regional Vegetation Dataset (2008), Yuba and Sutter County HCP (2008), and U.S. Forest Service Existing Vegetation Tiles (2007).
- **SCARI Aquatic Resource Class (2012)**[2]**:** The SCARI Aquatic Resource Class dataset was created by USACE to help streamline future Section 404 Permits. The dataset covered the entire Permit Area and included aquatic resources. The dataset was created from source data gathered from the National Wetlands Inventory (2009), National Hydrography Dataset (NHD) (NHD 2004), Placer County (2008), Placer County Land Cover (2009), Holland Vernal Pool Survey (2005), SSHCP (2009), Yolo County Regional Vegetation Dataset (2008), Tetra Tech (2004/2008), Yuba and Sutter County HCP (2009), and Digital Globe Satellite Imagery (2010). USACE took the source habitat types and crosswalked the wetlands into five land cover types – Open Water/Fringe, Other Depressional Wetlands, Riverine/Riparian, Vernal Pools, and Seeps.
- **SSHCP Land Cover (2013)**[3]**:** The SSHCP Land Cover dataset was created by Sacramento County for the purposes of the SSHCP primarily based off of aerial

[1] The land cover data was received from Jason Deters at USACE in July 2012. The publication date is 6/11/10.
[2] Tetra Tech, Inc. 2010. "Six Counties Aquatic Resource Inventory." Draft Technical Report prepared for the U.S. Army Corps of Engineers.
[3] The land cover data was received from Richard Radmacher of Sacramento County on May 30, 2013.

photographic interpretation. Approximately 4,000 acres of selected, County-owned, parcels located throughout the SSHCP Plan Area were ground-truthed to provide recognition of signatures for aerial interpretation of the remaining portions of the Plan Area.[4] The dataset covered the southeastern portion of the Permit Area and included both upland and aquatic resources.

- **Natomas Basin HCP Land Cover (2012)[5]:** The Natomas Basin HCP Land Cover dataset was created by the Natomas Basin Conservancy for the Natomas Basin HCP primarily based off of aerial photographic interpretation.[6] The dataset covered the northwestern portion of the Permit Area and included upland and aquatic resources (three aquatic land cover types).

- **Placer County Conservation Plan (PCCP) Land Cover (2008/2009[7], and 2013)[8]:** The PCCP Land Cover dataset was created by TRA Environmental Sciences for Placer County. The sources used include mapping prepared by JSA (2004); mapping by North Fork Associates (2009); Chapter 3. Physical and Biological Resources Placer County Conservation Plan WORKING DRAFT; Placer County GIS data for jurisdiction boundaries, cities and city Spheres of Influence; Placer County General Plan; City of Lincoln General Plan; Placer County Assessor's Parcel Database; JSA Year 2002 Land Cover mapping; North Fork Associates Year 2002 Freshwater Wetlands mapping; and Eric Beckwitt 2002 Watershed Analysis and supporting GIS data.[9] The dataset covered the northern portion of the Permit Area in Placer County and included upland and aquatic resources. Of note, the PCCP Land Cover Dataset mapped vernal pools as part of a vernal pool/annual grassland landscape, and assigned a percentage of vernal pool cover, as compared to individually delineating the boundaries of the vernal pools.

- **Yolo County SMUD Aquatic Data (2013)[10]:** The SMUD HCP Permit Area includes a portion of Yolo County that corresponds with SMUD's gas pipeline. The SCARI Aquatic Resource Class and associated base data in Yolo County appeared incomplete, based off of work SMUD completed along its gas pipeline.

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[4] County of Sacramento, City of Elk Grove, City of Galt, City of Rancho Cordova, Sacramento Regional County Sanitation District, Sacramento Area Sewer District, Sacramento County Water Agency, and Southeastern Connector. 2010. "Land Cover Type Mapping Report, Appendix E." In *Draft South Sacramento Habitat Conservation Plan*. Last updated 2013. http://www.per.saccounty.net/PlansandProjectsIn-Progress/Pages/SSHCPTablesofContent.aspx.

[5] The land cover data was received from Douglas Leslie of ICF International on April 18, 2013.

[6] ICF International. 2012. *Biological Effectiveness Monitoring for the Natomas Basin Habitat Conservation Plan Area: 2011 Annual Survey Results*. Final document (ICF 00890.10.). Prepared for the Natomas Basin Conservancy. Accessed October 22, 2013. http://www.natomasbasin.org/portals/0/images/stories/pdf/NBC_BioMonReport_Final_Public_ELECTRONIC.pdf.

[7] The land cover data was received from Emily Bacchini of SMUD in 2013.

[8] The land cover data was received from Chris Brown of Placer County on April 16, 2013.

[9] Placer County Community Development Resources Agency and TRA Environmental Services. 2011. "Land Use and Covered Activities Working Draft: Chapter 2." In *Placer County Conservation Plan: Western Placer County*. Last updated 2013. http://www.placer.ca.gov/departments/CommunityDevelopment/Planning/PCCP.aspx.

[10] The land cover data was received from Emily Bacchini of SMUD on May 10, 2013.

This was particularly true as it related to potential giant garter snake aquatic habitat. Therefore, SMUD digitized aquatic habitat along its gas pipeline in 2013, consistent with the results of habitat surveys completed in 2012. To complete the data along the gas pipeline in Yolo County, SMUD created a GIS layer using both a field-verified survey of aquatic resources for potential giant garter snake habitat completed in 2012 and the SCARI Land Cover dataset and overlaid this onto the 2013 Yolo County NCCP/HCP dataset.

- **Yolo County NCCP/HCP Land Cover (2013)**[11]**:** The Yolo County NCCP/HCP mapping was developed using the following sources: mapping of the Blue Ridge and Little Blue Ridge regions of the Yolo County NCCP/HCP plan area on 1993 U.S. Geological Survey digital orthophotographs prepared by University of California, Davis, California Department of Fish and Wildlife (CDFW), and Aerial Information Systems; riparian land cover mapping prepared by Jones & Stokes (1989, 1990); riparian land cover mapping of the Sacramento River (1996), Cache Creek (1996), and Putah Creek (1998) prepared by Chico State University as adjusted in 2004; CDFW Bay-Delta vegetation mapping dataset (2005 data); Department of Water Resources 2008 land cover data set; National Agriculture Imagery Program 2012 aerial imagery; U.S. Fish and Wildlife Service Wetland Easements data; and 2013 Google Earth imagery.[12]
- **SMUD Nature Preserve Mitigation Bank (SMUD Bank) Data (2015)**[13]**:** Area West Environmental, Inc. mapped and digitized aquatic habitats within the SMUD Bank. These habitats were delineated for the purposes of the SMUD Bank and are included in all SMUD Bank documents. The delineation was verified by USACE on June 2, 2009. The data also includes upland habitat mapping and location information for SMUD HCP Covered Species within the SMUD Bank dating back to 1993.
- **NHD 2015**[14]**:** The U.S. Geological Society's NHD represents the drainage network with features such as rivers, streams, canals, lakes, ponds, coastline, dams, and stream gages. The data is designed to be used in general mapping and in the analysis of surface water systems.

2.0 Data Review

The SCARI Land Cover dataset covered the greatest area and included all of the SMUD HCP Permit Area. It was therefore used as primary dataset for SMUD's Land Cover data. Where the other datasets overlapped with the SCARI Land Cover dataset, the

[11] The land cover data was received from Petrea Marchand of Consero Solutions on April 10, 2013.
[12] Yolo County Habitat/Natural Community Conservation Plan Joint Powers Agency. 2013. "Chapter 2. Existing Ecological Conditions." In *First Administrative Draft Yolo Natural Heritage Program*. Last updated June 28, 2013. http://www.yoloconservationplan.org/yolo_pdfs/documents/FirstDraft/website_version/Ch_2_Existing_Ecological_Conditions.pdf.
[13] SMUD dataset from August 5, 2014.
[14] Downloaded from http://nhd.usgs.gov/data.html on 1/5/2015

SCARI Land Cover dataset was clipped (deleted) beneath the more current and comprehensive dataset (Attachment 1).

The SCARI Land Cover and Aquatic Resource Class datasets included upland and wetland data prepared for the SSHCP, PCCP, Yolo County NCCP/HCP, and Natomas Basin HCP. However, all of these datasets were updated between their use for SCARI and SMUD's analysis.

SMUD used the updated datasets with a few additional exceptions/modifications as described below:

- There are small areas along the west edge of the Permit Area following the Sacramento River where the Natomas Basin Land Cover dataset and the Yolo County NCCP/HCP overlap. In these areas the Natomas HCP data was used instead of the Yolo County NCCP/HCP data.
- The Yolo County NCCP/HCP Land Cover dataset was supplemented by aquatic features digitized by SMUD.
- The SMUD Nature Preserve Mitigation Bank land cover data were used instead of the SSHCP land cover data because it was field-verified.
- Polygons that lacked metadata describing the land cover classification were excluded from the dataset and the SCARI Land Cover dataset was used in their place, including providing land cover descriptions.
- The NHD line data was buffered, as described below in Section 6.0, to provide approximate stream widths.

3.0 Data Modifications

During the data review several minor modifications were made to the source data. The modifications made to the source data are described below.

3.1 Land Cover Reclassifications

Certain land cover types within the SCARI Land Cover dataset were merged with other land cover classifications depending on the dominant surrounding land cover type and based on aerial photographic interpretation. The land cover types below were reclassified and are explained in further detail.

- Mixed Chaparral
- Montane Riparian
- Montane Hardwood

- Seeps
- Riverine

3.1.1 Mixed Chaparral

Within the SCARI Land Cover dataset, three isolated patches of mixed chaparral land cover had been mapped. SMUD merged these areas with the dominant, surrounding land cover type based off of aerial photography review. The two areas farther north were included in blue oak woodland. The area farther south was included in urban. (Attachment 2 – Mixed Chaparral).

3.1.2 Montane Riparian

Within the SCARI Land Cover dataset, areas classified as montane riparian within the Permit Area were reclassified as either urban or valley foothill riparian, depending on the dominant, surrounding land cover type and based off of aerial photography review. Within the Permit Area, there were three locations where montane riparian classifications occurred.

The first location (Attachment 3 – Montane Riparian, Detail 1) was located near the intersection of Oak Avenue Parkway and Cascade Falls Drive, near Folsom Lake. At Detail 1, there were two polygons classified as montane riparian; the northern polygon was reclassified as two habitat types. The northern portion of the northern polygon was reclassified as valley foothill riparian. The southern portion of the northern polygon was reclassified as Urban, consistent with the surrounding habitat classification. The polygon south of Oak Avenue Parkway was reclassified to valley foothill riparian, consistent with the adjacent southern land cover classification.

The second location (Attachment 3 – Montane Riparian, Detail 2) was located in Folsom, near the intersection of Blue Ravine Road and East Natoma Street. Within Detail 2, there were several polygons classified as montane riparian, both north and south of East Natoma Street. The montane riparian polygons north of East Natoma Street were reclassified as valley foothill riparian and urban. South of East Natoma Street, the montane riparian polygon was reclassified to urban.

The third location (Attachment 3 – Montane Riparian, Detail 3) is located in Staten Island, San Joaquin, south of Andrus Island Road and west of Race Track Road. The polygon classified as montane riparian was reclassified as valley foothill riparian, matching the adjacent habitat classification.

3.1.3 Montane Hardwood

Within the SCARI Land Cover dataset, areas classified as montane hardwood within the Permit Area were reclassified as blue oak woodland, based on the dominant, surrounding land cover type and based off of aerial photography review. There were three locations classified as montane hardwood within the Permit Area (Attachment 4 –

Montane Hardwood Details 1, 2, and 3); all of the polygons formerly classified as montane hardwood were reclassified to blue oak woodland.

3.1.4 Seeps

Within the SCARI Aquatic Resource Class dataset, three seeps were identified within the Permit Area east of Steelhead Creek, north of West Elverta Road and west of Rio Linda Boulevard. These seeps were merged with their adjacent land cover type because they did not appear to be seeps; they were located within other wetlands and in uplands. The first seep (Attachment 5) was reclassified as riverine. The other two seeps (Attachment 5) were reclassified as grasses and forbs (upland).

3.1.5 Riverine

In the PCCP dataset, aerial photographs were reviewed for "Riverine" areas, which were determined to be paved roads. These areas were then reclassified as urban.

3.2 Overlapping Polygons in SCARI Aquatic Resource Class

The SCARI Aquatic Resource Class data had overlapping polygons which led to the same area being classified and accounted for multiple times. The issue of overlapping polygons within the SCARI Aquatic Resource Class was rectified by creating hierarchies of the four aquatic land cover types. The four land cover types and their hierarchy are:

- Vernal Pools
- Other Depressional Wetlands
- Riverine/Riparian
- Open Water/Fringe

For example, if a Vernal Pool polygon and an Other Depressional Wetland polygon occurred in the same location, the Vernal Pool polygon took precedence over the Other Depressional Wetland area, replacing the overlapping portion of the Other Depressional Wetland polygon with Vernal Pool.

3.3 Steelhead Creek, Sacramento River, and American River

Portions of Steelhead Creek are within the Natomas Basin HCP dataset and are classified as Grasses and Forbs, Open Water Fringe, Other Depressional Wetland, Urban, and Valley Foothill Riparian. The remaining portions of Steelhead Creek within the Permit Area are within the SCARI dataset and are classified as Riverine, Valley Foothill Riparian, and Other Depressional Wetland. To group Steelhead Creek as one system, all of Steelhead Creek was reclassified as Riverine using the NHD dataset.

Portions of the Sacramento and American rivers within the Natomas Basin HCP dataset classified as wetlands were also reclassified as Riverine using the NHD dataset.

4.0 Combining Upland and Aquatic Datasets

Following the resolution of each issue, the datasets were merged to form the SMUD land cover type layer. Land cover types from the different base sources were crosswalked to the 17 SMUD land cover types (Table 1).

When combining the upland and aquatic data, it was discovered that overlap existed between the datasets. In all cases of overlap between upland and aquatic data, the aquatic data was used since most of SMUD's HCP Covered Species rely on an aquatic component for some portion of their life cycles. To remove the overlaps the underlying data was cut resulting in one continuous land cover layer.

5.0 Land Cover Crosswalk

SMUD prepared a crosswalk to correlate the different land cover classifications from the original datasets into SMUD's land cover types (Table 1). All data was reclassified using the crosswalk.

6.0 Stream Data

Stream data was inconsistently provided in the datasets listed in Section 1.0. This data was primarily included as polygon data, however three of the datasets also contained polyline data. The three datasets containing polyline data are the SCARI Aquatic Resource Class, Yolo County SMUD Aquatic Data, and NHD.

In order to evaluate the approximate width of streams within the Permit Area, the NHD was used. The NHD provided the most complete coverage for the Permit Area, but does not contain widths or assign a stream order for all of the streams. Most of the streams are depicted as a line, but some of the larger streams are depicted as polygons. All of the streams that already contain width information in the NHD were left "as-is". A polygon was created and the stream information was incorporated into the SMUD HCP land cover dataset.

Since not all streams in the NHD and none in the SCARI Aquatic Resource Class or Yolo County SMUD Aquatic Data contain width information, methods were devised to assign widths.

Streams that did not contain width data were assigned a width based on the information provided below:

- Depending on the number of null values and number of streams within each stream order, 10-20 stream widths per stream order along open habitats (not riparian areas), were measured using the Google Earth application.
- Stream order 1 – The average width, out of 20 point locations, was 448.85 feet; therefore, the average width of 450 feet was assigned to streams within stream order 1.
- Stream order 2 – The average width, out of 14 point locations, was 262 feet; therefore, the average width of 250 feet for streams within stream order 2.
- Stream orders 3-5 – The average width, out of 50 point locations, was 18.74 feet; therefore, the average width was assumed to be 20 feet was assigned to streams within stream orders 3-5.
- Stream orders 6-8 – The average width, out of 40 point locations, was 10.6 feet; therefore, the average width of 10 feet was assigned to streams within stream orders 6-8.
- Streams with no stream order data – the average width, out of 50 point locations, was 19.2 feet; therefore, the average width of 20 feet was assigned to streams with no stream order data.
- For the agricultural ditches digitized by SMUD in the Yolo County SMUD Aquatic Data, a width of four feet was assigned to the features.

Polygons were created using the polylines and assigned widths, and the polygons were overlain on the land cover data. The following hierarchy was used to address any overlapping polygons:

- Vernal Pools
- Other Depressional Wetlands
- Riverine/Riparian
- Open Water/Fringe
- Original NHD polygon data
- Created NHD polygons (based off of the NHD polylines and assigned widths)

NHD was used throughout the Permit Area, with exception of the SMUD Bank where SMUD conducted ground-truthed habitat and stream mapping. The NHD streams immediately adjacent to but outside the Permit Area were also buffered to ensure that streams located just outside of the Permit Area were captured.

The NHD polygon associated with portions of Steelhead Creek, Sacramento River, and American River within the Natomas Basin HCP was superimposed, similar to the SMUD Bank data, over the datasets that it intersected.

All former polylines were then crosswalked to (classified as) Riverine.

Table 1. Final Combined Land Cover Types Crosswalk

(Original Datasets → SMUD's Dataset)

SCARI Land Cover	Natomas Basin HCP	South Sacramento HCP	SCARI Aquatic Resource Class	Yolo NCCP/ HCP	Yolo SMUD Aquatic Data	PCCP	SMUD Bank	NHD	SMUD Land Cover Type
--	--	Eucalyptus Woodland	--	--	--	Eucalyptus Woodland	--	--	Eucalyptus Woodland
Valley Foothill Riparian	Riparian Scrub	Valley Oak Riparian Woodland	--	Valley Foothill Riparian	--	Valley Foothill Riparian Woodland	--	--	Valley Foothill Riparian
Montane Riparian*	Riparian Woodland	Mixed Riparian Scrub				Urban Riparian			
		Mixed Riparian Woodland							
Blue Oak-Foothill Pine	--	--	--	--	--	--	--	--	Blue Oak Foothill Pine
Blue Oak Woodland	--	Blue Oak Woodland	--	--	--	Blue Oak Woodland	--	--	Blue Oak Woodland
Blue Oak Woodland or Valley Oak Woodland						Foothill Hardwood Woodland			
Coastal Oak Woodland		Blue Oak Savanna				Oak Woodland Savanna			
Mixed Chaparral*									
Montane Hardwood*									
Valley Oak	Non-	Woodland	--	--	--	Interior Live	--	--	Valley Oak

SCARI Land Cover	Natomas Basin HCP	South Sacramento HCP	SCARI Aquatic Resource Class	Yolo NCCP/ HCP	Yolo SMUD Aquatic Data	PCCP	SMUD Bank	NHD	SMUD Land Cover Type
Woodland	Riparian Woodland Valley Oak Woodland	Restoration				Oak Woodland			Woodland
--	--	Mine Tailing Riparian Woodland	--	--	--	--	--	--	Mine Tailing Riparian Woodland
Orchard Deciduous Orchard	Orchard	Orchard	--	Deciduous Fruits and Nuts	--	Orchard	--	--	Orchard/ Vineyard
Vineyard		Vineyard		Vineyard					
Cropland	Alfalfa or Grass Hay	Cropland	--	Field Crop	--	Row Crop	--	--	Cropland
Irrigated Row and Field Crop	Fallow								
Irrigated Grain Crop	Fallow Row and Grain Crop			Semi Agricultural/ Incidental to Agriculture					
				Truck/ Nursery/ Berry Crops		Unidentified Crop			
Irrigated Hay Field	Other Row and Grain Crops, Safflower, Sunflower, Tomatoes or Wheat			Grain and Hay Crop					
--	Fallow Rice	--	--	Rice	--	Rice	--	--	Rice

SCARI Land Cover	Natomas Basin HCP	South Sacramento HCP	SCARI Aquatic Resource Class	Yolo NCCP/ HCP	Yolo SMUD Aquatic Data	PCCP	SMUD Bank	NHD	SMUD Land Cover Type
	Rice								
Pasture	Irrigated Grassland	Irrigated Pasture-Grassland	--	Pasture	--	Pasture	--	--	Pasture
Perennial Grassland	Non-Native Annual Grassland	Valley Grassland	Seep*	Annual Grassland	--	Annual Grassland	Upland CTS	--	Grasses and Forbs
Annual Grassland	Grassland (Created)					Disturbed Lands	TCBB Upland Annual Grassland (NSSH)		
Urban	Developed (Low or High Density)	High Density Development	--	Urban	--	Disturbed Lands	--	--	Urban
Mixed Chaparral*		Low Density Development				Riverine* Rural Residential			
Montane Riparian*		Major Roads Recreation/ Landscaped				Urban/ Suburban Urban Golf Course Urban Woodland Urban Park			
Barren	Disturbed/ Bare	Disturbed	--	--	--	--	--	--	Barren/ Disturbed
	Ruderal	Mine Tailing							
Riverine	--	Streams/ Creeks	Riverine/ Riparian	--	Agricultural Ditches	--	Intermittent Drainage	Artificial Path	Riverine
		Ephemeral Streams						Canal/Ditch /Aqueduct	

SCARI Land Cover	Natomas Basin HCP	South Sacramento HCP	SCARI Aquatic Resource Class	Yolo NCCP/ HCP	Yolo SMUD Aquatic Data	PCCP	SMUD Bank	NHD	SMUD Land Cover Type
		Aqueducts	Seep*			--		Connector Stream/ River	
Lacustrine	Open Water	Open Water	Open Water/ Fringe	Open Water	Seasonal Pond	Lacustrine Stock Ponds	Open Water	--	Open Water/ Fringe
Fresh Emergent Wetland	Fresh Emergent Marsh	Freshwater Marsh	Other Depressional Wetland	Fresh Emergent Wetland	--	Fresh Emergent Wetland	Juncus Wetland	--	Other Depressional Wetland
	Fresh Emergent Marsh (Created)	Seasonal Wetland						--	
Wet Meadow	Seasonal Wetland	Wetland Restoration				Urban Wetland	Seasonal Swale		
--	--	Swale	Vernal Pool	--	--	Vernal Pool Complex Low	Seasonal Wetland	--	Vernal Pool, Seasonal Wetland, and Swale
		Vernal Pool				Vernal Pool Complex Intermediate	Vernal Pool		
						Vernal Pool Complex High	Vernal Swale		

*Only a few select locations

Attachment 1. Land Cover Extent of Source Dataset used to Prepare the SMUD HCP Land Cover

Attachment 2. Mixed Chaparral

Attachment 3. Montane Riparian

Attachment 4. Montane Hardwood

Attachment 5. SCARI Wetlands Seeps

APPENDIX B ANALYSIS OF POTENTIAL COVERED SPECIES

Table B-1 SMUD Habitat Conservation Plan Species Evaluation Table

Species considered for coverage under the Sacramento Municipal Utility District's (SMUD's) Habitat Conservation Plan (HCP) were generated from the following searches: U.S. Fish and Wildlife Service (USFWS) and California Native Plant Society (CNPS) 7.5 minute quadrangle searches of the Permit Area and a 5-mile buffer and the Department of Fish and Wildlife's (DFW's) California Natural Diversity Database (CNDDB) search of the Permit Area and a 5-mile buffer. In addition to these searches, species were considered for coverage if they were included in the following documents: South Sac HCP, Natomas Basin HCP, Metro Air Park HCP, Yolo County Natural Heritage Program, Placer County Conservation Plan, USFWS Vernal Pool Recovery Plan, and the Birds of Conservation Concern (Region 32).

Scientific Name	Common Name	Federal Status [1,2]	State Status [3,4]	CNPS Status [5]	CNDDB Occurrences in Permit Area[6,7]	CNDDB Occurrences in 5 mile Buffer[6,8]	USFWS List[2,8]	CNPS List[5,8]	South Sacramento HCP[9]	Natomas Basin HCP[10]	Metro Air Park HCP[11]	Yolo County Natural Heritage Program[12]	Placer County Conservation Plan[13]	Vernal Pool Recovery Plan[14]	Birds of Conservation Concern[15]	Present at SMUD Mitigation Bank[16]
Plants																
Agrostis hendersonii	Henderson's bent grass	--	--	3.2				B								
Allium jepsonii	Jepson's onion	--	--	1B.2				B								
Amsinckia lunaris	bent-flowered fiddleneck	--	--	1B.2												
Arabis modesta	modest rockcress	--	--	4.3				B								
Arctostaphylos myrtifolia	Ione manzanita	T	--	1B.2		X	X	X								
Astragalus pauperculus	depauperate milk-vetch	--	--	4.3				X								
Astragalus rattanii var. *jepsonianus*	Jepson's milk-vetch	--	--	1B.2												
Astragalus tener var. *ferrisiae*	Ferris's milk-vetch	--	--	1B.1		X		B						X		
Astragalus tener var. *tener*	alkali milk-vetch	--	--	1B.2	X	X		X						X		
Atriplex cordulata var. *cordulata*	heartscale	--	--	1B.2	X	X		X								
Atriplex depressa	brittlescale	--	--	1B.2		X		X								
Atriplex joaquiniana	San Joaquin spearscale	--	--	1B.2	X	X		X								
Atriplex persistens	vernal pool smallscale	--	--	1B.2										X		
Balsamorhiza macrolepis	big-scale balsamroot	--	--	1B.2		X		X								
Brasenia schreberi	watershield	--	--	2B.3	X			X								
California macrophylla	round-leaved fillaree	--	--	1B.1		X										
Calycadenia hooveri	Hoover's calycadenia	--	--	1B.3				B								
Calystegia stebbinsii	Stebbins' morning-glory	E	E	1B.1		X	X	B								
Carex comosa	bristly sedge	--	--	2B.1	X			X								
Castilleja campestris var. *succulenta*	succulent owl's clover	T	E	1B.2		X	X	X						X		
Ceanothus roderickii	Pine Hill ceanothus	E	R	1B.2		X	X	X								
Centromadia parryi ssp. *rudis*	Parry's rough tarplant	--	--	4.2				X								
Chamaesyce hooveri	Hoover's spurge	T	--	1B.2										X		
Chlorogalum grandiflorum	Red Hills soaproot	--	--	1B.2		X		X								
Chloropyron molle ssp. *hispidum*	hispid bird's-beak	--	--	1B.1		X		X								
Chloropyron palmatum	palmate-bracted bird's-beak	E	E	1B.1		X	X	X				X				
Cicuta maculata var. *bolanderi*	Bolander's water-hemlock	--	--	2B.1	X	X		X								
Clarkia biloba ssp. *brandegeeae*	Brandegee's clarkia	--	--	4.2	X	X		X								
Claytonia parviflora ssp. *grandiflora*	streambank spring beauty	--	--	4.2				B								
Cuscuta obtusiflora var. *glandulosa*	Peruvian dodder	--	--	2B.2	X			X								

Table B-1 SMUD Habitat Conservation Plan Species Evaluation Table

Scientific Name	Common Name	Federal Status [1,2]	State Status [3,4]	CNPS Status [5]	CNDDB Occurrences in Permit Area [6,7]	CNDDB Occurrences in 5 mile Buffer [6,8]	USFWS List [2,8]	CNPS List [5,8]	South Sacramento HCP [9]	Natomas Basin HCP [10]	Metro Air Park HCP [11]	Yolo County Natural Heritage Program [12]	Placer County Conservation Plan [13]	Vernal Pool Recovery Plan [14]	Birds of Conservation Concern [15]	Present at SMUD Mitigation Bank [16]
Downingia pusilla	dwarf downingia	--	--	2B.2	X	X		X	X				X			X
Eriogonum apricum var. *apricum*	Ione buckwheat	E	E	1B.1	X	X	X	X								
Eriogonum apricum var. *prostratum*	Irish Hill buckwheat	E	E	1B.1		X	X	X								
Eryngium constancei	Loch Lomond button-celery	E	E	1B.1										X		
Eryngium pinnatisectum	Tuolumne button-celery	--	--	1B.2	X	X		X								
Eryngium spinosepalum	spiny-sepaled button-celery	--	--	1B.2										X		
Fremontodendron decumbens	Pine Hill flannelbush	E	R	1B.2			X	X								
Fritillaria agrestis	stinkbells	--	--	4.2	X			X								
Fritillaria pluriflora	adobe-lily	--	--	1B.2				B								
Galium californicum ssp. *sierrae*	El Dorado bedstraw	E	R	1B.2		X	X	X								
Gratiola heterosepala	Boggs Lake hedge-hyssop	--	E	1B.2	X	X		X	X	X			X	X		X
Harmonia hallii	Hall's harmonia	--	--	1B.2												
Helianthemum suffrutescens (Helianthemum scoparium) [17]	Bisbee Peak rush-rose	--	--	3.2	X	X		X								
Hesperevax caulescens	hogwallow starfish	--	--	4.2				X								
Hesperolinon breweri	Brewer's western flax	--	--	1B.2				B								
Hesperolinon drymarioides	drymaria like western flax	--	--	1B.2												
Hibiscus lasiocarpos var. *occidentalis*	woolly rose-mallow	--	--	1B.2	X	X		X								
Horkelia parryi	Parry's horkelia	--	--	1B.2		X		X								
Juglans hindsii	Northern California black walnut	--	--	1B.1	X	X		X								
Juncus leiospermus var. *ahartii*	Ahart's dwarf rush	--	--	1B.2	X			X	X				X	X		
Juncus leiospermus var. *leiospermus*	Red Bluff dwarf rush	--	--	1B.1		X		X								
Lasthenia conjugens	Contra Costa goldfields	E	--	1B.1										X		
Lasthenia ferrisiae	Ferris' goldfields	--	--	4.2				X								
Lathyrus jepsonii var. *jepsonii*	Delta tule pea	--	--	1B.2	X	X		X		X	X					
Lathyrus sulphureus var. *argillaceus*	dubious pea	--	--	3				B								
Layia septentrionalis	Colusa layia	--	--	1B.2				B								
Legenere limosa	legenere	--	--	1B.1	X	X		X	X	X			X	X		X
Lepidium latipes var. *heckardii (Lepidium latipes)* [17]	Heckard's pepper-grass	--	--	1B.2	X	X		X								
Leptosiphon jepsonii	Jepson's leptosiphon	--	--	1B.2				B								
Lessingia hololeuca	woolly-headed lessingia	--	--	3				B								
Lilaeopsis masonii	Mason's lilaeopsis	--	R	1B.1	X	X		X								
Limnanthes floccosa ssp. *californica*	Butte County meadowfoam	E	E	1B.1										X		
Limosella australis	Delta mudwort	--	--	2B.1	X	X		X								

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Myosurus minimus ssp. *apus (Myosurus minimus)* [17]	little mousetail	--	--	3.1				B						X		
Navarretia leucocephala ssp. *bakeri*	Baker's navarretia	--	--	1B.1		X		B								
Navarretia leucocephala ssp. *pauciflora*	few-flowered navarretia	E	T	1B.1										X		
Navarretia leucocephala ssp. *plieantha*	many-flowered navarretia	E	E	1B.2										X		
Navarretia myersii ssp. *deminuta*	small pincushion navarretia	--	--	1B.1										X		
Navarretia myersii ssp. myersii	pincushion navarretia	--	--	1B.1	X	X		X	X							
Navarretia nigelliformis ssp. *nigelliformis*	adobe navarretia	--	--	4.2				X								
Neostapfia colusana	Colusa grass	T	E	1B.1		X	X	B		X				X		
Orcuttia inaequalis	San Joaquin Valley Orcutt grass	T	E	1B.1										X		
Orcuttia pilosa	hairy Orcutt grass	E	E	1B.1										X		
Orcuttia tenuis	slender Orcutt grass	T	E	1B.1	X		X	X	X	X				X		
Orcuttia viscida	Sacramento Orcutt grass	E	E	1B.1	X		X	X	X	X				X		X
Packera layneae	Layne's ragwort	T	R	1B.2		X	X	X								
Plagiobothrys hystriculus	bearded popcornflower	--	--	1B.1				B						X		
Ranunculus lobbii	Lobb's aquatic buttercup	--	--	4.2												X
Rorippa subumbellata	Tahoe yellow-cress	C	E	1B.1												
Sagittaria sanfordii	Sanford's arrowhead	--	--	1B.2	X	X		X	X	X	X					
Scutellaria galericulata	marsh skullcap	--	--	2B.2	X			X								
Scutellaria lateriflora	side-flowering skullcap	--	--	2B.2	X	X		X								
Sedella leiocarpa	Lake County stone crop	E	E	1B.1										X		
Sidalcea keckii	Keck's checkerbloom	E	--	1B.1			B	B								
Streptanthus morrisonii ssp. *morrisonii*	Morrison's jewelflower	--	--	1B.2												
Symphyotrichum lentum	Suisun Marsh aster	--	--	1B.2	X	X		X								
Trifolium hydrophilum	saline clover	--	--	1B.2	X	X		X								
Tuctoria greenei	Greene's tuctoria	E	R	1B.1										X		
Tuctoria mucronata	Solano grass	E	E	1B.1		X	X	B						X		
Wyethia reticulata	El Dorado County mule ears	--	--	1B.2		X		X								
Invertebrates																
Andrena blennospermatis	blennosperma vernal pool andrenid bee	--	--	--	X	X										
Andrena subapasta	a vernal pool andrenid bee	--	--	--	X	X										
Anthicus sacramento	Sacramento anthicid beetle	--	--	--		X										
Branchinecta conservatio	conservancy fairy shrimp	E	--	--		X	X						X	X		
Branchinecta longiantenna	longhorn fairy shrimp	E	--	--										X		

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Branchinecta lynchi	vernal pool fairy shrimp	T	--	--	X	X	X		X	X			X	X		X
Branchinecta mesovallensis	mid-valley fairy shrimp	P	--	--	X	X			X	X				X		
Cicindela hirticollis abrupta	Sacramento Valley tiger beetle	--	--	--	X	X										
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	T	--	--	X	X	X		X	X	X	X	X			
Dumontia oregonensis	hairy water flea	--	--	--	X											
Elaphrus viridis	Delta green ground beetle	T	--	--			X							X		
Hydrochara ricksecker	Ricksecker's water scavenger beetle	--	--	--	X	X			X							
Lepidurus packardi	vernal pool tadpole shrimp	E	--	--	X	X	X		X	X			X	X		X
Linderiella occidentalis	California linderiella	--	--	--	X	X								X		X
Myrmosula pacifica	Antioch multilid wasp	--	--	--		X										
Polyphylla stellate	Delta June beetle	--	--	--												
Smithistruma reliquia	ancient ant	--	--	--												
Syncaris pacifica	California freshwater shrimp	E	--	--			B									
Fish																
Acipenser medirostris	green sturgeon	T	SSC	--			X									
Archoplites interruptus	Sacramento perch	--	SSC	--	X											
Hypomesus transpacificus	Delta smelt	T	E	--		X	X									
Oncorhynchus mykiss irideus	Central Valley steelhead	T	--	--			X									
Oncorhynchus tshawytscha	Central Valley fall/late fall-run Chinook salmon	--	SSC	--		X	X						X			
Oncorhynchus tshawytscha	Central Valley winter-run Chinook salmon	E	E	--		X	X									
Oncorhynchus tshawytscha	Central Valley spring-run Chinook salmon	T	T	--		X	X									
Pogonichthys macrolepidotus	Sacramento splittail	--	SSC	--	X	X										
Spirinchus thaleichthys	Longfin smelt	--	T	--												
Amphibians																
Ambystoma californiense	California tiger salamander	T	T	--	X	X	X		X	X		X				X
Rana boylii	foothill yellow-legged frog	--	SSC	--		X							X			
Rana draytonii	California red-legged frog	T	SSC	--		X	X						X			
Spea hammondii	western spadefoot	--	SSC	--	X	X			X	X				X		
Reptiles																
Emys marmorata (Actinemys marmorata) [20]	western pond turtle	--	SSC	--	X	X			X	X	X	X	X			
Thamnophis gigas	giant garter snake	T	T	--	X	X	X		X	X	X	X	X			
Birds																
Accipiter cooperii	Cooper's hawk	--	WL	--	X				X							

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Agelaius tricolor	tricolored blackbird	--	SSC	--	X	X			X	X	X	X	X		X	X
Ammodramus savannarum	grasshopper sparrow	--	SSC	--	X											
Aphelocoma insularis	island scrub-jay	--	--	--											X	
Aquila chrysaetos	golden eagle	--	FP	--	X											
Ardea alba	great egret	--	--	--	X	X										
Ardea herodias	great blue heron	--	--	--	X	X										
Asio flammeus	short-eared owl	--	SSC	--												
Asio otus	long-eared owl	--	SSC	--												
Athene cunicularia	burrowing owl	--	SSC	--	X	X			X	X	X	X	X		X	X
Aythya americana	redhead	--	SSC	--												
Baeolophus inornatus	oak titmouse	--	--	--											X	
Branta hutchinsii leucopareia	Aleutian Canada goose	D	--	--						X	X					
Buteo regalis	ferruginous hawk	--	WL	--	X				X							
Buteo swainsoni	Swainson's hawk	--	T	--	X	X			X	X	X	X	X			X
Calidris canutus roselaari	red knot	--	--	--											X	
Calypte costae	Costa’s hummingbird	--	--	--											X	
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	--	SSC	--											X	
Charadrius alexandrinus nivosus	western snowy plover (interior population)	T	SSC	--	X	X	X								X	
Charadrius montanus	mountain plover	--	SSC	--		X									X	
Chlidonias niger	black tern	--	SSC	--												
Circus cyaneus	northern harrier	--	SSC	--					X							
Coccyzus americanus occidentalis	western yellow-bill cuckoo	C	E	--	X	X	X					X			X	
Coturnicops noveboracensis	yellow rail	--	SSC	--											X	
Cypseloides niger	black swift	--	SSC	--											X	
Dendroica petechia brewsteri	yellow warbler	--	SSC	--											X	
Egretta thula	snowy egret	--	--	--	X											
Elanus leucurus	white-tailed kite	--	FP	--	X	X			X			X				
Falco columbarius	merlin	--	WL	--	X											
Falco mexicanus	prairie falcon	--	WL	--												
Falco peregrinus anatum	American peregrine falcon	D	D/FP	--							X				X	
Gelochelidon nilotica	gull-billed tern	--	SSC	--											X	
Geothlypis trichas sinuosa	saltmarsh common yellowthroat	--	SSC	--											X	
Grus canadensis tabida	greater sandhill crane	--	T/FP	--					X		X					
Haematopus bachmani	black oystercatcher	--	--	--											X	
Haliaeetus leucocephalus	bald eagle	D	E/FP	--		X									X	
Icteria virens	yellow breasted chat	--	SSC	--		X										

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Ixobrychus exilis	least bittern	--	SSC	--												
Lanius ludovicianus	loggerhead shrike	--	SSC	--					X	X	X				X	
Laterallus jamaicensis coturniculus	California black rail	--	T/FP	--		X							X		X	
Limnodromus griseus	short-billed dowitcher	--	--	--											X	
Limosa fedoa	marbled godwit	--	--	--											X	
Melanerpes lewis	Lewis's woodpecker	--	--	--											X	
Melospiza melodia graminea	Channel Island song sparrow	--	SSC	--											X	
Melospiza melodia mailliardi	Modesto song sparrow	--	SSC	--												
Melospiza melodia maxillaris	Suisun song sparrow	--	SSC	--											X	
Melospiza melodia pusillula	Alameda song sparrow	--	SSC	--											X	
Melospiza melodia samuelis	Samuels [San Pablo] song sparrow	--	SSC	--											X	
Numenius phaeopus	whimbrel	--	--	--											X	
Numenius americanus	long-billed curlew	--	WL	--											X	
Nycticorax nycticorax	black-crowned night heron	--	--	--	X	X										
Oceanodroma homochroa	ashy storm-petrel	--	SSC	--											X	
Otus flammeolus	flammulated owl	--	--	--											X	
Pandion haliaetus	osprey	--	WL	--		X										
Phalacrocorax auritus	double-crested cormorant	--	WL	--	X											
Phoebastria nigripes	black-footed albatross	--	--	--											X	
Pica nuttali	yellow-billed magpie	--	--	--											X	
Picoides albolarvatus	white-headed woodpecker	--	--	--											X	
Picoides nuttallii	Nuttall's woodpecker	--	--	--											X	
Pipilo maculatus clementae	San Clemente spotted towhee	--	SSC	--											X	
Plegadis chihi	white-faced ibis	--	WL	--		X				X	X					
Progne subis	purple martin	--	SSC	--	X	X										
Ptychoramphus aleuticus	Cassin's auklet	--	--	--											X	
Puffinus creatopus	pink-footed shearwater	--	--	--											X	
Puffinus opisthomelas	black-vented shearwater	--	--	--											X	
Rallus longirostris obsoletus	California clapper rail	E	E/FP	--			X									
Riparia riparia	bank swallow	--	T	--	X	X				X	X	X				
Rynchops niger	black skimmer	--	SSC	--											X	
Selasphorus sasin	Allen's hummingbird	--	--	--											X	
Spinus lawrencei	Lawrence's goldfinch	--	--	--											X	
Spizella atrogularis	black-chinned sparrow	--	--	--											X	
Strix occidentalis caurina	northern spotted owl	T	SSC	--			B									
Strix occidentalis occidentalis	California spotted owl	--	SSC	--											X	

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Synthliboramphus scrippsi	Scripps's murrelet (Xantus' murrelet)[21]	C	T	--											X	
Synthliboramphus hypoleucus	Guadalupe murrelet (Xantus' murrelet)[21]	C	T	--											X	
Toxostoma lecontei	LeConte's thrasher	--	SSC	--											X	
Vireo bellii pusillus	least Bell's vireo	E	E	--		X	X					X				
Xanthocephalus xanthocephalus	yellow-headed blackbird	--	SSC	--	X	X										
Mammals																
Antrozous pallidus	pallid bat	--	SSC	--	X	X										
Corynorhinus townsendii	Townsend's big-eared bat	--	SSC	--												
Lasionycteris noctivagans	silver-haired bat	--	--	--	X	X										
Lasiurus blossevilli	western red bat	--	SSC	--		X			X							
Lasiurus cinereus	hoary bat	--	--	--		X										
Myotis yumanensis	Yuma myotis bat	--	--	--												
Perognathus inornatus inornatus	San Joaquin pocket mouse															
Sylvilagus bachmani riparius	riparian brush rabbit	E	E	--			X									
Taxidea taxus	American badger	--	SSC	--	X	X			X							

Key to Abbreviations:

CNPS = California Native Plant Society
CNDDB = California Natural Diversity Database
HCP = Habitat Conservation Plan
SSHCP = South Sacramento Habitat Conservation Plan
USFWS = United States Fish and Wildlife Service
X = Species is present
B = Present only in 5-mile buffer of Permit Area, obtained from the USFWS and CNPS quad searches

Federal
E = Listed as endangered under the Endangered Species Act (ESA)
T = Listed as threatened under ESA
PT = Proposed for federal listing as threatened under the ESA
C = Species for which USFWS has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list, but issuance of the proposed rule is precluded
P = Petitioned for listing as threatened or endangered under the ESA
D = Delisted
-- = No listing

State
E = Listed as endangered under the California Endangered Species Act (CESA)
T = Listed as threatened under the CESA
SSC = Species of Special Concern
D = Delisted
FP = Fully Protected under the California Fish and Game Code
R = Rare
WL = Watch List for species that do not meet SSC criteria but for which there is concern and a need for additional information to clarify status

Table B-1 SMUD Habitat Conservation Plan Species Evaluation Table

-- = No listing

CNPS

1B = rare, threatened, or endangered in California and elsewhere
2B = rare, threatened, or endangered in California, but more common elsewhere
3 = plants about which we need more information - a review list
4 = plants of limited distribution - a watch list
.1 = seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 = moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
.3 = not very threatened in California (<20% of occurrences threatened / low degree and immediacy of threat or no current threats known)
-- = No listing

[1]U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; review of native species that are candidates for listing as endangered or threatened; annual notice of findings on resubmitted petitions; annual description of progress on listing actions; proposed rule. (50 CFR §6994)

[2]U.S. Fish and Wildlife Service, Sacramento Fish & Wildlife Office. 2013. Species list. Federal endangered and threatened species that occur in or may be affected by projects in the counties and/or U.S.G.S. 7 1/2 minute quads you requested. Last updated September 18, 2011. Available online: http://www.fws.gov/sacramento/es_species/Lists/es_species_lists-overview.htm. Accessed on May 20, 2013.

[3]California Department of Fish and Wildlife. 2011. Special animals. Available online: http://www.dfg.ca.gov/wildlife/nongame/list.html. Accessed on June 20, 2013.

[4]California Department of Fish and Wildlife. 2013. State and federally listed endangered, threatened and rare plants of California. Available online: http://www.dfg.ca.gov/wildlife/nongame/list.html. Accessed on June 20, 2013.

[5]California Native Plant Society. 2013. Inventory of Rare and Endangered Plants. Available online: http://rareplants.cnps.org/. Accessed on May 20, 2013.

[6]California Department of Fish and Wildlife. 2013. California Natural Diversity Database. Available online: http://www.dfg.ca.gov/biogeodata/cnddb/. Accessed on May 20, 2013.

[7]Query of 31 U.S. Geological Survey quadrangles that cover the Permit Area: Bruceville , Buffalo Creek, Carbondale, Carmichael, Citrus Hts, Clarksburg, Clarksville, Clay, Courtland, Davis, Elk Grove, Florin, Folsom, Folsom SE, Galt, Goose Creek, Grays Bend, Isleton, Lockeford, Lodi North, Merritt, Pleasant Grove, Rio Linda, Rocklin, Roseville, Sacramento East, Sacramento West, Sloughhouse, Taylor Monument, Thornton, and Winters.

[8]Querry of 47 U.S. Geological Survey quadrangles that cover the Permit Area and a 5-mile buffer of the Permit Area: Bruceville , Buffalo Creek, Carbondale, Carmichael, Citrus Hts, Clarksburg, Clarksville, Clay, Clements, Courtland, Davis, Elk Grove, Esparto, Florin, Folsom, Folsom SE, Galt, Goose Creek, Grays Bend, Ione, Irish Hill, Isleton, Knights Landing, Latrobe, Liberty Island, Lockeford, Lodi North, Madison, Merritt, Monticello Dam, Pilot Hill, Pleasant Grove, Rio Linda, Rio Vista, Rocklin, Roseville, Sacramento East, Sacramento West, Saxon, Shingle Springs, Sloughhouse, Taylor Monument, Thornton, Verona, Wallace, Winters, and Woodland. [9]County of Sacramento. 2010. County of Sacramento, City of Elk Grove, City of Galt, City of Rancho Cordova, Sacramento Regional County Sanitation District, Sacramento Area Sewer District, Sacramento County Water Agency, and Southeastern Connector. 2010. South Sacramento Habitat Conservation Plan Working Draft. Available online: http://www.msa2.saccounty.net/planning/Pages/SSHCPPlan.aspx. Accessed on June 5, 2013.

[10]The Natomas Basin Conservancy. 2003. Covered Species, Natomas Basin Habitat Conservation Plan, Metro Air Park Habitat Conservation Plan. Available online: http://www.natomasbasin.org/Portals/0/NBC111101coveredspeciesbook.pdf. Accessed on May 20, 2013.

[11]County of Sacramento. 2001. Implementation Agreement for the Metro Air Park Habitat Conservation Plan.

[12]Yolo County Habitat Conservation Plan/Natural Community Conservation Plan Joint Powers Agency. 2011. Yolo Natural Heritage Program Plan Document Working Draft. Available online: http://www.yoloconservationplan.org/yolo_pdfs/enviro-portal/chapter-1.pdf. Accessed on May 20, 2013. "X" denotes Yolo County covered species and "L" denotes Yolo County local species of concern.

[13]Placer County Community Development Resources Agency and TRA Environmental Sciences. 2011. Placer County Conservation Plan, Western Placer County, Agency Review Draft Document. Available online: http://www.placer.ca.gov/departments/communitydevelopment/planning/pccp/2011draftpccp. Accessed on May 20, 2013.

[14]U.S. Fish and Wildlife Service. 2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Available online: http://www.fws.gov/sacramento/ES/Recovery-Planning/Vernal-Pool/es_recovery_vernal-pool-recovery.htm. Accessed on May 17, 2013.

[15]U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. Birds of Conservation Concern 2008, Region 32. Last updated December 2008. Available online: http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf. Accessed on May 20, 2013

[16] Sacramento Municipal Utility District and Area West Environmental, Inc. 2013. Development Plan for the SMUD Nature Preserve Mitigation Bank, Sacramento County, California.

[17]Scientific name follows CNDDB naming convention, scientific name in parenthesis follows "The Jepson Manual: Vascular Plants of California" 2012 edition

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

This list of species was generated based off of the following searches: U.S. Fish and Wildlife Service (USFWS) and California Native Plant Society (CNPS) 7.5 minute quadrangle searches of the Permit Area and a 5-mile buffer and the Department of Fish and Wildlife's (DFW's) California Natural Diversity Database (CNDDB) search of the Permit Area and a 5-mile buffer. The listing potential of a species was determined through, review of published documentation on ECOS (ECOS 2013). The occurrence in the permit area was determined by using CNDDB Rare Find 5 along with species expert observations. Sufficient information was determined by checking Nature Serve Explorer (Nature Serve 2013); it was given a "+" if there was occurrence information, distribution and life history (ecology) data; furthermore, if the species was listed in any other regional HCPs it was given a "+". The potential to be affected was determined by whether the species occurs/breeds/forages in the Permit Area. A species was often proposed for coverage if it is known to occur/breed/forage in the Permit Area and Sacramento Municipal Utility District's (SMUD's) Covered Activities could result in take of species and/or its associated habitat. All data was reviewed by various experts for their comments and any additional information they could provide in regards to associated habitat and breeding locales.

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Plants										
Agrostis hendersonii	Henderson's bent grass	--	--	3.2	-	-	+	-	-	Species included on the CNPS list of the United States Geological Survey (USGS) quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in valley and foothill grassland (mesic) and vernal pools (CNPS 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Allium jepsonii	Jepson's onion	--	--	1B.2	+	-	-	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in serpentinite or volcanic soils, chaparral, cismontane woodlands, and lower montane coniferous forests (CNPS 2013). Species has the potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Amsinckia lunaris	bent-flowered fiddleneck	--	--	1B.2	+	-	+	-	-	Species identified in the Yolo County Natural Heritage Program (Yolo NHP) as a Species of Local Concern. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in coastal bluff scrub, cismontane woodland, and valley and foothill grassland (CNPS 2013). Species has the potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Arabis modesta	modest rockcress	--	--	4.3	-	-	+	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in chaparral and lower montane coniferous forests (CNPS 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Arctostaphylos myrtifolia	Ione manzanita	T	--	1B.2	+	-	+	-	-	Species identified in the USFWS search of USGS quadrangles within the Permit Area and 5-mile buffer of the Permit Area and the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are several occurrences within the 5-mile buffer, in Amador County, southeast of Rancho Murieta, near Ione (CNDDB 2013). Species occurs in acidic, Ione soil (clay or sandy), chaparral, and cismontane woodlands (CNPS 2013). Species is federally listed as threatened. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Astragalus pauperculus	depauperate milk-vetch	--	--	4.3	-	-	-	-	-	Species identified in the Yolo NHP as a Species of Local Concern. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in vernally mesic, volcanic, chaparral, cismontane woodland, and valley and foothill grassland habitat (CNPS 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Astragalus rattanii var. *jepsonianus*	Jepson's milk-vetch	--	--	1B.2	+	-	+	-	-	Species identified in the Yolo NHP as a Species of Local Concern. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species often occurs in serpentinite chaparral, cismontane woodlands, and valley and foothill grassland (CNPS 2013). Species has the potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Astragalus tener var. *ferrisiae*	Ferris's milk-vetch	--	--	1B.1	+	-	+	-	-	Species identified in the Yolo NHP as a Species of Local Concern and in the USFWS Vernal Pool Recovery Plan (USFWS VPRP). Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are occurrences within the 5-mile buffer, southwest of the Permit Area, in Solano County (CNDDB 2013). Species occurs in meadows and seeps (vernally mesic) and valley and foothill grassland (subalkaline flats) (CNPS 2013). Species has the potential to be listed within the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Astragalus tener var. *tener*	alkali milk-vetch	--	--	1B.2	+	+	+	-	-	Species identified in the Yolo NHP as a Covered Species and identified in the USFWS VPRP. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There is one reported CNDDB occurrence of this species within the Permit Area, located 2 miles north of Davis along the south side of Willow Slough, and it is possibly extirpated (CNDDB 2013). Species observed at the Cosumnes River Preserve south of Desmond Road in a disturbed alkali playa (Brent Helm, pers. comm.). Species occurs in alkaline playas, valley and foothill grassland (adobe clay) and vernal pools (CNPS 2013). Species has the low potential to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Atriplex cordulata var. *cordulata*	heartscale	--	--	1B.2	+	+	-	-	-	Species identified in the Yolo NHP as a Species of Local Concern. Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area. There is one reported CNDDB occurrence of this species in the Permit Area and it is extirpated (CNDDB 2013). Species observed at the Cosumnes River Preserve (Brent Helm, pers. comm.). Species occurs in saline or alkaline chenopod scrub, meadows and seeps, and valley and foothill grassland (sandy) (CNPS 2013). Species has low potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Atriplex depressa	brittlescale	--	--	1B.2	+	-	+	-	-	Species identified in the Yolo NHP as a Covered Species. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer. There are no reported CNDDB occurrences of this species within the Permit Area; there are occurrences within the 5-mile buffer of the Permit Area, west of the Permit Area, in Yolo County (CNDDB 2013). Species occurs in alkaline or clay chenopod scrub, meadows and seeps, playas, valley and foothill grassland, and vernal pools (CNPS 2013). Species has the potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Atriplex joaquiniana	San Joaquin spearscale	--	--	1B.2	+	+	+	-	-	Species identified in the Yolo NHP as a Covered Species. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There is one reported CNDDB occurrence within the Permit Area in Yolo County, near the intersection of Highway 113 and Interstate 5 (I-5) (CNDDB 2013). Additionally, species was observed within the Permit Area along the natural gas pipeline in Yolo County during a targeted survey on May 5, 2013 by Dr. Brent Helm (Brent Helm, pers. comm.). Species observed at the Cosumnes River Preserve (Brent Helm, pers. comm.). Species occurs in alkaline soils in scrub, meadows and seeps, playas, and grassland (CNPS 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Atriplex persistens	vernal pool smallscale	--	--	1B.2	+	-	-	-	-	Species identified in the Yolo NHP as a Species of Local Concern and in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in vernal pools (alkaline) (CNPS 2013). Species has potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Balsamorhiza macrolepis	big-scale balsamroot	--	--	1B.2	+	-	-	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are occurrences within the 5-mile buffer, in Placer County, north of the Permit Area (CNDDB 2013). Species occurs in sometimes serpentinite chaparral, cismontane woodland, and valley and foothill grassland (CNPS 2013). Species has potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Brasenia schreberi	watershield	--	--	2B.3	-	+	-	-	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There is one extant reported CNDDB occurrence located within the Permit Area in the Stone Lakes National Wildlife Refuge (CNDDB 2013). Species occurs in freshwater marshes and swamps (CNPS 2013). Any SMUD activities that occur in the vicinity of this species would occur outside of its habitat. Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
California macrophylla	round-leaved filaree	--	--	1B.1	+	-	+	-	-	Species identified in the Yolo NHP as a Species of Local Concern. There are no reported CNDDB occurrences of this species within the Permit Area; there are occurrences within the 5-mile buffer, in Yolo and Solano Counties, south of the natural gas pipeline (CNDDB 2013). Species occurs in clay soils in cismontane woodland and valley and foothill grassland (CNPS 2013). Species has potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Calycadenia hooveri	Hoover's calycadenia	--	--	1B.3	+	-	-	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in rocky cismontane woodland and valley and foothill grassland (CNPS 2013). Species has potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Calystegia stebbinsii	Stebbins' morning-glory	E	E	1B.1	+	-	+	-	-	Species identified in the USFWS search of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. Species identified in the CNPS species search of USGS quadrangles within the 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are occurrences in the 5-mile buffer, northeast of the Permit Area, along the northeastern border of Folsom Lake and in Shingle Springs (CNDDB 2013). Species is federally and state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Carex comosa	bristly sedge	--	--	2B.1	-	+	+	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area. There are multiple reported CNDDB occurrences within the Permit Area along sloughs and channels associated with the Sacramento Delta (CNDDB 2013). Species occurs in coastal prairie, marshes and swamps, and grassland (CNPS 2013). Any SMUD activities that occur in the vicinity of this species would occur outside of its habitat. Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Castilleja campestris var. *succulenta*	succulent owl's clover	T	E	1B.2	+	-	+	-	-	Species identified in the USFWS and CNPS species search of USGS quadrangles within 5-mile buffer of the Permit Area and CNPS species search of USGS quadrangles within the 5-mile buffer of the Permit Area, however, not within the Permit Area. Species included in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area; there are occurrences within the 5-mile buffer, in San Joaquin County, southeast of Galt (CNDDB 2018). Species observed south of Galt in San Joaquin County (Brent Helm, pers. comm.). Species occurs in vernal pools (often acidic) (CNPS 2018). Species is federally listed as threatened and state listed as endangered. Since this species has not been observed or reported to occur within the Permit Area, this species is not expected to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Ceanothus roderickii	Pine Hill ceanothus	E	R	1B.2	+	-	+	-	-	Species identified in the USFWS species search of USGS quadrangles within the Permit Area and 5-mile buffer of the Permit Area and CNPS search of USGS quadrangles within the 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are several occurrences within the 5-mile buffer along the northeastern border of Folsom Lake and south to Shingle Springs (CNDDB 2013). Species occurs in serpentinite or gabbroic (nutrient-deficient forms of gabbro-derived soils characterized by low concentrations of available potassium, phosphorous, sulfur, iron, and zinc) soils in chaparral and cismontane woodland (CNPS 2013). Species is federally listed as endangered and is considered rare in by the State. Species occurs at elevations between 260 and 630 meters (Jepson 2013) and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Centromadia parryi ssp. *rudis*	Parry's rough tarplant	--	--	4.2	-	+	-	-	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in alkaline soils in vernal pools and grassland (CNPS 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Chamaesyce hooveri	Hoover's spurge	T	--	1B.2	+	-	+	-	-	Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in vernal pools (CNPS 2013). Species is federally listed as threatened. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Chlorogalum grandiflorum	Red Hills soaproot	--	--	1B.2	+	-	+	-	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are occurrences within the 5-mile buffer, east of the Permit Area, primarily east of Folsom Lake and south to Shingle Springs (CNDDB 2013). Species occurs in serpentinite, gabbroic, and other soils within chaparral, cismontane woodland, and lower montane coniferous forest habitat (CNPS 2013). Species has potential to be listed during the Permit term. Species occurs between 300 and 500 meters elevation and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Chloropyron molle ssp. *hispidum*	hispid bird's-beak	--	--	1B.1	+	-	-	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there is one occurrence within the 5-mile buffer in Placer County in the Stanford Ranch Alkali Seep Preserve, approximately 4 miles northeast of Roseville (CNDDB 2013). Species occurs in alkaline soils in meadows and seeps, playas, and valley and foothill grassland (CNPS 2013). Species has potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Chloropyron palmatum	palmate-bracted bird's beak	E	E	1B.1	+	-	+	-	-	Species identified in the Yolo NHP as a Covered Species. Species identified in the USFWS and CNPS species search of USGS quadrangles within the Permit Area and the 5-mile buffer. There are no reported CNDDB occurrences of this species within the Permit Area; there are occurrences within the 5-mile buffer of the Permit Area near the junction of Road 103 and Road 25, between Woodland and Davis (CNDDB 2013). Species is federally and state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Cicuta maculata var. *bolanderi*	Bolander's water-hemlock	--	--	2B.1	-	+	-	-	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There is one reported CNDDB occurrence of this species within the Permit Area in the Delta Meadow River Park (CNDDB 2013). Species occurs in coastal, fresh, or brackish marshes and swamps (CNPS 2013). Any SMUD activities that occur in the vicinity of this species would occur outside of its habitat. Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Clarkia biloba ssp. *brandegeeae*	Brandegee's clarkia	--	--	4.2	-	+	-	+	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There is one reported CNDDB occurrence of this species within the Permit Area located within a 1 mile radius of Lake Natoma (CNDDB 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Claytonia parviflora ssp. *grandiflora*	streambank spring beauty	--	--	4.2	-	-	+	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in rocky soils in cismontane woodland (CNPS 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Cuscuta obtusiflora var. *glandulosa*	Peruvian dodder	--	--	2B.2	-	+	-	-	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There is one reported CNDDB occurrence of the species within the Permit Area; located on Laguna Lake, an artificial lake in the middle of a housing development in Elk Grove (CNDDB 2013). Species occurs in freshwater marshes and swamps (CNPS 2013); any SMUD activities that occur in the vicinity of this species would occur outside of its habitat. Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Downingia pusilla	dwarf downingia	--	--	2B.2	-	+	+	+	-	Species identified in the South Sacramento HCP (SSHCP) and the Placer County Conservation Plan (PCCP) as a Covered Species. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are several recently reported CNDDB occurrences throughout SMUD's Permit Area (CNDDB 2013). Species identified at the SMUD Nature Preserve Mitigation Bank (SMUD and AWE 2013). Species grows along the margins of several types of vernal pools as well as mesic sites within valley and foothill grassland (CNPS 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for covered.
Eriogonum apricum var. *apricum*	Ione buckwheat	E	E	1B.1	+	+	+	-	-	Species identified in the USFWS and CNPS species searches of USGS quadrangles within the Permit Area and 5-mile buffer of the Permit Area. There is one recorded CNDDB occurrence within the Permit Area dated 1997 straddling Sacramento and Amador County lines, south of Highway 16; there is a reported CNDDB occurrence within the 5-mile buffer of the Permit Area, directly southeast of the 1997 occurrence (CNDDB 2013). Ione buckwheat occurs in chaparral in Ione soils (CNPS 2013). Species is federally and state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities given its recorded location and soil requirements that are not likely to be found elsewhere in the Permit Area; therefore, it is not proposed for coverage.
Eriogonum apricum var. *prostratum*	Irish hill buckwheat	E	E	1B.1	+	-	+	-	-	Species identified in the USFWS species search of USGS quadrangles within the Permit Area and 5-mile buffer of the Permit Area and CNPS species search of USGS quadrangles within 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are occurrences within the 5-mile buffer of the Permit Area east of the Sacramento/Amador County lines, within the Carbondale and Irish Hill quads (CNDDB 2013). Species is federally and state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Eryngium constancei	Loch Lomond button-celery	E	E	1B.1	+	-	+	-	-	Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in vernal pools (CNPS 2013). Species is federally and state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Eryngium pinnatisectum	Tuolumne button-celery	--	--	1B.2	+	+	-	-	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There is one recorded CNDDB occurrence located in east Sacramento County from 1941, east of Rancho Murieta in the vicinity of Michigan Bar. Exact location unknown, mapped as a best guess by CNDDB as a 1-mile radius (CNDDB 2013). Species observed on the county border at Carbondale Farms (Brent Helm, pers. comm.). Species occurs in mesic areas in cismontane woodland, lower montane coniferous forests, and vernal pools between elevations of 250 to 450 meters (CNPS 2013; Jepson 2013). Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur near SMUD facilities; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Eryngium spinosepalum	spiny-sepaled button-celery	--	--	1B.2	+	-	-	-	-	Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in valley and foothill grassland and vernal pools (CNPS 2013). Species has potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Fremontodendron decumbens	Pine Hill flannelbush	E	R	1B.2	+	-	+	-	-	Species identified in the USFWS species search of USGS quadrangles within the Permit Area and 5-mile buffer of the Permit Area and CNPS species search of USGS quadrangles within 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species is federally listed as endangered and is listed as rare in California. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Fritillaria agrestis	stinkbells	--	--	4.2	-	+	-	+	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are two recorded CNDDB occurrences of this species in the Permit Area, one in Carmichael and one in Rio Linda (CNDDB 2013). Both occurrences are surrounded by development. The Rio Linda occurrence is located in a proposed housing development, which has been disked, but not yet developed. The one in Carmichael is on a site used as a fruit stand and the plants have been observed on the edges of the parking lot. Species occurs in chaparral, cismontane woodland, pinyon and juniper woodland, and grassland in clay soils. Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Fritillaria pluriflora	adobe lily	--	--	1B.2	+	-	+	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species often occurs in adobe soils in chaparral, cismontane woodland, and valley and foothill grassland (CNPS 2013). Species has the potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Galium californicum ssp. *sierrae*	El Dorado bedstraw	E	R	1B.2	+	-	+	-	-	Species identified on the USFWS and CNPS species searches of USGS quadrangles within the 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are numerous occurrences within the 5-mile buffer of the Permit Area, northeast of the Permit Area, along the northeastern border of Folsom Lake and south to Shingle Springs (CNDDB 2013). Species occurs in gabbroic soils in chaparral, cismontane woodland, and lower montane coniferous forest (CNPS 2013). Species is federally listed as endangered and is listed as rare in California. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Gratiola heterosepala	Bogg's Lake hedge-hyssop	--	E	1B.2	+	+	+	+	+	Species identified in the SSHCP, the Natomas Basin HCP (NBHCP) (NBHCP 2003), and the PCCP as a Covered Species. Species identified in the VPRP. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are numerous reported CNDDB occurrences throughout the Permit Area (CNDDB 2013). Species also identified at the SMUD Nature Preserve Mitigation Bank. Species occurs in vernal pools and in marshy areas on the margins of reservoirs and lakes, as well as in man-made habitats such as borrow pits and cattle ponds. It has been found in several types of vernal pools, including northern basalt flow, northern claypan, northern hardpan, northern volcanic ash flow, and northern volcanic mudflow (Sawyer and Keeler-Wolf 2009). Species is state listed as endangered. This species has potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Harmonia hallii	Hall's harmonia	--	--	1B.2	+	-	-	-	-	Species identified in the Yolo NHP as a Species of Local Concern. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in serpentinite soils in chaparral (CNPS 2013). Species has potential to be listed during the Permit term. This species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Helianthemum suffrutescens	Bisbee Peak rush-rose	--	--	3.2	-	+	-	+	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There is one reported CNDDB occurrence within the Permit Area on the east side in an undeveloped area of Amador County (CNDDB 2013). SMUD has a limited number of facilities in Amador County. Species occurs in chaparral (serpentinite, grabbroic, or Ione soils) (CNPS 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Hesperevax caulescens	hogwallow starfish	--	--	4.2	-	+	-	+	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species observed within the Permit Area at Howard Ranch (Brent Helm, pers. comm.). Species occurs in mesic grassland and shallow vernal pools (CNPS 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Hesperolinon breweri	Brewer's western flax	--	--	1B.2	+	-	-	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in usually serpentinite soils in chaparral, cismontane woodland, and valley and foothill grassland (CNPS 2013). Species has potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Hesperolinon drymarioides	Drymaria like western flax	--	--	1B.2	+	-	+	-	-	Species identified in the Yolo NHP as a Species of Local Concern. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in serpentinite soils in closed-cone coniferous forest, chaparral, cismontane woodland, and valley and foothill grassland (CNPS 2013). Species has potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Hibiscus lasiocarpus var. *occidentalis*	woolly rose-mallow	--	--	1B.2	+	+	-	-	-	Species identified in the Yolo NHP as a Species of Local Concern. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are numerous reported CNDDB occurrences which are restricted to west and southwest portions of SMUD's Permit Area (CNDDB 2013). Species occurs in freshwater marshes and swamps, on floodplains and slough islands, and along the banks of rivers and creeks (CNPS 2013). Species occurs along the edges of slow moving water bodies in the Delta and emerges from shallow water (Brent Helm, pers. comm.). Species has the potential to be listed during the Permit term. Any SMUD activities that occur in the vicinity of this species would occur outside of its habitat. Species is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Horkelia parryi	Parry's horkelia	--	--	1B.2	+	-	+	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are occurrences within the 5-mile buffer east of the Sacramento/Amador County lines, within the Carbondale, Irish Hill, and Ione quads (CNDDB 2013). Species occurs in Ione formation and other soils in chaparral and cismontane woodland (CNPS 2013). Species has the potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Juglans hindsii	Northern California black walnut	--	--	1B.1	+	+	-	-	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There is one reported CNDDB occurrence of the species within the Permit Area located along the Sacramento River, between Freeport and Rio Vista; trees were reported to be cut prior to 1949 and this occurrence is extirpated (CNDDB 2013). Threatened by hybridization with orchard trees, urbanization, and conversion to agriculture. Formerly cultivated as rootstock for *J. regia*, with which it hybridizes readily (CNPS 2013). The species is known to occur throughout the Permit Area (Brent Helm, pers. comm.). Species occurs in riparian forests and woodlands (CNPS 2013). Species has the potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Juncus leiospermus var. *ahartii*	Ahart's dwarf rush	--	--	1B.2	+	+	+	-	-	Species identified in the SSHCP and the PCCP as a Covered Species. Species identified in the VPRP. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are two reported CNDDB occurrence of this species within the Permit Area southeast of Mather Airport, although one may be extirpated (CNDDB 2013). The draft SSHCP reports numerous recent recorded occurrences, primarily in the central and west-central portions of SMUD's Permit Area (SSHCP 2010). Species occurs in mesic grassland (CNPS 2013). Species has the low potential to be listed during the Permit term. This species is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Juncus leiospermus var. *leiospermus*	Red Bluff dwarf rush	--	--	1B.1	+	-	+	-	-	Species identified in the PCCP as a Covered Species. Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there is one 1982 occurrence within the 5-mile buffer in Placer County a half a mile north of Scow Rd. and Industrial Blvd. in Roseville (CNDDB 2013). Carol Witham considers this site to be erroneous; it is well outside the reported range of this species and may be misidentified (CNDDB 2013). Species occurs in vernally mesic soils in chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, and vernal pools (CNPS 2013). Species has the potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Lasthenia conjugens	Contra Costa goldfields	E	--	1B.1	+	-	+	-	-	Species identified in the USFWS VPRP. Species identified on the USFWS species search of USGS quadrangles within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in mesic soils in cismontane woodland, playas (alkaline), valley and foothill grassland, and vernal pools (CNPS 2013). Species is federally listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Lasthenia ferrisiae	Ferris' goldfields	--	--	4.2	-	-	-	-	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in vernal pools (alkaline, clay) (CNPS 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Lathyrus jepsonii var. *jepsonii*	Delta tule pea	--	--	1B.2	+	+	+	-	-	Species identified in the NBHCP and the Metro Air Park HCP (MAPHCP) as a Covered Species. Species identified in the Yolo NHP as a Species of Local Concern. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are numerous reported CNDDB occurrences in the southwest portion of the Permit Area, just north of Walnut Grove (CNDDB 2013). Species occurs in areas that are often deeply inundated during the flood events and are subjected to intense soil disturbance by the flood waters and also in freshwater and brackish marshes and swamps (CNPS 2013). Species has potential to be listed during the Permit term. Any SMUD activities that occur in the vicinity of this species would occur outside of its habitat. Species is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Lathyrus sulphureus var. *argillaceus*	dubious pea (Jepson Brewer's peavine)	--	--	3	-	-	-	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in cismontane woodland and lower and upper montane coniferous forest (CNPS 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Layia septentrionalis	Colusa layia	--	--	1B.2	+	-	+	-	-	Species identified in the Yolo NHP as a Species of Local Concern. Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in sandy, serpentinite soils in chaparral, cismontane woodland, and valley and foothill grassland (CNPS 2013). Species has the potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Legenere limosa	legenere	--	--	1B.1	+	+	+	+	+	Species identified in the SSHCP, the NBHCP, and the PCCP as a Covered Species. Species identified in the VPRP. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are numerous reported CNDDB occurrences throughout the Permit Area (CNDDB 2013). Species identified at the SMUD Nature Preserve Mitigation Bank. Occurs in vernal pools (CNPS 2013). Occupied vernal pool types include northern basalt flow, northern claypan, northern hardpan, northern volcanic ash flow, and northern volcanic mudflow (Sawyer and Keeler-Wolf 2009). Species has potential to be listed during the Permit term and has potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Lepidium latipes var. *heckardii (Lepidium latipes)*	Heckard's pepper-grass	--	--	1B.2	+	+	-	-	-	Species identified in the Yolo NHP as a Covered Species. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are two reported CNDDB occurrences of this species documented within the Permit Area. One occurrence is a 1957 herbarium record 3 miles north of Davis, the 1-mile radius CNDDB polygon overlaps SMUD's Gas pipeline in Yolo County. The second occurrence, from 2009, is located southwest of Stone Lake (in the southwest portion of the Permit Area), in Sacramento County (CNDDB 2013). Species occurs in valley and foothill grassland (alkaline flats) (CNPS 2013). Species was previously categorized as two species, one common species and one rare species; The Jepson Manual, Higher Plants of California combined these species; however, CNPS is continuing to recognize them as taxonomically separate (Aaron Sims, pers. comm.; Brent Helm, pers. comm.). Species has the low potential to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Leptosiphon jepsonii	Jepson's leptosiphon	--	--	1B.2	+	-	-	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species usually occurs in volcanic soils in chaparral and cismontane woodland (CNPS 2013). Species has the potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Lessingia hololeuca	woolly-headed lessingia	--	--	3	-	-	-	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, this species has been observed north of Davis (Calflora 2013). Species occurs in clay and serpentinite soils in broadleafed upland forest, coastal scrub, lower montane coniferous forest, and valley and foothill grassland (CNPS 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Lilaeopsis masonii	Mason's lilaeopsis	--	R	1B.1	+	+	-	-	-	Species identified in the Yolo NHP as a Species of Local Concern. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are three reported CNDDB occurrences of this species within the Permit Area; two are located within the Delta Region along Dead Horse Slough. The third occurrence is a 16 mile stretch along the Sacramento Deep Water Ship Channel (CNDDB 2013). Species occurs in freshwater and brackish marshes, swamps, and riparian scrub (CNPS 2013). It grows in open areas within brackish or fresh water habitats subjected to different levels of immersion by waves or tides or during the flood events in areas such as bypasses that are subjected to intense soil disturbance by flood waters. Species is found below the ordinary high water mark in areas that are inundated such as estuarine wetlands, sloughs, and rivers. Species is listed as rare in California. Any SMUD activities that occur in the vicinity of this species would occur outside of its habitat. Species is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Limnanthes floccosa ssp. *californica*	Butte county meadowfoam	E	E	1B.1	+	-	+	-	-	Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in valley and foothill grassland (mesic) and vernal pools (CNPS 2013). Species is federally and state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Limosella australis	Delta mudwort	--	--	2.1	-	+	-	-	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There is one reported CNDDB occurrence of this species within the Permit Area, growing along the levee at Dead Horse Cut in the Delta Region (CNDDB 2013). Occurs in mud banks, freshwater and brackish marshes and swamps, and riparian scrub habitats (CNPS 2013). Any SMUD activities that occur in the vicinity of this species would occur outside of its habitat. Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Myosurus minimus ssp. *apus (Myosurus minimus)*	little mousetail	--	--	3.1	-	+	-	+	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area but not within the Permit Area. Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, it is known to occur throughout the Permit Area (Brent Helm, pers. comm.). Species occurs in valley and foothill grassland and vernal pools (alkaline) (CNPS 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Navarretia leucocephala ssp. *bakeri*	Baker's navarretia	--	--	1B.1	+	-	+	-	-	Species identified in the Yolo NHP as a Covered Species. Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are occurrences within the 5-mile buffer at the Glide Tule Ecological Reserve, east of the Sacramento Northern Canal (CNDDB 2013). Species occurs in mesic soils in cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, and vernal pools (CNPS 2013). Species has potential to be listed within the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Navarretia leucocephala ssp. *pauciflora*	few-flowered navarretia	E	T	1B.1	+	-	+	-	-	Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in vernal pools (volcanic ash flow) (CNPS 2013). Species is federally listed as endangered and is state listed as threatened. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Navarretia leucocephala ssp. *plieantha*	many-flowered navarretia	E	E	1B.2	+	-	+	-	-	Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in vernal pools (volcanic ash flow) (CNPS 2013). Species is federally and state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Navarretia myersii ssp. *deminuta*	small pincushion navarretia	--	--	1B.1	+	-	-	-	-	Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in vernal pools (clay loam) (CNPS 2013). Species has potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Navarretia myersii ssp. *myersii*	pincushion navarretia	--	--	1B.1	+	+	+	-	-	Species identified in the SSHCP as a Covered Species. Species identified in the USFWS VPRP. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are five reported CNDDB occurrences within the Permit Area on the eastern/southeastern portion of the Permit Area (CNDDB 2013). One of these is in Folsom, in the northeastern portion of the Permit Area (CNDDB 2013). Species often occurs in acidic vernal pools (CNPS 2013). Species has low potential to be listed within the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Navarretia nigelliformis ssp. *nigelliformis*	adobe navarretia	--	--	4.2	-	-	-	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in clay, sometimes serpentinite soils in vernally mesic valley and foothill grassland and sometimes occurs in vernal pools (CNPS 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Neostapfia colusana	Colusa grass	T	E	1B.1	+	-	+	-	-	Species identified in the SSHCP and the Yolo NHP as a Covered Species. Species identified in the USFWS VPRP. Species identified in the USFWS species search of USGS quadrangles within the Permit Area and 5-mile buffer of the Permit Area. Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are two occurrences within the 5-mile buffer of the Permit Area on the east side of the Davis Air Force Communications Facility, 2.5 miles northwest of Saxon (CNDDB 2013). Species occurs in vernal pools (adobe, large) (CNPS 2013). Species is federally listed as threatened and is state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Orcuttia inaequalis	San Joaquin valley Orcutt grass	T	E	1B.1	+	-	+	-	-	Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in vernal pools (CNPS 2013). Species is federally listed as threatened and is state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Orcuttia pilosa	hairy Orcutt grass	E	E	1B.1	+	-	+	-	-	Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in vernal pools (CNPS 2013). Species is federally and state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Orcuttia tenuis	slender Orcutt grass	T	E	1B.1	+	+	+	+	+	Species identified in the SSHCP and the NBHCP as a Covered Species. Species identified in the USFWS VPRP. Species identified on the USFWS and CNPS species searches of USGS quadrangles within the Permit Area and 5-mile buffer of the Permit Area. There are three reported CNDDB occurrences within the Permit Area in the Mather Core Recovery Area (CNDDB 2013). This species often occurs in gravelly vernal pools (CNPS 2013). Species is federally listed as threatened and state listed as endangered. Species has potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Orcuttia viscida	Sacramento Orcutt grass	E	E	1B.1	+	+	+	+	+	Species identified in the SSHCP and the NBHCP as a Covered Species. Species identified in the USFWS VPRP. Species identified on the USFWS and CNPS species searches of USGS quadrangles within the Permit Area and 5-mile buffer of the Permit Area. There are numerous reported CNDDB occurrences in Sacramento County; located in east/northeastern portions of the Permit Area (CNDDB 2013). This species often occurs in gravelly vernal pools on Red Bluff-Redding Complex, Redding Gravelly Loam, Corning Complex, and Xerarents-Urban Land San Joaquin Complex soils (CNPS 2013). Species is federally and state listed as endangered. Species has potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Packera layneae	Layne's ragwort	T	R	1B.2	+	-	+	-	-	Species identified on the USFWS species search of USGS quadrangles within Permit Area and the 5-mile buffer of the Permit Area and CNPS species search of USGS quadrangles within the 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are multiple occurrences in the 5-mile buffer southeast of Folsom Lake, near El Dorado Hills and Shingle Springs (CNDDB 2013). Species occurs in serpentinite or gabbroic, rocky soils in chaparral and cismontane woodland (CNPS 2013). Species occurs at elevations between 300 and 900 meters (Trock 2012). Species is federally listed as threatened and listed as rare in California. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Plagiobothrys hystriculus	bearded popcornflower	--	--	1B.1	+	-	-	-	-	Species identified in the USFWS VPRP. Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area, but not within the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species often occurs in vernal swales; occurs in valley and foothill grassland (mesic) and vernal pools margins (CNPS 2013). Species has potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Ranunculus lobbii	Lobb's aquatic buttercup	--	--	4.2	-	+	-	+	-	Species identified at the SMUD Nature Preserve Mitigation Bank. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in mesic soils in cismontane woodland, North Coast coniferous forest, valley and foothill grassland, and vernal pools (CNPS 2013). Species is unlikely to be listed during the Permit term; therefore it is not proposed for coverage.
Sagittaria sanfordii	Sanford's arrowhead	--	--	1B.2	-	+	+	-	-	Species identified in the SSHCP, the NBHCP, and the MAPHCP as a Covered Species. Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are numerous reported CNDDB occurrences throughout the Permit Area (CNDDB 2013). This species occurs in assorted shallow freshwater marshes and swamps (CNPS 2013). Strictly associated with hydrologic systems supporting emergent marsh vegetation. These include the margins of rivers, streams, ponds, reservoirs, irrigation and drainage canals and ditches, and stock-ponds. Species can also occur in small drainages and channelized drainages in urban settings (Brent Helm, pers. comm.). Species is not expected to be state or federally listed in the foreseeable future. Furthermore, Sanford's arrowhead is a wetland species and therefore impacts to this plant would likely be addressed through Section 7 of the Endangered Species Act, in conjunction with a permit under Section 404 of the Clean Water Act, if the species is federally listed in the future; therefore, it is not proposed for coverage.
Scutellaria galericulata	marsh skullcap	--	--	2B.2	-	+	-	+	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are two reported CNDDB occurrences within the Permit Area along Snodgrass Slough in the Delta Region (CNDDB 2013). Species occurs in lower montane coniferous forest, mesic meadows and seeps, and marshes and swamps (CNPS 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Scutellaria lateriflora	side-flowering skullcap	--	--	2B.2	-	+	-	+	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are numerous reported CNDDB occurrences within the Permit Area, in the Delta Region, along Snodgrass Slough (CNDDB 2013). Species occurs in mesic meadows and seeps and in marshes and swamps (CNPS 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Sedella leiocarpa	Lake County stone crop	E	E	1B.1	+	-	+	-	-	Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in vernally mesic depressions in volcanic outcrops in cismontane woodland, valley and foothill grassland, and vernal pools (CNPS 2013). Species is federally and state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Sidalcea keckii	Keck's checkerbloom	E	--	1B.1	+	-	+	-	-	Species identified on the USFWS species search of USGS quadrangles within the Permit Area and 5-mile buffer of the Permit Area and CNPS species search of USGS quadrangles within the 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in serpentinite and clay soils in cismontane woodland and valley and foothill grassland (CNPS 2013). Species is federally endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Streptanthus morrisonii ssp. *morrisonii*	Morrison's jewelflower	--	--	1B.2	+	-	-	-	-	Species identified in the Yolo NHP as a Species of Local Concern. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in chaparral (serpentinite, rocky, talus) (CNPS 2013). Species has potential to be listed within the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Symphyotrichum lentum	Suisun Marsh aster	--	--	1B.2	+	+	+	-	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are two reported CNDDB occurrences of this species in the Permit Area (CNDDB 2013). One occurrence at the base of the levee at the Delta Cross Channel; the second occurrence is at the north tip of Staten Island (CNDDB 2013). The species occurs in brackish and freshwater marshes and swamps (CNPS 2013). Species has the potential to be listed during the Permit term. Any SMUD activities that occur in the vicinity of this species would occur outside of its habitat. Species is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Trifolium hydrophilum	saline clover	--	--	1B.2	+	+	+	-	-	Species included on the CNPS list of the USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are five reported CNDDB occurrences within the Permit Area; a large population occurs west of I-5 at Elk Grove (CNDDB 2013). Species occurs in marshes, mesic and alkaline valley and foothill grassland and vernal pools (CNPS 2013). Species has a low potential to be listed within the Permit term. SMUD has three distribution poles near the occurrences west of I-5 and north of Hood Franklin Road. However, this species is not expected to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Tuctoria greenei	Greene's tuctoria	E	R	1B.1	+	-	+	-	-	Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in vernal pools (CNPS 2013). Species is federally listed as endangered and is listed as rare in California. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Tuctoria mucronata	Solano grass	E	E	1B.1	+	-	+	-	-	Species identified in the Yolo NHP as a Covered Species and in the USFWS VPRP. Species identified on the USFWS search of USGS quadrangles within the 5-mile buffer of the Permit Area, but not within the Permit Area. Species identified on the CNPS search of USGS quadrangles within the 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are two occurrences within the 5-mile buffer at the Davis Air Force Communications Facility, 2.5 miles northwest of Saxon (CNDDB 2013). Species occurs in valley and foothill grassland (mesic) and vernal pools (CNPS 2013). Species is federally and state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Wyethia reticulata	El Dorado County mule ears	--	--	1B.2	+	-	+	-	-	Species included on the CNPS list of the USGS quadrangles for the 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are multiple occurrences in the 5-mile buffer, northeast of the Permit Area, along the northeastern border of Folsom Lake and in Shingle Springs (CNDDB 2013). Species occurs in clay or gabbroic soils in chaparral, cismontane woodland, and lower montane coniferous forest (CNPS 2013). Species has potential to be listed during the Permit term. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Invertebrates										
Andrena blennospermatis	blennosperma vernal pool andrenid bee	--	--	--	-	+	-	+	-	There is one reported CNDDB occurrence of this species within the Permit Area, 4 miles east of Sloughhouse (CNDDB 2013). Species is a solitary, ground-nesting bee that forages at vernal pool flowers and nests in upland areas near vernal pools (CDFW 2013a). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Andrena subapasta	a vernal pool andrenid bee	--	--	--	-	+	-	+	-	There is one reported CNDDB occurrence of this species within the Permit Area, mapped as a one-mile radius polygon in Rancho Cordova (CNDDB 2013). Species is a ground nesting bee that forages at vernal pool flowers and is most often found associated with grassland forbs (CDFW 2013b). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Anthicus sacramento	Sacramento anthicid beetle	--	--	--	-	-	-	+	-	There are no reported CNDDB occurrences of this species within the Permit Area; there are three occurrences in the 5-mile buffer, southwest of the Permit Area, in Rio Vista (CNDDB 2013). Species is found in interior sand dunes and sand bars; has also been found in dredge spoil heaps (CDFW 2013c). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Branchinecta conservatio	conservancy fairy shrimp	E	--	--	+	-	+	-	-	Species identified on the USFWS species search of USGS quadrangles within the Permit Area and 5-mile buffer of the Permit Area. Species identified in the the Yolo NHP, and the PCCP as a Covered Species and in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area; there is one occurrence in the 5-mile buffer, in the Yolo Bypass Wildlife Area (CNDDB 2013). Species is found in vernal pools in grasslands that are filled by winter and usually last into June. The current range of this species is restricted to the northern two-thirds of the Central Valley (Eriksen and Belk 1999). Species is federally listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Branchinecta longiantenna	longhorn fairy shrimp	E	--	--	+	-	+	-	-	Species identified in the USFWS VPRP Plan. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in ephemeral freshwater habitats, such as vernal pools and swales (USFWS 2012a). Species has a restricted distribution; the few known sites lie near the eastern edge of the Central Coast Mountains Region (Eriksen and Belk 1999). The population found in the Altamont Pass occur within clear depression pools in sand stone outcrops (Eriksen and Belk 1999). Species is federally listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Branchinecta lynchi	vernal pool fairy shrimp	T	--	--	+	+	+	+	+	Species identified on the USFWS species search of USGS quadrangles within the Permit Area and 5-mile buffer of the Project Area. Species identified in the SSHCP, the NBHCP, the Yolo County NHP, and the PCCP as a Covered Species and in the USFWS VPRP. Species identified at the SMUD Nature Preserve Mitigation Bank. There are numerous reported CNDDB occurrences throughout the Permit Area (CNDDB 2013). Species lives in ephemeral freshwater habitats, such as vernal pools and swales; none are known to occur in running or marine waters or other permanent bodies of water (USFWS 2007). Species is federally listed as threatened. Species has the potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Branchinecta mesovallensis	mid-valley fairy shrimp	--	--	--	-	+	+	+	-	Species identified in the SSHCP, the NBHCP, and the Yolo NHP as a Covered Species and in the USFWS VPRP. There are numerous reported CNDDB occurrences in the SMUD Permit Area (CNDDB 2013). Species occurs in vernal pools, vernal swales and other ephemeral water bodies near the middle of California's Central Valley (Helm 1998; Eriksen and Belk 1999; Belk and Fugate 2000). This species is not expected to be listed during the Permit term; therefore, it is not proposed for coverage.
Cicindela hirticollis abrupta	Sacramento Valley tiger beetle	--	--	--	-	+	+	-	-	There is one reported CNDDB occurrence from 1955 within the Permit Area, located along the Sacramento River between Sacramento and West Sacramento; this occurrence is extirpated (CNDDB 2013). Species occurs in sand bars or sandy riverine shorelines, but is most likely extinct due to altered flows due to dams (Fenster and Knisley 2006). However, most of the survey work was conducted north of Sacramento, so it may remain within the Permit Area (Richard Arnold, pers. comm.). This species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	T	--	--	+	+	+	+	+	Species identified in the SSHCP, the NBHCP, the MAPHCP, the Yolo County NHP, and the PCCP as a Covered Species. Species identified on the USFWS species search of USGS quadrangles within the Permit Area and 5-mile buffer of the Permit Area. There are numerous reported CNDDB occurrences of this species throughout the Permit Area (CNDDB 2013). Species is only found in association with its host plant, the elderberry (*Sambucus* sp.) (USFWS 2006). Species is federally listed as threatened. Species has the potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Dumontia oregonensis	hairy water flea	--	--	--	-	+	-	-	-	There is one reported CNDDB occurrence of this species within the Permit Area in Mather Field (CNDDB 2013). This species is endemic to vernal pools (USFWS 2012b). This species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Elaphrus viridis	Delta green ground beetle	T	--	--	+	-	+	-	-	Species identified on the USFWS species search of USGS quadrangles within the Permit Area and 5-mile buffer of the Permit Area. Species identified in the USFWS VPRP. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). The revised recovery plan reported that there were 5 extant populations, all in the Jepson Prairie area (USFWS 2005). Species occurs in vernal lake habitats where sandy-mud substrate slopes gently enter the water (Arnold 1989). Upland habitat is also known to be frequented by the beetles, but only during the wet season (Arnold 1983). Species is federally listed as threatened. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Hydrochara rickseckeri	Ricksecker's water scavenger beetle	--	--	--	-	+	+	+	-	Species identified in the SSHCP as a Covered Species. There are three reported CNDDB occurrences in the Permit Area located in the Mather Core Recovery Area, northeast of Folsom, and at the Cosumnes River Preserve (CNDDB 2013). Species occurs in a variety of shallow aquatic habitats including creeks, springs, and artificial ponds (Nature Serve Explorer 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Lepidurus packardi	vernal pool tadpole shrimp	E	--	--	+	+	+	+	+	Species identified in the SSHCP, the NBHCP, the Yolo NHP, and the PCCP as a Covered Species and in the USFWS VPRP. Species identified on the USFWS species search of USGS quadrangles within the 5-mile buffer of the Project Area. There are numerous reported CNDDB occurrences of this species within the Permit Area (CNDDB 2013) and the species has been identified at the SMUD Nature Preserve Mitigation Bank. Species occurs in vernal pools and swales containing clear to highly turbid waters (Eng et al. 1990). Species is federally listed as endangered. Species has potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Linderiella occidentalis	California linderiella	--	--	--	-	+	+	+	-	Species identified in the Yolo County NHP as a Covered Species and in the USFWS VPRP. There are numerous reported CNDDB occurrences throughout the Permit Area (CNDDB 2013). Species is the most common inhabitant of cool, soft-water vernal pools of California's Central Valley grasslands (Syrdahl 1993). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Myrmosula pacifica	Antioch multilid wasp	--	--	--	-	-	-	-	-	There are no reported CNDDB occurrences of this species within the Permit Area; there is one possibly extirpated occurrence from 1945 in the 5-mile buffer of the Permit Area, in Davis (CNDDB 2013). Species occurs in sandy areas, such as dunes or loose sandy areas along rivers or streams (Richard Arnold, pers. comm.). This species is unlikely to be listed during the Permit term because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Polyphylla stellata	Delta June beetle	--	--	--	-	+	-	-	-	There are no reported CNDDB occurrences of this species within the Permit area or within the 5-mile buffer of the Permit Area (CNDDB 2013). The Delta June beetle is not well known, but has been found in several places in and around the periphery of the Sacramento area and Delta, including Carmichael, Sloughouse, and Antioch (Richard Arnold, pers. comm.). It is likely associated with sandy soils and may live in sandy areas along rivers that drain into the Delta. The beetle has been observed in Ancil Hoffman Park, Carmichael in the valley oak woodland and grassland with sandy soils (Richard Arnold, pers. comm.). This species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Smithistruma reliquia	ancient ant	--	--	--	-	-	-	-	-	Species identified in the Yolo NHP as a Species of Local Concern. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs in oak woodlands, especially valley oak woodlands. Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Syncaris pacifica	California freshwater shrimp	E	--	--	+	-	+	-	-	Species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). During the winter, habitat includes shallow margins of stream pools containing undercut banks and exposed living fine-root material that provide shelter and refuge from high water velocities associated with winter storm events. During the summer months, species is often associated with submerged leafy branches. It is believed both winter and summer habitat components need to be found in close proximity in order for this species to persist for prolonged periods (USFWS 2011). Species is federally listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Fish										
Acipenser medirostris	green sturgeon	T	SSC	--	+	+	+	-	-	This anadromous fish species is identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species spawns in three river systems, the Klamath, Rogue, and Sacramento Rivers which takes places in deep, fast water. Preferred spawning substrate is likely large cobble, but it can range from clean sand to bedrock. (Moyle 2002) Species is federally listed as threatened. It is unlikely that SMUD's Covered Activities will adversely special-status fish species and SMUD would consult separately for projects that may have an effect on special-status fish species. Species is unlikely to be affected by SMUD's Covered Activities; therefore it is not proposed for coverage.
Archoplites interuptus	Sacramento perch	--	SSC	--	-	+	+	-	-	There is one reported CNDDB occurrences of this species within the Permit Area in Greenhaven Lake in the Pocket area of Sacramento (CNDDB 2013). The only populations today that represent continuous habitation within their native range are those in Clear Lake and Alameda Creek. Outside their native range, populations have become established in California reservoirs and associated streams in the upper Klamath basin, the Cedar Creek watershed, the Walker River watershed, the Mono Lake watershed, and the Owens River watershed. They are often associated with beds of rooted, submerged, and emergent vegetation and submerged objects. (Moyle 2002). It is unlikely that SMUD's Covered Activities will adversely special-status fish species and SMUD would consult separately for projects that may have an effect on special-status fish species. Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Hypomesus transpacificus	delta smelt	T	E	--	+	+	+	-	-	Species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there are multiple occurrences in the 5-mile buffer southwest of the Permit Area, along the Mokelumne River (CNDDB 2013). Species has been observed within the Permit Area (Brent Helm, pers. comm.; Jim Estep, pers. comm.). Delta smelt prefer to rear in or just above the region of the estuary where fresh water and brackish water mix and hydrodynamics are complex as a result of the meeting of tidal and riverine currents. They usually stay within relatively limited regions including main channels of the Delta and Suisun Marsh and open waters of Suisun Bay where the waters are well oxygenated and temperature are relatively cool (Moyle 2002). Species is federally listed as threatened and is state listed as endangered. It is unlikely that SMUD's Covered Activities will adversely special-status fish species and SMUD would consult separately for projects that may have an effect on special-status fish species. Species is unlikely to be affected by SMUD's Covered Activities; therefore it is not proposed for coverage.
Oncorhynchus mykiss irideus	Central Valley steelhead	T	--	--	+	+	+	-	-	This anadromous fish species is identified in the PCCP as a Covered Species. Species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). This species has been observed within the Permit Area in the Sacramento, American, and Cosumnes rivers (Brent Helm, pers. comm.; Jim Estep, pers. comm.). For the first year or two of life, they are found in cool, clear, fast-flowing permanent streams and rivers where riffles predominate over pools, where there is ample cover from riparian vegetation or undercut banks, and where invertebrate life is diverse and abundant (Moyle 2002). Species is federally listed as threatened. It is unlikely that SMUD's Covered Activities will adversely special-status fish species and SMUD would consult separately for projects that may have an effect on special-status fish species. Species is unlikely to be affected by SMUD's Covered Activities; therefore it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Oncorhynchus tshawytscha	Central Valley fall/late fall-run Chinook salmon	--	SSC	--	-	-	+	-	-	This anadromous fish species is identified in the PCCP as a Covered Species. Species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species is adapted for spawning and rearing in reaches of mainstem rivers such as the upper Sacramento that remain cold and deep enough in summer for rearing of juveniles. In the Central Valley, during high flow periods these fish historically moved into the floodplain where they could rear for several months. (Moyle 2002) Species is unlikely to be listed during the Permit term. It is unlikely that SMUD's Covered Activities will adversely special-status fish species and SMUD would consult separately for projects that may have an effect on special-status fish species. Species is unlikely to be affected by SMUD's Covered Activities; therefore it is not proposed for coverage.
Oncorhynchus tshawytscha	Central Valley winter-run Chinook salmon	E	E	--	+	-	+	-	-	This anadromous fish species is identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences within the Permit Area: there is one occurrence within the 5-mile buffer of the Permit Area in West Sacramento where CA 84 crosses the Barge Canal (CNDDB 2013). Species originally spawned in the McCloud, Pit and upper Sacramento rivers but is currently only found in the mainstem Sacramento River, below Keswick Dam. Species is adapted for spawning and rearing in the clear spring-fed rivers of the upper Sacramento basin (Moyle 2002). It is unlikely that SMUD's Covered Activities will adversely special-status fish species and SMUD would consult separately for projects that may have an effect on special-status fish species. Species is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Oncorhynchus tshawytscha	Central Valley spring-run Chinook salmon	T	T	--	+	-	-	-	-	This anadromous fish species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences within the Permit Area: there is one occurrence within the 5-mile buffer of the Permit Area in West Sacramento where CA 84 crosses the Barge Canal (CNDDB 2013). Species historically occurs in the Sacramento and San Joaquin rivers and their tributaries, although it occurs today only in the Sacramento River drainage. Access to most of their historical spawning area is blocked by dams, and they persist in just a few streams in the Sacramento and Klamath drainages. (Moyle 2002) It is unlikely that SMUD's Covered Activities will adversely special-status fish species and SMUD would consult separately for projects that may have an effect on special-status fish species. Species is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Pogonichthys macrolepidotus	Sacramento splittail	--	SSC	--	+	+	+	-	-	There are numerous reported CNDDB occurrences of this species within the Permit Area; occurrences in the Sacramento River from River Mile 33 south of Courtland to River Mile 97 north of Knights Landing (CNDDB 2013). In the Sacramento Valley, they were found in early surveys as far up the Sacramento River as Redding, up the Feather River as high as Oroville, and in the American River to Folsom. Today they are largely absent from the upper parts of their distribution, although in wet years they may migrate up the Sacramento River as far as the Red Bluff Diversion Dam (Tehama County) and into the lower Feather and American Rivers. The Sutter and Yolo Bypasses, along the Sacramento River, are apparently important spawning areas today. Species is adapted for living in estuarine waters with fluctuating conditions, as well as in severe conditions that once occurred in alkaline lakes and sloughs on the floor of the Central Valley during droughts (Moyle 2002). Species is unlikely to be listed during the Permit term. It is unlikely that SMUD's Covered Activities will adversely special-status fish species and SMUD would consult separately for projects that may have an effect on special-status fish species. Species is unlikely to be affected by SMUD's Covered Activities; therefore it is not proposed for coverage.
Spirinchus thaleichthys	Longfin smelt	--	T	--	+	-	+	-	-	There are no reported CNDDB occurrences for this species within the Permit Area or the 5-mile buffer of the Permit Area (CNDDB 2013). Species is more commonly found near the lower Sacramento River, including the Yolo Bypass and Cache Creek complex in low and moderate outflow years (CDFW 2009). In the San Francisco Estuary, Species is rarely found upstream of Rio Vista or Medford Island in the Delta (Moyle 2002). Species is state listed as threatened (CDFW 2009). It is unlikely that SMUD's Covered Activities will adversely special-status fish species and SMUD would consult separately for projects that may have an effect on special-status fish species. Species is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Amphibians										
Ambystoma californiense	California tiger salamander	T	T	--	+	+	+	+	+	Species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are numerous reported CNDDB occurrences of this species within the Permit Area, primarily in the southeastern portion of the Permit Area (CNDDB 2013). Species observed at the SMUD Mitigation Bank (SMUD and AWE 2013). Species occurs in grassland, oak savanna, and edges of mixed woodland and lower elevation coniferous forest. Usually breeds in ponds and pools that form during winter and may dry out in summer, but also breeds in slower parts of streams and in some permanent waters, primarily within grassland and woodland areas; some pools may be quite alkaline. Spends much time underground in burrows of California ground squirrels, gophers, and other animals (Stebbins and McGinnis 2012). Species is federally and state listed as threatened. Species has potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Rana boylii	foothill yellow-legged frog	--	SSC	--	+	-	+	-	-	Species identified in the Yolo NHP and the PCCP as a Covered Species. There are no reported CNDDB occurrences of this species within the Permit Area; there is one 1958 potentially waif occurrence in the 5-mile buffer of the Permit Area, south of Galt, 5 miles north of Lodi (CNDDB 2013). Species occurs in woodland, chaparral, and forest habitats (Stebbins 2003). Usually found near water, especially near riffles with rocks and sunny banks (Stebbins and McGinnis 2012). Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Rana draytonii	California red-legged frog	T	SSC	--	+	-	+	-	-	Species identified in the Yolo NHP and the PCCP as a Covered Species. Species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area; there is one occurrence in the 5-mile buffer on the east side of Folsom Lake, southwest of Iron Mountain (CNDDB 2013). Species occurs in humid forests, woodlands, grasslands, and stream-sides, especially where cattails, bulrushes, or other plants provide dense riparian cover in lowlands and foothills. Frequents marshes, streams, lakes, reservoirs, ponds, and other, usually permanent, sources of water (Stebbins and McGinnis 2012). Species is federally listed as threatened. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Spea hammondii	western spadefoot	--	SSC	--	+	+	+	+	+	Species identified in the SSHCP, the NBHCP, the Yolo NHP, and the PCCP as a Covered Species and in the USFWS VPRP. There are numerous reported CNDDB occurrences of this species throughout the western portion of the Permit Area (CNDDB 2013). Species has two distinct habitat requirements including quiet streams or seasonal pools for breeding, and uplands for foraging and dry-season aestivation (Stebbins 2003). Species eggs and larvae have been observed in a variety of permanent and temporary wetlands including rivers, creeks, pools in intermittent streams, vernal pools, and temporary rain pools (Stebbins and McGinnis 2012; CDFG 2010). This species has the potential to be listed during the Permit term, SMUD has determined this to be a local species of concern. Species has potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Reptiles										
Actinemys (= Emys) marmorata	western pond turtle	--	SSC	--	-	+	+	+	+	Species identified in the SSHCP, the NBHCP, the MAPHCP, the Yolo NHP, and the PCCP as a Covered Species. There are numerous reported CNDDB occurrences of this species throughout the western portion of the Permit Area (CNDDB 2013). Species occurs in ponds, lakes, marshes, rivers, streams, and irrigation ditches that typically have a rocky or muddy bottom and grown to watercress, cattails, water lilies, or other aquatic vegetation (Stebbins 2003). Although this species is unlikely to be listed during the Permit term, SMUD has determined this to be a local species of concern. Species has potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Thamnophis gigas	giant garter snake	T	T	--	+	+	+	+	+	Species identified in the SSHCP, the NBHCP, the MAPHCP, the Yolo NHP, and the PCCP as a Covered Species. Species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are numerous reported CNDDB occurrences of this species throughout the Permit Area, especially in the northeastern corner of the Permit Area (CNDDB 2013). Species occurs in marshes, sloughs, mud-bottom canals of rice farming areas, and occasionally slow streams (Stebbins 2003). Tules and cattails are usually present and are used for basking and cover. Species is state and federally listed as threatened. Species has potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Birds										
Accipiter cooperii	Cooper's hawk	--	WL	--	-	+	+	+	-	Species identified in the SSHCP and the PCCP as a Covered Species. Species identified in the SMUD Avian Protection Plan. There are six reported CNDDB occurrences for this species within the Permit Area distributed along the American River and near Elk Grove (CNDDB 2013), but numerous additional occurrences have been documented throughout the Permit Area. Species usually nests in pines, oaks, Douglas firs, beeches, spruces, and other tree species, often on flat ground rather than hillsides. Species forages primarily in woodlands, but can be found in suburban areas including parks and quiet neighborhoods (Cornell 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Agelaius tricolor	tricolored blackbird	--	SSC	--	+	+	+	+	+	Species identified in the SSHCP, the NBHCP, the MAPHCP, the Yolo NHP, and the PCCP as a Covered Species. Species identified on the USFWS Bird of Conservation Concern list and in the SMUD Avian Protection Plan. There are seventy reported CNDDB occurrences within the Permit Area, mostly distributed in central and southeast Sacramento County (CNDDB 2013); however, many of these are known or suspected to be extirpated. Species has been observed at the SMUD Nature Preserve Mitigation Bank (SMUD and AWE 2013). Species nests in freshwater marshes dominated by cattails and bulrushes and forages in annual grasslands, wet and dry vernal pools and other seasonal wetlands, agricultural fields, cattle feedlots, and dairies. They also forage occasionally in mixed riparian scrub habitats along marsh borders (Cornell 2013). Species has potential to be federally listed during the Permit term and has the potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Ammodramus savannarum	grasshopper sparrow	--	SSC	--	-	+	+	+	-	Species identified in the Yolo NHP and the PCCP as a Covered Species. There are two reported CNDDB occurrences in the Permit Area, one north of Rancho Murieta and one south of Rancho Murieta (CNDDB 2013). Species observed at the Cosumnes River Preserve (Jim Estep, pers. comm.). Species nests on the ground and forages in grasslands and prairies with patches of bare ground (Cornell 2013). While populations have declined due to conversion of grassland habitats, the species remains widely distributed within most of its historic range, and therefore is unlikely to be listed during the Permit term. This species is not proposed for coverage.
Aphelocoma insularis	island scrub-jay	--	--	--	-	-	+	-	-	Species identified on the USFWS Bird of Conservation Concern list. There are no reported CNDDB occurrences within the Permit Area or the 5-mile buffer of the Permit Area (CNDDB 2013). Species is common within limited range on Santa Cruz Island off southern California (Sibley 2003). Found in open oak woods and brushy patches (Sibley 2003). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Aquila chrysaetos	golden eagle	--	FP	--	-	+	+	-	-	Species identified in the Yolo NHP as a Covered Species and in the SMUD Avian Protection Plan. There are two reported historic CNDDB occurrences within the Permit Area, one wintering near Mather Air Force Base and one nesting at Howard Ranch (CNDDB 2013). Both occurrences are presumed extant, this species has also been observed foraging in the Permit Area (Brent Helm, pers. comm.; Jim Estep, pers. comm.) and at the SMUD Nature Preserve Mitigation Bank (Becky Rozumowicz pers. comm.). Species nests in trees and on cliff ledges and forages in open and semi-open country; they avoid developed areas and uninterrupted stretches of forest (Cornell 2013). Species is not expected to be listed during the Permit term and because incidental take authorization under the HCP would not allow take of individuals due to the restrictions of the federal Bald and Golden Eagle Protection Act and the species' state Fully Protected status; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Ardea alba	great egret	--	--	--	-	+	+	+	-	Species identified in the SMUD Avian Protection Plan. There are 10 nesting rookeries reported in CNDDB within the Permit Area. There is one extirpated occurrence in Folsom, and the other nine occurrences are distributed throughout the Permit Area (CNDDB 2013). Species nests in trees and shrubs, often over water in freshwater, brackish, and marine wetlands (Cornell 2013). This species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Ardea herodias	great blue heron	--	--	--	-	+	+	+	-	Species identified in the SMUD Avian Protection Plan. There are 14 rookeries reported in CNDDB within the Permit Area. There is one extirpated occurrence in Folsom, and the other 13 extant occurrences are distributed throughout the Permit Area (CNDDB 2013). Species nests mainly in trees but will also nest on the ground or in bushes. Species forages in freshwater and saltwater habitats (Cornell 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Asio flammeus	short-eared owl	--	SSC	--	-	-	+	+	-	Species identified in the Yolo NHP as a Species of Local Concern and in the SMUD Avian Protection Plan. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). The species has been reported from the Cosumnes River Preserve and the nearby Yolo Bypass Wildlife Area (Jim Estep, pers. comm.). Species nests on the ground in grasslands and forges in prairie, meadows, tundra, moorlands, marshes, savannah, and open woodland (Cornell 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Asio otus	long-eared owl	--	SSC	--	-	-	+	+	-	Species identified in the Yolo NHP as a Species of Local Concern. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). The species was reported nesting along the American River Parkway in 2002 (Shuford and Gardali 2008). Species nests in stick nests built by other bird species in dense vegetation adjacent to open areas. Species forages in open grassland, shrubland, and open forests (Cornell 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Athene cunicularia	burrowing owl	--	SSC	--	+	+	+	+	+	Species identified in the SSHCP, the NBHCP, the MAPHCP, the Yolo NHP, and the PCCP as a Covered Species and on the USFWS Bird of Conservation Concern list. Species identified in the SMUD Avian Protection Plan. There are 72 reported CNDDB occurrences of this species distributed throughout the Permit Area (CNDDB 2013) and it has been observed at the SMUD Mitigation Bank (SMUD and AWE 2013). Species nest in burrows usually dug by mammals in dry open areas with no trees and short grass. Species forages primarily in grasslands, but can be found on golf courses, vacant lots, and pastures (Cornell 2013). Species has potential to be listed during the Permit term and has the potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Aythya americana	redhead	--	SSC	--	-	-	+	-	-	Species identified in the Yolo NHP as a Species of Local Concern. Species identified in the SMUD Avian Protection Plan. There are no reported CNDDB occurrences of this species within the Permit area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species occurs at Stone Lakes and has been observed in the Delta (Brent Helm, pers. comm.; Jim Estep, pers. comm.). Species nests on lakes, bays, and lagoons and forages on open water, or in small numbers mixed with other bay ducks. It is a year-round resident in the Central Valley (Sibley 2003). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Baeolophus inornatus	oak titmouse	--	--	--	-	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). The species is known to occur in oak/pine woodlands throughout the eastern portion of the Permit Area and at the Cosumnes River Preserve (Jim Estep, pers. comm.). Species nests in tree cavities in open, dry oak or oak-pine woodlands. They will use scrub oaks or other brush as long as woodlands are nearby (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Branta hutchinsii leucopareia	Aleutian Canada goose	D	--	--	-	-	+	+	-	Species identified in the NBHCP and the MAPHCP as a Covered Species. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests on the ground on slightly elevated sites near water and sometimes on cliffs. Species forages in coastal marshes, along tundra ponds and streams, and on steep turf slopes above rocky shores (Cornell 2013). Species was delisted in 2001 and is unlikely to be listed again during the Permit term; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Buteo regalis	ferruginous hawk	--	WL	--	-	+	+	+	-	Species identified in the SSHCP and the PCCP as a Covered Species. Species identified in the SMUD Avian Protection Plan. There are three reported CNDDB non-breeding occurrences of this species in the Permit Area, two near Beach Lake and one south of Mather Airport (CNDDB 2013). The species does not breed in the Permit Area or anywhere in California except the extreme northeast corner of the state. It migrates through and occasionally winters in the Permit Area where it forages primarily in open grasslands and some agricultural habitats (Jim Estep, pers. comm.). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Buteo swainsoni	Swainson's hawk	--	T	--	+	+	+	+	+	Species identified in the SSHCP, the NBHCP, the MAPHCP, the Yolo NHP, and the PCCP as a Covered Species. Species identified in the SMUD Avian Protection Plan. There are 285 reported CNDDB occurrences distributed throughout the Permit Area (CNDDB 2013). Species observed foraging at the SMUD Nature Preserve Mitigation Bank (SMUD and AWE 2013). Species nests in riparian woodlands, roadside and field border trees, and solitary trees and forages primarily in agricultural landscapes and grasslands. Species is state listed and has the potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Calidris canutus roselaari	red knot	--	--	--	-	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests on the ground in drier tundra areas. Species forages in intertidal marine habitats near coastal inlets, estuaries, and bays (Cornell 2013). Species unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Calypte costae	Costa's hummingbird	--	--	--	-	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences for this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in scrub in the Sonoran and Mojave Deserts and forages in chaparral, scrub, or woodland habitats (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	--	SSC	--	-	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in shrubs and coastal sage scrub and forages in lowland and montane thorn-scrub in deserts (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Charadrius alexandrinus nivosus	western snowy plover (interior population)	T	SSC	--	+	+	+	-	-	Species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. Species identified in the Yolo NHP as a Species of Local Concern and on the USFWS Birds of Conservation Concern list. There is one reported CNDDB occurrence within the Permit Area along the gas pipeline at the Davis sewage treatment ponds from 1963 (CNDDB 2013), and more recently occurrences in the Yolo Bypass Wildlife Area in 1998 and 2006. Species nests in barren to sparsely vegetated sandy beaches, dry salt flats, levees and flats at evaporation ponds, river bars, along saline lakes, reservoirs, and ponds (Cornell 2013). Species is federally listed as threatened; however, the threatened status applies only to the coastal population, which excludes Yolo County. Species is not expected to nest in the Permit Area and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Charadrius montanus	mountain plover	--	SSC	--	-	+	+	-	-	Species identified in the Yolo NHP as a Covered Species and on the USFWS Birds of Conservation Concern list. This species does not breed in California, but migrates through and winters in the state. It is considered rare and very localized in the Sacramento Valley during winter (Jim Estep, pers. comm.). There are no reported CNDDB occurrences within the Permit Area. There is one extirpated CNDDB occurrence within the 5-mile buffer of the Permit Area near the city of Woodland (CNDDB 2013). Species forages in short-grass plains, plowed fields, and sandy deserts (Cornell 2013). Species would not be affected during the nesting season by SMUD's Covered Activities because it does not nest in California; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Chlidonias niger	black tern	--	SSC	--	-	+	+	-	-	Species identified in the Yolo NHP as a Covered Species. There are no reported CNDDB occurrences within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013) but it has been observed at Stone Lakes (Jim Estep, pers. comm.). Species nests in floating nests on marshes, ponds, and in association with rice cultivation where it nests along rice checks. Species forages in open water (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Circus cyaneus	northern harrier	--	SSC	--	-	+	+	+	-	Species identified in the SSHCP, the Yolo NHP, and the PCCP as a Covered Species. Species identified in the SMUD Avian Protection Plan. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, this species is known to nest and winter throughout s in the Permit Area (Jim Estep, pers. comm.). Species observed at the SMUD Nature Preserve Mitigation Bank (SMUD and AWE 2013). Species nests on the ground in dense vegetation such as willows, grasses, sedges, reeds, bulrushes, and cattails and forages in a range of habitats with low vegetation, including deserts, coastal sand dunes, pasturelands, croplands, dry plains, grasslands, old fields, estuaries, open floodplains, and marshes (Cornell 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Coccyzus americanus occidentalis	western yellow-bill cuckoo	C	E	--	+	+	+	-	-	Species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. Species identified in the Yolo NHP as Covered Species and on the USFWS Birds of Conservation Concern list. There is one extirpated CNDDB occurrence within the Permit Area south of the Pocket along the Sacramento River (CNDDB 2013). Species nests near water in cottonwood/willow riparian woodland. Species forages in open woodlands with clearings and dense scrubby vegetation (Cornell 2013). Insufficient suitable riparian woodland exists in the Permit Area to support breeding; however, it may continue to migrate through the Permit Area along the Sacramento River. Species is unlikely to be affected during the nesting season by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Coturnicops noveboracensis	yellow rail	--	SSC	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). This species breeds very locally in northeastern California and winters locally along the coast and in the Suisun Marsh region (Shuford and Gardali 2008). Species nests on the ground in shallow marshes and wet meadows. Species forages in drier fresh and brackish-water marshes, dense grasses, and rice fields (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Cypseloides niger	black swift	--	SSC	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests on damp coastal cliffs or cliff ledges near waterfalls (Sibley 2003). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Dendroica petechia brewsteri	yellow warbler	--	SSC	--	-	+	+	-	-	Species identified in the PCCP as a Covered Species. Species identified on the USFWS Birds of Conservation Concern. There are no reported CNDDB occurrences of this species within the Permit area or within the 5-mile buffer of the Permit Area (CNDDB 2013). This species is thought to be extirpated from Sacramento County (Shuford and Gardali 2008); however, the species is found in riparian habitats in the Permit Area during the migratory seasons (Jim Estep, pers. comm.). Species nests in brush or small trees such as willows, hawthorn, raspberry, white cedar, dogwood, and honeysuckle. Species forages in thickets or other disturbed or regrowing habitats (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Egretta thula	snowy egret	--	--	--	-	+	+	+	-	Species identified in the SMUD Avian Protection Plan. There is one reported CNDDB occurrence of this species within the Permit Area near the Sacramento River in Natomas (CNDDB 2013). However, this species is known to occur throughout the Permit Area (Jim Estep, pers. comm.). Species nests in low trees and forages in shallow open water and in marshes (Sibley 2003). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Elanus leucurus	white-tailed kite	--	FP	--	-	+	+	-	-	Species identified in the SSHCP and the Yolo NHP as a Covered Species. Species identified in the SMUD Avian Protection Plan. There are 34 reported CNDDB occurrences of this species distributed throughout the Permit Area (CNDDB 2013). Species nests in riparian woodlands, oak/pine woodlands, groves, tree rows, and isolated trees. Species forages in savanna, open woodlands, marshes, desert grasslands, partially cleared lands, and cultivated fields (Cornell 2013). Species has low likelihood that it will be listed during the permit term, and nests would need to be avoided consistent with the Fully Protected status even if the species were covered (take allowance for Fully Protected species is only available through a Natural Community Conservation Plan); therefore, it is not proposed for coverage.
Falco columbarius	merlin	--	WL	--	-	+	+	-	-	Species identified in the CNDDB search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are six reported non-breeding CNDDB occurrences of this species within the Permit Area. One at Lake Natoma and five near Beach Lake (CNDDB 2013). This species does not breed in California, but migrates through and winters in open woodlands, grasslands, marshes, and cultivated lands in the Permit Area (Jim Estep, pers. comm.). Species nests in trees in open country from open coniferous forests to prairie and forages in open woodland, grasslands, open cultivated fields, marshes, estuaries, and seacoasts (Cornell 2013). Species is on the CDFW watch list. Species is unlikely to be affected by SMUD's Covered Activities and to be listed during the Permit term; therefore, it is not proposed for coverage.
Falco mexicanus	prairie falcon	--	WL	--	-	+	+	+	-	Species identified in the Yolo NHP as a Species of Local Concern. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). The species does not nest in the Permit Area due to lack of suitable nesting habitat; however, it is regularly observed during the non-breeding season (Jim Estep, pers. comm.). Species nests on overhanging, south-facing cliffs up to 500 feet high. Species forages in grasslands, shrub-steppe, deserts, and other open areas (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Falco peregrinus anatum	American peregrine falcon	D	D/FP	--	-	+	+	+	-	Species identified in the MAPHCP and the PCCP as a Covered Species. Species identified on the USFWS Birds of Conservation Concern and in the SMUD Avian Protection Plan. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). The species does not breed in the Permit Area due to lack of suitable nesting habitat; however, it is regularly observed during the non-breeding season (Jim Estep, pers. comm.). Species nests mainly on cliffs, but is also known to nest in transmission towers, quarries, bridges, and other man-made structures. Species forages primarily in permanent and seasonal wetlands, grasslands, and some cultivated fields. Species is unlikely to be listed during the permit term; therefore, it is not proposed for coverage.
Gelochelidon nilotica	gull-billed tern	--	SSC	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). This species does not occur in the Permit Area (Jim Estep, pers. comm.). Species nests on gravelly or sandy beaches. Species forages in salt marshes, estuaries, lagoons, plowed fields, and occasionally along rivers, lakes, and freshwater marshes (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Geothlypis trichas sinuosa	saltmarsh common yellowthroat	--	SSC	--	-	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). This species is not known to occur in the Permit Area; it occurs in salt marsh habitats around San Francisco Bay and along the coast (Jim Estep, pers. comm.). Species nests in sedges, grasses, reeds, cattails, briars, or skunk cabbage. Species forages in thick tangled vegetation in a wide variety of habitats (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Grus canadensis tabida	greater sandhill crane	--	T/FP	--	+	+	+	-	-	Species identified in the SSHCP and the MAPHCP as a Covered Species. Species identified in the SMUD Avian Protection Plan. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, the species does not breed in the Permit Area but traditionally winters in the Permit Area each year (Jim Estep, pers. comm.). Species nests of the ground in open marshes, bogs, wet grasslands, and meadows Species forages in harvested corn, rice, alfalfa, pastures, and other cultivated fields and seasonal wetland habitats. Species is state listed as threatened. SMUD would not receive take coverage through collision or electrocution on their lines. As a California Fully Protected Species, SMUD cannot take greater sandhill crane, therefore the HCP cannot allow for take of this state-listed species through 2081 of the CESA (take allowance for Fully Protected species is only available through a Natural Community Conservation Plan); therefore, species is not proposed for coverage.
Haematopus bachmani	black oystercatcher	--	--	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests and forages on the ground in rocky seacoasts and islands (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Haliaeetus leucocephalus	bald eagle	D	E/FP	--	-	+	+	-	-	Species identified in the Yolo NHP and the PCCP as a Covered Species. Species identified on the USFWS Birds of Conservation Concern list and in the SMUD Avian Protection Plan. There are no reported CNDDB occurrences of this species within the Permit Area; there is one occurrence within the 5-mile buffer of the Permit Area east of El Dorado Hills (CNDDB 2013). This species is known to forage and winter within the Permit Area (Brent Helm, pers. comm..; Jim Estep, pers. comm.), but not nest. Species nests in trees except in regions where only cliff faces or ground sites are available. Species forages in forested areas adjacent to large bodies of water, around fish processing plants, dumps, below dams and in dry, open uplands if there is access to open water for fishing (Cornell 2013). Species is federally delisted and state threatened. It is unlikely this species will be re-listed in the foreseeable future by the federal government due to a strong recovery nationwide. Furthermore, coverage under the HCP is unnecessary because take of individuals would not be allowed anyway due to the restrictions of the federal Bald and Golden Eagle Protection Act and the species' state Fully Protected status; therefore, it is not proposed for coverage.
Icteria virens	yellow breasted chat	--	SSC	--	-	+	+	+	-	Species identified on the USFWS Birds of Conservation Concern list and in the SMUD Avian Protection Plan. There are no reported CNDDB occurrences of this species within the Permit Area; there is one occurrence within the 5-mile buffer of the Permit Area near Mokelumne river, about 0.9 mi upstream from Camanche Reservoir (CNDDB 2013). The species has been found recently nesting in the Delta, including within the Permit Area (Jim Estep, pers. comm.). Species nests in dense shrubs. Species forages in dense second-growth, riparian thickets, and brush (Cornell 2013). Species is unlikely to be listed during the Permit term therefore, it is not proposed for coverage.
Ixobrychus exilis	least bittern	--	SSC	--	-	+	+	-	-	Species identified in the Yolo NHP as a Local Species of Concern and in the SMUD Avian Protection Plan. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, the species has been observed at the Stone Lakes National Wildlife Refuge (Jim Estep, pers. comm.). Species nests in platforms of marsh vegetation placed in dense, tall stands of vegetation. Species forages in freshwater or brackish marshes with tall emergent vegetation (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Lanius ludovicianus	loggerhead shrike	--	SSC	--	-	+	+	+	-	Species identified in the SSHCP, NBHCP, MAPHCP, Yolo NHP and PCCP as a Covered Species. Species identified on the USFWS Birds of Conservation Concern list and on the SMUD Avian Protection Plan. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, nesting records have been reported from throughout the Permit Area, including the Natomas Basin, Stone Lakes National Wildlife Refuge, and Cosumnes River Preserve (Jim Estep, pers. comm.). Species nests in trees and forages in open pastures and cultivated habitats with scattered bushes, hedgerows and trees (Sibley 2003). Species is unlikely to be listed during the Permit term therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Laterallus jamaicensis coturniculus	California black rail	--	T/FP	--	+	-	+	-	-	Species identified in the Yolo NHP as a Species of Local Concern and in the PCCP as a Covered Species. Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area; there is one occurrence in the 5-mile buffer near Loomis (CNDDB 2013). Species observed in the interior Delta, where the species nests on small in-channel islands (Jim Estep, pers. comm.). Species nests on the ground. Species forages in high portions of salt marshes, shallow freshwater marshes, wet meadows and flooded grassy vegetation (Cornell 2013). Species is state listed as threatened. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Limnodromus griseus	short-billed dowitcher	--	--	--	-	+	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, species has been observed within the Permit Area at Cosumnes River Preserve and the Yolo Bypass Wildlife Area. The species does not breed in the state (Jim Estep, pers. comm.). Species nests in thick vegetation, usually on top of a clump of sedge. Species forages in subarctic tundra, coastal mud flats, brackish lagoons, saltwater tidal flats, beaches, salt marshes, freshwater mud flats and flooded agricultural fields (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Limosa fedoa	marbled godwit	--	--	--	-	+	+	+	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species in the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). The species has been observed at the Cosumnes River Preserve and several locations in the Delta region. This species does not breed in California but winters along the coast and in the Central and southern Central Valley (Jim Estep, pers. comm.). Species nests on ground around prairie ponds and forages in marshes, flooded plains, mudflats and beaches (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Melanerpes lewis	Lewis's woodpecker	--	--	--	-	+	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013); however, the species has been observed within the Permit Area near Rancho Seco (Jim Estep, pers. comm.). Species nests in the cavities of trees and forages in dry open pine forests and other habitat with scattered trees, such as orchards (Sibley 2003). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Melospiza melodia ssp. *graminea*	Channel Island song sparrow	--	SSC	--	-	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in grasses or weeds and forages in tidal marshes, arctic grasslands, desert scrub, pinyon pine forests, aspen parklands, prairie shelterbelts, Pacific rain forest, chaparral, agricultural fields, overgrown pastures, freshwater marsh and lake edges, forest edges, suburbs, and deciduous or mixed woodlands (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Melospiza melodia mailliardi	Modesto song sparrow	--	SSC	--	-	+	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). The range of this population of song sparrow includes the entire Permit Area (Jim Estep, pers. comm.). Species nests in grasses or weeds and forages in tidal marshes, arctic grasslands, desert scrub, pinyon pine forests, aspen parklands, prairie shelterbelts, Pacific rain forest, chaparral, agricultural fields, overgrown pastures, freshwater marsh and lake edges, forest edges, suburbs, and deciduous or mixed woodlands (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Melospiza melodia maxillaris	Suisun song sparrow	--	SSC	--	-	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). This species' range is generally restricted to the extreme western Delta, Suisun Marsh, and the eastern San Francisco Bay estuary. Its range does not include the Permit Area (Jim Estep, pers. comm.). Species nests in grasses or weeds and forages in tidal marshes, arctic grasslands, desert scrub, pinyon pine forests, aspen parklands, prairie shelterbelts, Pacific rain forest, chaparral, agricultural fields, overgrown pastures, freshwater marsh and lake edges, forest edges, suburbs and deciduous or mixed woodlands (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Melospiza melodia ssp. *pusillula*	Alameda song sparrow	--	SSC	--	-	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). This species' range is generally restricted to the San Francisco Bay. Its range does not include the Permit Area (Jim Estep, pers. comm.). Species nests in grasses or weeds and forages in tidal marshes, arctic grasslands, desert scrub, pinyon pine forests, aspen parklands, prairie shelterbelts, Pacific rain forest, chaparral, agricultural fields, overgrown pastures, freshwater marsh and lake edges, forest edges, suburbs and deciduous or mixed woodlands (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Melospiza melodia ssp. *samuelis*	Samuels (San Pablo) song sparrow	--	SSC	--	-	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). This species' range is generally restricted to the northern San Francisco Bay. Its range does not include the Permit Area (Jim Estep, pers. comm.). Species nests usually hidden in grasses or weeds. Species forages in tidal marshes, arctic grasslands, desert scrub, pinyon pine forests, aspen parklands, prairie shelterbelts, Pacific rain forest, chaparral, agricultural fields, overgrown pastures, freshwater marsh and lake edges, forest edges, suburbs and deciduous or mixed woodlands (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Numenius phaeopus	whimbrel	--	--	--	-	+	+	+	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, winter occurrences are regularly reported from the Permit Area. The species does not breed in California (Jim Estep, pers. comm.). Species nests in shallow bowl on the ground and forages in wet lowlands, dry heath, fields, beaches, tidal flats and shorelines (Cornell 2013). Species is unlikely to be listed during the permit term; therefore, it is not proposed for coverage.
Numenius americanus	Long-billed curlew	--	WL	--	-	+	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, this species is common and widespread in pasturelands and cultivated habitats throughout the Permit Area during winter. This species does not breed in the Central Valley (Jim Estep, pers. comm.). Species nests in scrapes on the ground and forages in sparse, short grasses, including shortgrass and mixed-grass prairies, agricultural fields, taller, denser grasses, wetlands, tidal estuaries, mudflats, flooded fields and occasionally beaches (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Nycticorax nycticorax	black-crowned night heron	--	--	--	-	+	+	+	-	Species identified in the SMUD Avian Protection Plan. There are five CNDDB reported nesting occurrences within the Permit Area; one north of Herald, three near Beach Lake, and one north of Sacramento International Airport (CNDDB 2013). However, this species is common and widespread in the Permit Area (Jim Estep, pers. comm.). Species nests in trees or cattails and forages in various wetland habitats including salt, brackish, freshwater marshes, swamps, streams, lakes and agricultural fields (Cornell 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Oceanodroma homochroa	ashy storm-petrel	--	SSC	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in underground caverns and burrows on islands. Species forages over open ocean for plankton (Sibley 2003). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Otus flammeolus	flammulated owl	--	--	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in tree cavities and forages in open pine forest along mountains (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Pandion haliaetus	osprey	--	WL	--	-	+	+	+	-	Species identified in the SMUD Avian Protection Plan. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, this species is known to nest in the southeastern portion of the Permit Area and is occasionally observed hunting along the Sacramento River (Jim Estep, pers. comm.). Species nests on snags, treetops, or crotches between large branches and trunks, on cliffs, or on human-built platforms. Species forages any expanse of shallow, fish-filled water, including rivers, lakes, reservoirs, lagoons, swamps, and marshes (Cornell 2013). This species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Phalacrocorax auritus	double-crested cormorant	--	WL	--	-	+	+	+	-	Species identified in the SMUD Avian Protection Plan. There are four reported CNDDB occurrences within the Permit Area: two of these are at Beach Lake, one is at Stone Lake and the last is at Lake Natoma (CNDDB 2013). Species nests on ground, rocks or reefs with no vegetation, or atop trees and forages in lakes and ponds (Cornell 2013). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Phoebastria nigripes	black-footed albatross	--	--	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in a scrape in the sand and forages in sandy areas on islands and over open ocean (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Pica nuttali	yellow-billed magpie	--	--	--	-	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list and in the Yolo NHP as a Species of Local Concern. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, the species is known to occur throughout the Permit Area (Jim Estep, pers. comm.). Species nests in trees and forages in oak savanna, open areas with large trees, along streams, in grassland, pasture, fields and orchards (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Picoides albolarvatus	white-headed woodpecker	--	--	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in the cavities of dead trees and forages in montane coniferous forests (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Picoides nuttallii	Nuttall's woodpecker	--	--	--	-	+	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, this species is known to occur in riparian and other woodland habitats throughout the Permit Area (Jim Estep, pers. comm.). Species nests in the cavities of trees and forages in oak woodlands and riparian woods (Cornell 2103). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Pipilo maculatus clementae	San Clemente spotted towhee	--	SSC	--	-	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests on the ground (often deep inside a thicket) and forages in dry thickets, brushy tangles, forest edges, old fields, shrubby backyards, chaparral, coulees and canyon bottoms (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Plegadis chihi	white-faced ibis	--	WL	--	-	+	+	+	-	Species identified in the NBHCP and MAPHCP as a Covered Species. Species identified in the SMUD Avian Protection Plan. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, this species is common in the rice fields of the Natomas Basin and has been observed elsewhere within the Permit Area (Jim Estep, pers. comm.). Species nests in low trees or reeds and forages for aquatic prey in muddy pools, marshes and rice fields (Sibley 2003). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Progne subis	purple martin	--	SSC	--	-	+	-	+	-	Species identified in the Yolo NHP as a Covered Species and in the SMUD APP. There are 10 reported CNDDB occurrences distributed throughout the greater Sacramento urban area in the Permit Area (CNDDB 2013). Species nests in hollow-box bridges in Sacramento (Shuford and Gardali 2008), and elsewhere in birdhouses, holes in trees, holes in cactus, or crevices in cliffs or buildings and forages over towns, cities, parks, open fields, dunes, streams, wet meadows, beaver ponds, and other open areas (Cornell 2013). With the decline of suitable nest trees, the species has more recently nested in the weep holes of freeway underpasses (Jim Estep, pers. comm.). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Ptychoramphus aleuticus	Cassin's auklet	--	--	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in burrows or crevices on islands and forages over the open ocean for plankton (Sibley 2003). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Puffinus creatopus	pink-footed shearwater	--	--	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in burrows or forested slopes on islands off western Chile and forages on the open ocean for squid and fish (Sibley 2003). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Puffinus opisthomelas	black-vented shearwater	--	--	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in burrows or rocky crevices on islands off western Mexico and forages on the open ocean for squid and fish (Sibley 2003). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Rallus longirostris obsoletus	California clapper rail	E	E/FP	--	+	-	+	-	-	Species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests and forages in salt and brackish marsh habitats in the Sacramento-San Joaquin Delta and the San Francisco estuary (Jim Estep, pers. comm.). Species is federally listed as endangered and state listed as endangered. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Riparia riparia	bank swallow	--	T	--	+	+	+	-	-	Species identified in the NBHCP, the MAPHCP, the Yolo NHP and the PCCP as a Covered Species. There are six reported CNDDB occurrences of this species within the Permit Area; four of these are along the American river and two occurrences are near Rancho Murieta along the Cosumnes river (CNDDB 2013). Species nests by burrowing into vertical banks and bluffs and forages in low areas along rivers, streams, ocean coasts, or reservoirs (Cornell 2013). Species is state listed as threatened. Species is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Rynchops niger	black skimmer	--	SSC	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences for this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests on beaches, gravel or shell bars, dredge deposition islands, saltmarshes and rooftops and forages on open sandy beaches, gravel or shell bars with sparse vegetation, or on mats of sea wrack (tide-stranded debris) in saltmarsh (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Selasphorus sasin	Allen's hummingbird	--	--	--	-	+	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). The species has been observed at the Cosumnes River Preserve (Jim Estep, pers. comm.). Species nests in shrubs or branches of trees and forages in moist coastal areas, scrub, chaparral and forests (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Spinus lawrencei	Lawrence's goldfinch	--	--	--	-	+	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, this species has been observed within the Permit Area (Brent Helm, pers. comm.; Jim Estep, pers. comm.). Species nests in trees and forages in open woodland, chaparral and weedy fields (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Spizella atrogularis	black-chinned sparrow	--	--	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in brushy vegetation and forages in chaparral and similar arid hillsides (Sibley 2003). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Strix occidentalis caurina	northern spotted owl	T	SSC	--	+	-	+	-	-	Species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in tree cavities, broken-topped trees, and platforms, such as old raptor or squirrel nests and forages in old-growth coniferous forests, other forest types and rocky canyons (Cornell 2013). Species is federally listed as threatened. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Strix occidentalis occidentalis	California spotted owl	--	SSC	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). This species often migrates to lower foothill elevations during the non-breeding season, but it occurs at higher elevations than the Permit Area. Species nests in tree cavities, broken-topped trees, and platforms, such as old raptor or squirrel nests and forages in old-growth coniferous forests, other forest types and rocky canyons (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Synthliboramphus hypoleucus	Xantus' murrelet (Guadalupe murrelet)	C	T	--	+	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in crevices on rocky islands and forages in relatively warm open water (Sibley 2003). Species is a federal candidate and state listed as threatened. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Synthliboramphus scrippsi	Xantus' murrelet (Scripps's murrelet)	C	T	--	+	-	-	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in crevices on rocky islands and forages in relatively warm open water (Sibley 2003). Species is a federal candidate and state listed as threatened. Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Toxostoma lecontei	LeConte's thrasher	--	SSC	--	-	-	+	-	-	Species identified on the USFWS Birds of Conservation Concern list. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species nests in thorny desert shrubs or cactus and forages in desert scrub, mesquite, chaparral and tall riparian brush (Cornell 2013). Species is unlikely to be affected by SMUD's Covered Activities because it is not expected to occur within the Permit Area; therefore, it is not proposed for coverage.
Vireo bellii pusillus	least Bell's vireo	E	E	--	+	-	+	+	+	Species identified in the USFWS search of USGS quadrangles for the Permit area and 5-mile buffer of the Permit Area. Species identified in the Yolo NHP as a Covered Species. There are no reported CNDDB occurrences of this species within the Permit Area; there is one occurrence in the 5-mile buffer along the south fork Putah Creek, Yolo Bypass Wildlife Area (CNDDB 2013). Species nests in small trees or shrubs and forages in dense, low, shrubby vegetation, brushy fields, young second-growth forest or woodland, scrub oak, coastal chaparral and mesquite brushlands (Cornell 2013). This species continues to move northward and could potentially occur in the Permit Area during the Permit term (Jim Estep, pers. comm.). Species is federally listed as endangered and state listed as endangered. If the species continues to expand its range and enters the Permit Area, the species has potential to be affected by SMUD's Covered Activities; therefore, it is proposed for coverage.
Xanthocephalus xanthocephalus	yellow-headed blackbird	--	SSC	--	-	+	-	-	-	Species identified in the Yolo NHP as a Species of Local Concern and in the SMUD Avian Protection Plan. There is one reported CNNDDB occurrence within the Permit Area from an 1899 egg collection along the Sacramento River south of the Pocket (CNDDB 2013). However, the species is known to occur in the Yolo Bypass Wildlife Area and at several locations within the Permit Area (Jim Estep, pers. comm.). Species nests in wetland prairies, mountain meadows, quaking aspen parklands, and shallow areas of marshes, ponds, rivers, cattails, bulrushes, and reeds and forages in grasslands, croplands, or savanna (Cornell 2013). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Mammals										
Antrozous pallidus	pallid bat	--	SSC	--	-	+	+	-	-	Species identified in the SSHCP as a Covered Species and in the Yolo NHP as a Species of Local Concern. There is one reported CNDDB occurrence in the Permit Area from a specimen collection in Folsom from 1941 (CNDDB 2013). However, this species is widely distributed in the Central Valley and likely occurs in the Permit Area (Jeff Alvarez, pers. comm.). Day roosts are in caves, crevices, mines, and occasionally in hollow trees and buildings. Night roosts may be in more open sites, such as porches and open buildings (Zeiner et al. 1988). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Corynorhinus townsendii	Townsend's big-eared bat	--	SSC	--	-	-	+	-	-	Species identified in the Yolo NHP as a Covered Species. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species is found throughout California, but the details of its distribution are not well known. This species is found in all but subalpine and alpine habitats, and may be found at any season throughout its range. Requires caves, mines, tunnels, buildings, or other human-made structures for roosting. May use separate sites for night, day, hibernation, or maternity roosts. (Zeiner et al. 1988) Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Lasionycteris noctivagans	silver-haired bat	--	--	--	-	+	+	+	-	There are two reported CNDDB occurrences of this species within the Permit Area. Both are specimen collections, one in Folsom and the second in Orangevale (CNDDB 2013). Species ranges from the Oregon border south along the coast to San Francisco Bay, and along the Sierra Nevada and Great Basin region to Inyo County. It is widespread during spring and fall migration during which time it can be found throughout the Central Valley, including within the Permit Area (Jeff Alvarez, pers. comm.). Species roosts in hollow trees, snags, buildings, rock crevices, caves, and under bark (Zeiner et al. 1988). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

Scientific Name	Common Name	Legal Status[1]		CNPS Status[1]	Listing Potential[2]	Occurrence in Permit Area[3]	Sufficient Information[4]	Potential to be Affected[5]	Proposed for Coverage[6]	Comments
		Federal	State							
Lasiurus blossevillii	western red bat	--	SSC	--	-	+	+	+	-	Species identified in the SSHCP as a Covered Species and in the Yolo NHP as a Species of Local Concern. There are no reported CNDDB occurrences within the Permit Area, but there are three known occurrences within the 5-mile buffer of the Permit Area in the Sacramento Delta (CNDDB 2013). Additionally, this species has been observed in several locations within the Permit Area (Pierson et al. 2006). Species roosts primarily in trees, less often in shrubs in edge habitats adjacent to streams, fields, or urban areas (Zeiner et al. 1988). Cottonwood and sycamore riparian forests are the most often used habitat, with orchards being a surrogate habitat (Pierson et al. 2006). Species is unlikely to be listed during the Permit term; therefore, it is not proposed for coverage.
Lasiurus cinereus	hoary bat	--	--	--	-	+	+	+	-	There are no reported CNDDB occurrences of this species within the Permit Area; there are two reported CNDDB occurrences from specimen collections within the 5-mile buffer of the Permit Area, one in West Sacramento and the one in Davis (CNDDB 2013). However, this species has been observed within the Permit Area (Brent Helm, pers. comm.). Species is distributed throughout California and roosts in dense foliage and on the bark of medium to large trees (Zeiner et al. 1988). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Myotis yumanensis	Yuma myotis bat	--	--	--	-	-	+	-	-	Species identified in the SSHCP as a Covered Species. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). However, this species is common and widespread in California and known to occur within the Permit Area (Jeff Alvarez, pers. comm.). Species roosts in buildings, mines, caves, crevices, and sometimes under bridges, and forages in association with creeks, ponds, and other water bodies (Zeiner et al. 1988). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Perognathus inornatus inornatus	San Joaquin pocket mouse	--	--	--	-	-	+	-	-	Species identified in the Yolo NHP as a Species of Local Concern. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). The Permit Area occurs within the range of the species; however, loss of suitable grassland habitats has resulted in the species decline and restricted its current distribution (Jeff Alvarez, pers. comm.). Species occurs in dry, open grasslands, or scrub areas in the Central and Salinas valleys (Zeiner et al. 1988). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.
Sylvilagus bachmani riparius	riparian brush rabbit	E	E	--	+	-	+	-	-	Species identified in the USFWS search of USGS quadrangles for the Permit Area and 5-mile buffer of the Permit Area. There are no reported CNDDB occurrences of this species within the Permit Area or within the 5-mile buffer of the Permit Area (CNDDB 2013). Species is restricted to Caswell Memorial State Park and several locations in the south Delta, but was historically distributed throughout the Sacramento and San Joaquin river systems. Species occurs in riparian forests with a dense understory shrub layer (§65 FR 8881). Species is unlikely to be affected by SMUD's Covered Activities because it is unlikely to occur in the Permit Area; therefore, it is not proposed for coverage.
Taxidea taxus	American badger	--	SSC	--	-	+	+	-	-	Species identified in the SSHCP as a Covered Species and in the Yolo NHP as a Species of Local Concern. There are two reported CNDDB occurrences within the Permit Area, one occurrence south of Mather Airport and the second occurrence along the Sacramento River (CNDDB 2013). Species is distributed throughout California except in the North Coast. Species occurs in burrows in friable soils in drier open stages of shrub, forest, and herbaceous habitats (Zeiner et al. 1988). Species is unlikely to be listed during the Permit term and is unlikely to be affected by SMUD's Covered Activities; therefore, it is not proposed for coverage.

Table B-2 Analysis of Potential Covered Plant and Wildlife Species for SMUD's Habitat Conservation Plan

[1] Status Explanations:

Federal

E = Listed as endangered under ESA
T = Listed as threatened under the ESA
PT = Proposed for federal listing as threatened under the ESA
C = Species for which USFWS has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list, but issuance of the proposed rule is precluded
P = Petitioned for listing as threatened or endangered under the ESA
D = Delisted

State

E = Listed as endangered under the CESA
T = Listed as threatened under the CESA
R = Rare
SSC = Species of Special Concern
D = Delisted
FP = Fully Protected under the California Fish and Game Code
WL = Watch List
-- = No listing

CNPS

1B = List IB species: rare, threatened, or endangered in California and elsewhere.
2 = List 2 species: rare, threatened, or endangered in California, but more common elsewhere.
3 = List 3 species: lack the necessary information to assign them to one of the other ranks or to reject them.
4 = List 4 species: limited distribution or infrequent throughout a broader area in California, but uncommon enough that their status should be monitored regularly.
.1 = seriously endangered in California.
.2 = fairly endangered in California.
.3 = not very threatened in California

[2] Listing Potential
(–) Species is not currently state or federally listed as threatened or endangered, and has low potential of being listed over the next 5-10 years.
(+) Species is currently state or federally listed as a candidate, threatened, or endangered; species has been federally petitioned within the last 10 years; plant species is a CNPS list 1B plant.

[3] Occurrence in the Permit Area
(–) Species has not been documented in the Permit Area and/or the Permit Area lacks suitable habitat or is outside the species range; species is unlikely to occur within Permit Area.
(+) Species has been documented in the Permit Area and/or suitable habitat is present; species may occur within the Permit Area.

[4] Sufficient Information
(–) Sufficient scientific information and data are not available to address species' biological requirements, conservation needs, and compensation options.
(+) Sufficient scientific information and data are available to address species' biological requirements, conservation needs, and compensation options.

[5] Potential to be Affected
(–) Species is unlikely to be affected by Covered Activities; species does not occur within the Permit Area.
(+) Species is likely to be affected by Covered Activities; Covered Activities may result in take.

[6] Proposed for Coverage

Species are proposed for coverage if the following criteria are met:

- The species is state or federally listed or has potential to be listed during the Permit term or species is state fully protected,
- The species has a moderate to high likelihood of occurring within the Permit Area, and
- The species is likely to be affected by SMUD's Covered Activities.

(–) Species not proposed for coverage
(+) Species proposed for coverage

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APPENDIX C SPECIES DESCRIPTIONS

1.0 Plants

1.1 Slender Orcutt Grass (*Orcuttia tenuis*)

1.1.1 Conservation Considerations

Status

Federal: Threatened

State: Endangered

Other: California Native Plant Society List 1B.1

1.1.2 Habitat Requirements

Slender Orcutt grass is a small annual herb in the grass family (Poaceae). Slender Orcutt grass is considered one of the least specifically adapted of the Orcutt grasses with regard to hydrology and habitat breadth, indicated by its presence in a wider range of vernal pool sizes and vernal wetland types,; occurrence over a greater geographical area and landform types; a larger number of occurrences; and a marked tendency to colonize newly available habitats (where seed sources are available), including constructed stockponds and hydrology-enhanced vernal pools (Stone *et al.* 1988). Slender Orcutt grass occurrences are distributed among six of the Geographic Subregions of the California Floristic Province and Great Basin Province, as described by Baldwin (2012): the Sacramento Valley, Inner North Coastal Ranges, Cascade Range Foothill, High Cascade Range, and the Non-Warner Mountain and Warner Mountain Sub-regions of the Modoc Plateau Region (Baldwin 2012, CNPS 2013). Vegetation types in which the occupied pools occur are diverse, ranging from grassland and oak woodland to mixed conifer forest, silver sagebrush flats, and sedge meadows (USFWS 2005).

Slender Orcutt grass is found primarily on substrates of volcanic origin, classified as Northern Volcanic Ashflow and Northern Volcanic Mudflow vernal pools (USFWS 2005). Soil types supporting slender Orcutt grass are diverse, ranging from slightly to strongly acidic (Stone *et al.* 1988) and from clay to sandy, silty, or cobbly loam (Corbin and Schoolcraft 1989). The soil series for slender Orcutt grass in the Northeastern Sacramento Valley are the Anita, Guenon, Inks, Inskip, Laniger, Moda, Redding, Toomes, and Tuscan soil series (USFWS 2005). The Redding soil series also supports slender Orcutt grass in the Southeastern Sacramento Valley Vernal Pool Region (Stone *et al.* 1988).

Among the populations studied by Stone *et al.* (1988), the median area of pools occupied by slender Orcutt grass was 1.6 acres (0.65 hectares) and ranged from 0.2 to 111 acres (0.08 to 45 hectares). On the Modoc Plateau, occupied pools known as of 1989 ranged in size from five to 100 acres (2 to 40 hectares) and were typically at least 11.8 inches (30 centimeters) deep, but slender Orcutt grass was restricted to the deepest areas of these pools (Corbin and Schoolcraft 1989).

Slender Orcutt grass has a wetland indicator status of obligate wetland (OBL), which means it almost always occurs in wetlands under natural conditions (USACE 2008).

In the Permit Area, slender Orcutt grass occurs in the SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type. All CNDDB occurrences of slender Orcutt grass and critical habitat for this species in the Permit Area are confined to the U.S. Fish and Wildlife Service Mather Core Recovery Area in the Southeastern Sacramento Valley Vernal Pool Region (CNDDB 2013; USFWS 2005).

1.1.3 Reproduction and Demography

Slender Orcutt grass blooms from May to October (CNPS 2013). Peak flowering of this species typically occurs in May in the Central Valley (USFWS 2005). The life history characteristics of slender Orcutt grass are common to all species of Orcutt grasses. They are all annuals and wind-pollinated; although the pollen probably is not carried long distances between populations. Local seed dispersal is by water, which breaks up the inflorescences. It is speculated that long-distance dispersal is unlikely, but seed may have historically been carried by waterfowl or other animals that visit vernal pools (USFWS 2005). The seeds can remain dormant for an undetermined length of time (at least three to four years) and germinate underwater in the fall or winter after they have been immersed for prolonged periods and exposed to cold stratification followed by increasingly warm fluctuating diurnal temperatures and the presence of symbiotic aquatic fungi (USFWS 2005).

1.1.4 Community Associations

Associated species vary throughout the range of slender Orcutt grass. Among the most common associates in the Sacramento Valley are stalked popcornflower (*Plagiobothrys stipitatus*), spikerush species (*Eleocharis* spp.), coyote thistle (*Eryngium* spp.), white-headed navarretia (*Navarretia leucocephala*), and hairy waterclover (*Marsilea vestita* ssp. *vestita*) (USFWS 2005).

1.1.5 Distribution

Slender Orcutt grass is among the most widespread of the *Orcuttiae* grasses and exhibits the widest range in elevation from 100 to 5,775 feet (35 to 1,760 meters). It is scattered in distinct areas of northern California in gravelly vernal pools that occur on remnant alluvial fans, on high stream terraces, and recent basalt flows within valley

grassland and blue oak woodland (CNPS 2013; USFWS 2005). These distinct areas are: the Sacramento Valley from eastern Sacramento County in the south to the vicinity of Redding in Shasta County to the north; the Cascade Range Foothills in the region north and northeast of Red Bluff, as well as sites in the Pit River Drainage; the montane region of northern Plumas, western Lassen and eastern Shasta counties, extending from the vicinity of Lake Almanor, north to the plateau region east and northeast of Lassen Peak; and the Inner Coast Range region of Lake County (CNPS 2013; CNDDB 2013).

There are 96 known occurrences, 89 of which are presumed extant in Sacramento, Lake, Tehama, Shasta, Siskiyou, Lassen, Modoc, Butte, and Plumas counties (CNDDB 2013). Modoc County has the most extant occurrences with 26, followed by Tehama County with 23 and Shasta County with 21 (CNDDB 2013). The species is located within the Northeastern Sacramento Valley Vernal Pool Region, Lake-Napa Vernal Pool Region, and Southeastern Sacramento Valley Vernal Pool Region (Keeler-Wolf *et al.* 1998).

There are three recorded California Natural Diversity Database (CNDDB) occurrences within the Permit Area, all in the Mather Core Recovery Area (CNDDB 2013).

1.1.6 Population Trend

The majority of the CNDDB occurrences reported unknown population trends, four reported decreasing populations, two reported stable populations, and two reported fluctuating populations (CNDDB 2013). Similar to other vernal pool annuals, slender Orcutt grass populations can vary greatly in size from year to year with fluctuations of up to four orders of magnitude documented in Lake and Shasta counties (USFWS 2003). This variability is attributable to interactions of seed dormancy, early seedling survivorship, and average seed set per plant, as determined by seasonal and between-year limitations in available moisture (Griggs and Jain 1983; Holland 1987).

1.1.7 Threats

Threats to vernal pool habitat and all vernal pool species in general, including slender Orcutt grass, are described in the *Recovery Plan for Vernal Pool Ecosystems for California and Southern Oregon* and include: habitat loss and fragmentation generally resulting from urbanization, agricultural conversion, and mining; and also occurring as a result of habitat alteration and degradation due to changes to natural hydrology, invasive species, incompatible grazing regimes (including insufficient grazing for prolonged periods), infrastructure projects (such as roads and utility projects), recreational activities (such as off-highway vehicles and hiking), erosion, climatic and environmental change, and contamination (USFWS 2005). Logging and fire are also listed by the California Native Plant Society (CNPS) as threats (CNPS 2013). Threats to slender Orcutt grass in the Permit Area include encroaching development, thatch

build-up, competition with invasive plants, hydrological changes, use of herbicide, human disturbance, and cattle grazing (CNDDB 2013).

1.1.8 Existing Conservation and Management

Slender Orcutt grass was federally listed as threatened on March 26, 1997 (USFWS 1997) and has been state listed as endangered since 1979 (CDFG 1991). USFWS determined no change was needed in the listing status of this species during the five-year review process (USFWS 2009). This species was recognized as rare and endangered by CNPS as early as 1974 (Powell 1974) and is now included on its List 1B.1, meaning it is seriously endangered in California, with more than 80 percent of occurrences threatened (CNPS 2013).

Critical habitat was designated for this species and several other vernal pool species in 2003 (USFWS 2003). The primary constituent elements (PCEs) of critical habitat for slender Orcutt grass are:

> "(i) Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools described below in (ii), providing for dispersal and promoting hydroperiods of adequate length in the pools.
>
> (ii) Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and nonnative upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands." (USFWS 2006).

There are 1,161 acres of critical habitat in the Permit Area. The subunits of critical habitat for this species are Unit 1 A-I, Unit 2 A-C, Unit 3, Unit 4, Unit 5 A-B, and Unit 6. Unit 6 is contained entirely within the Permit Area and is located north of Highway 16, south of Douglas Road, and east of Excelsior Road south of Rancho Cordova.

Slender Orcutt grass is one of 33 species of vernal pool plants and animals included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005). In the Permit Area, the recovery plan identified the goal of protecting 95 percent of suitable habitat for slender Orcutt grass in the Mather core recovery area within the Southeast Sacramento Vernal Pool Region (USFWS 2005). This species has been identified in the USFWS Vernal Pool Core Recovery Areas including Boggs Lake-Clear Lake, Northern Modoc Plateau, Western Modoc Plateau, Southwestern Modoc

Plateau, Southern Modoc Plateau, Dales, Palermo, Vina Plains, Redding, Millville Plains, and Mather.

Four natural occurrences of slender Orcutt grass are in designated preserves. These include the Trust for Wildland Communities' Boggs Lake Preserve in Lake County, The Nature Conservancy's Vina Plains Preserve in Tehama County, and two occurrences on the California Department of Fish and Wildlife's Dales Lake Ecological Reserve in Tehama County (USFWS 2005). It is also found at private mitigation banks such as the Stillwater Plains Mitigation Bank in Shasta County. Introductions of slender Orcutt grass have been attempted at two privately owned sites in Butte County and Shasta County with some success (USFWS 2005). Approximately one-third of the extant occurrences of slender Orcutt grass are wholly or partially on federal land, including Lassen National Forest, Shasta-Trinity National Forest, and the U.S. Bureau of Land Management's (BLM) Redding Resource Area and Alturas Resource Area (USFWS 2005). The Lassen National Forest and Susanville District of the BLM jointly prepared a management plan for slender Orcutt grass sites under their administration (including those in the Shasta-Trinity National Forest) in order to ensure the long-term survival of the species (Corbin and Schoolcraft 1989). None of the three known Permit Area occurrences are on preserved land.

Slender Orcutt grass is proposed as a covered species under the draft South Sacramento County Habitat Conservation Plan (HCP) (County of Sacramento *et al.* 2010) and draft Butte Regional Conservation Plan (BCAG 2012), and is a covered species in the Natomas Basin HCP (City of Sacramento *et al.* 2003).

1.1.9 SMUD HCP Modeled Habitat

Modeled habitat for slender Orcutt grass is the SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type located within the designated Phoenix Field and Park, Mather, and Cosumnes/Rancho Seco core recovery areas (Figure 3-11). There are 3,273 acres of slender Orcutt grass modeled habitat within the Permit Area.

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1.2 Sacramento Orcutt Grass (*Orcuttia viscida*)

1.2.1 Conservation Considerations

Status

Federal: Endangered

State: Endangered

Other: California Native Plant Society List 1B.1

1.2.2 Habitat Requirements

Sacramento Orcutt grass is a small annual herb in the grass family (Poaceae). Sacramento Orcutt grass appears to be the most specific of the genus *Orcuttia* in regard to niche breadth, indicated by restriction to the largest pools, comparatively poor seed germination during marginal hydrologic seasons, and highly limited geographic distribution (Holland 1987; Stone *et al.* 1988). The narrow geographic range of this species may be due to its relatively high level of ecological specialization and comparatively narrow habitat requirements (Stone *et al.* 1988; Holland 1987). This distribution also may reflect the fact that the largest, most hydrologically stable pools located at lower topographical positions in the Central Valley were the first lost to agriculture (USFWS 2005).

Sacramento Orcutt grass has been found in Northern Hardpan and Northern Volcanic Mudflow vernal pools (Sawyer and Keeler-Wolf 1995; USFWS 2005). Soils underlying pools where Sacramento Orcutt grass occur are acidic with an iron-silica hardpan (Stone *et al.* 1988), containing numerous cobbles (Crampton 1959; Stone *et al.* 1988). This species often occurs in gravelly vernal pools on Red Bluff-Redding Complex, Redding Gravelly Loam, Corning Complex, and Xerarents-Urban Land San Joaquin Complex soils (CNPS 2013).

Among occupied pools discovered prior to 1988, the median area was 0.28 hectare (0.69 acre) and ranged from 0.1 hectare (0.25 acre) to 0.82 hectare (2.03 acres) (Stone *et al.* 1988). Of the Orcutt grasses, Sacramento Orcutt grass tends to occupy the larger, more hydrologic-extreme pools. Occupied pools occur in blue oak (*Quercus douglasii*) woodland and annual grassland (Crampton 1959; Griggs 1977; CNDDB 2013).

Sacramento Orcutt grass has a wetland indicator status of Obligate Wetland (OBL), almost always occurs in wetlands under natural conditions (USACE 2008).

In the Permit Area, Sacramento Orcutt grass occurs in the SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type. Based on a review of the CNDDB and

designated critical habitat for the species, all occurrences of this species are confined to three of the Southeastern Sacramento Valley Vernal Pool Region Recovery Core Areas, including Phoenix Field and Park, Mather, and Cosumnes/Rancho Seco core areas (USFWS 2005).

1.2.3 Reproduction and Demography

Sacramento Orcutt grass flowers in May and June and sets seed in June and July (CNPS 2013; Holland 1987). The plants are adapted for wind pollination, but provide a source of pollen for native bees (Stone *et al.* 1988). Seeds likely do not disperse far (USFWS 2005). The number of plants varies with rainfall. Large numbers of plants grow only in years when seasonal rainfall exceeds 15.7 inches (40 centimeters), particularly when heavy rains begin in November and continue through the end of April (Holland 1987).

Sacramento Orcutt grass is thought to be the most specifically adapted of the genus with regard to suitable hydrology (Stone *et al.* 1988). This species is apparently less likely to germinate in years of below-normal precipitation than are other members of the tribe (Griggs 1980; Griggs and Jain 1983). Sacramento Orcutt grass seeds germinate during the later spring months after cessation of winter rains, as the shallow water at the pool margins begins to warm and recede, and after a requirement of cold stratification followed by increasingly warm fluctuating diurnal temperatures and the presence of a symbiotic aquatic fungus occurs (Griggs 1977; Holland 1987; Stone *et al.* 1988).

Not all *Orcuttia* seeds germinate every year, resulting in the buildup of a dormant soil seed bank which is a critical adaptive barrier against local extinction events that could otherwise result from the unpredictable occurrence and duration of favorable growing conditions (Stone *et al.* 1988).

1.2.4 Community Associations

The most common associates of Sacramento Orcutt grass are stalked popcornflower (*Plagiobothrys stipitatus*), coyote thistle (*Eryngium* spp.), spikerush (*Eleocharis* spp.), and wooly marbles (*Psilocarphus brevissimus*) (USFWS 2005).

1.2.5 Distribution

Sacramento Orcutt grass occurs only in southeastern Sacramento County near the juncture of the Sierra Nevada foothills and eastern edge of the Sacramento Valley, qualifying it as the most geographically restricted member of the Orcutt grasses (USFWS 2005). It occurs within a narrow swath of remnant high terrace vernal pools in the Southeastern Sacramento Valley Vernal Pool Region, near the juncture of the Northern Sierra Nevada Foothill and Sacramento Valley biogeographic provinces, between 110 and 330 feet (33 to 100 meters) in elevation (CNPS 2013; Baldwin 2012; Keeler-Wolf *et al.* 1998; Stone *et al.* 1988; USFWS 2005). The recorded range of the

species extends in a narrow band of habitat from the terrace just north of the American River in the vicinity of Orangevale, south approximately 26 miles (40 kilometers) to the vicinity of Rancho Seco Lake on the Arroyo Seco Mesa. It is primarily concentrated into a single area of about 2.3 square miles (600 hectares) in the vicinity of Rancho Cordova east of Mather Field (CNDDB 2013). There are no historic records or collections of this species made outside of this area (Stone *et al.* 1988).

There are 12 occurrences of Sacramento Orcutt grass in the Permit Area, two of which are extirpated (CNDDB 2013). All 10 extant CNDDB occurrences are in vernal pools located in the east and northeastern portions of the Permit Area (CNDDB 2013) (Figure 3-12).

1.2.6 Population Trend

Most of the CNDDB occurrences in the Permit Area list the population trend as unknown with two occurrences as decreasing and one as fluctuating (CNDDB 2013). It is impossible to determine the number of historically occurring Sacramento Orcutt grass populations or the acreage of suitable habitat lost to historic agricultural land use conversions, since so much habitat had been lost before this species first received attention (Stone *et al.* 1988). There has been no comprehensive effort to monitor all populations of Sacramento Orcutt grass, but informal monitoring projects have been conducted by CDFW at the Phoenix Field Ecological Preserve, by Holland at the Phoenix Park Vernal Pool Preserve, and by Jones and Stokes at the Kiefer Landfill sites (County of Sacramento *et al.* 2010). Stone *et al.* (1988) also provided estimates of populations at all occurrences visited in 1986 and 1987. Abundance within Orcutt grass populations varies greatly between species, between populations within species, and within populations year-to-year (Griggs and Jain 1983; Holland 1987). This variability is attributable to interactions of seed dormancy, early seedling survivorship, and average seed set per plant, as determined by seasonal and between-year limitations in available moisture (Griggs and Jain 1983; Holland 1987).

1.2.7 Threats

Threats to vernal pool habitat and all vernal pool species in general, including Sacramento Orcutt grass, include: habitat loss and fragmentation generally resulting from urbanization, agricultural conversion, and mining; and also occurring as a result of habitat alteration and degradation due to changes to natural hydrology, invasive species, incompatible grazing regimes, infrastructure projects (such as roads and utility projects), recreational activities (such as off-highway vehicles and hiking), erosion, climatic and environmental change, and contamination (USFWS 2005). Threats to Sacramento Orcutt grass in the Permit Area include incompatible cattle grazing regimes, off road vehicle use, development, altered hydrology, competition with invasive species, activities associated with transmission line maintenance, recreational activities, and landfill expansion (CNDDB 2013).

1.2.8 Existing Conservation and Management

Sacramento Orcutt grass was federally listed as an endangered species on March 26, 1997 (USFWS 1997) and had been previously state listed as endangered in 1979 (CDFG 1991). The U.S. Fish and Wildlife Service determined no change was needed in the listing status of this species during the last five-year review process (USFWS 2008). The California Native Plant Society (CNPS) has included it on lists of very rare and endangered plants for over two decades (Powell 1974). CNPS currently includes this species in its List 1B.1, meaning it is seriously endangered in California, with more than 80 percent of occurrences threatened (CNPS 2013).

Critical habitat was designated for this species and several other vernal pool species in 2003 (USFWS 2003). The primary constituent elements (PCEs) of critical habitat for Sacramento Orcutt grass are:

> "(i) Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools described below in (ii), providing for dispersal and promoting hydroperiods of adequate length in the pools.
>
> (ii) Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and nonnative upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands." (USFWS 2006).

There are 31,079 acres of Sacramento Orcutt grass critical habitat in the Permit Area. Critical habitat Unit 1 is located in the Phoenix Field Ecological Reserve area, Unit 2 is located in the Mather Field area, and Unit 3 is located in the Rancho Seco area in southeastern Sacramento County and into western Amador County.

Sacramento Orcutt grass is one of 33 species of vernal pool plants and animals included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005). In the Permit Area, the Recovery Plan identified the goal of protecting 95 percent of suitable habitat for Sacramento Orcutt grass in the Phoenix Field and Park, Mather, and Cosumnes/Rancho Seco core recovery areas (USFWS 2005).

Two reserves have been set aside to protect this species: The Phoenix Field and Park Ecological Reserve encompassing 8 acres (3.2 hectares) managed by CDFW and the

Phoenix Park Vernal Pool Preserve encompassing 14 acres (5.7 hectares) managed by the Fair Oaks Recreation and Park District (USFWS 2005). Additionally, this species occurs on SMUD's Nature Preserve Mitigation Bank.

Sacramento Orcutt grass is proposed as a covered species under the draft South Sacramento County Habitat Conservation Plan (HCP) (County of Sacramento *et al.* 2010) and is a covered species in the Natomas Basin HCP (City of Sacramento *et al.* 2003).

1.2.9 SMUD HCP Modeled Habitat

Modeled habitat for Sacramento Orcutt grass is the SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type located within Phoenix Field and Park, Mather, and Cosumnes/Rancho Seco designated core recovery areas in the Permit Area. There are 3,273 acres of Sacramento Orcutt grass modeled habitat within the Permit Area.

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2.0 Invertebrates

2.1 Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)

2.1.1 Conservation Considerations

Status

Federal: Threatened

State: None

Other: None

2.1.2 Habitat Requirements

Vernal pool fairy shrimp inhabit cool-water seasonal pools that pond long enough for the species to complete its life cycle (Eng *et al.* 1990; USFWS 2007). The species is typically associated with smaller and shallower vernal pools (typically about 6 inches [15 centimeters] deep) that have relatively short periods of inundation (Helm 1998) and relatively low to moderate total dissolved solids (TDS) and alkalinity (Eriksen and Belk 1999); however, at the southernmost extremes of the range, vernal pool fairy shrimp is only present in large, deep pools (USFWS 2007). Pools occupied by vernal pool fairy shrimp tend to have grass or mud bottoms and clear to tea-colored water and are often in basalt flow depression pools in unplowed grasslands. Water characteristics, such as alkalinity, total dissolved solids, and pH, are some of the most important factors in determining the distribution of fairy shrimp (Eriksen and Belk 1999).

The vernal pool fairy shrimp has an ephemeral life cycle and exists only in vernal pools or vernal pool-like habitats; the species does not occur in riverine, marine, or other permanent bodies of water (USFWS 2007). Occupied habitats range in size from rock outcrop pools as small as one square yard (0.8 square meters) to large vernal pools up to two acres (8,000 square meters) (Helm 1998; Helm and Vollmar 2002). The potential ponding depth of occupied habitatranges from 1.2 to 48 inches (three to 121 centimeters) (USFWS 2001).

2.1.3 Reproduction and Demography

Following insemination by the male, the female fairy shrimp releases eggs from lateral pouches into the ovisac and the eggs are fertilized (Eriksen and Belk 1999). Following fertilization, embryonic and cyst development begins. The embryo and the protective shell together are termed the cyst. Cysts are expelled from the brood pouch of the female or are retained by the female until her death. Cysts are capable of withstanding heat, cold, and prolonged desiccation. The cysts survive in the dry pool bottom

throughout the summer and fall months and hatch when the seasonal pools fill with rainwater and the appropriate environmental conditions (e.g., temperature, dissolved oxygen concentration) prevail. Vernal pool fairy shrimp develop rapidly into adults, reaching sexual maturity in as little as 18 days (Helm 1998; Eriksen and Belk 1999). Vernal pool fairy shrimp populations often disappear early in the season, long before the seasonal pools dry up (USFWS 2001). Immature and adult shrimp are known to die off when water temperatures rise to 75 degrees Fahrenheit (24 degrees Celsius) (USFWS 2007). At 139 days, this species has the shortest maximum longevity of any Central Valley fairy shrimp, although they generally disappear from pools much sooner (Helm 1998; Eriksen and Belk 1999).

Three to six hatches may occur within a season if conditions are suitable. The exact environmental cues for hatching are unknown for this species of fairy shrimp (Eriksen and Belk 1999). However, the cues must include the return of moisture to the cysts' location. In addition, temperature is believed to play a large role. Gallagher (1996) and Helm (1998) observed vernal pool fairy shrimp to hatch when water temperatures dropped below 50 degrees Fahrenheit (10 degrees Celsius). Maturity was reached in about 18 days when water temperatures rose to at least 68 degrees Fahrenheit (20 degrees Celsius). If water remained at a temperature of 59 degrees Fahrenheit (15 degrees Celsius), the fairy shrimp took 41 days to reach maturity. When an occupied pool fills multiple times in the same or subsequent seasons, some, but not all, of the cysts may hatch. The cyst bank in the soil may consist of cysts from several years of breeding; fairy shrimp cysts may remain viable for decades and possibly centuries (Belk 1996; Eriksen and Belk 1999).

2.1.4 Movement

Although not a highly mobile species, both flooding and the movement of wildlife within seasonal pool complexes allow fairy shrimp to move between individual pools (USFWS 2007). Consumption of fairy shrimp cysts by predators aids in the dispersal of the species (Eriksen and Belk 1999). Enzymes in the predators' digestive system do not break down the membranous layers of the cyst; rather the predators expel the cysts in their excrement, often outside the point of consumption. If conditions at the new location are suitable, these transported cysts may hatch and potentially establish a new population. Cysts may also be transported in mud or dirt that gets stuck to the feet of other animals passing through occupied vernal pool habitat (Eriksen and Belk 1999).

2.1.5 Community Associations

Vernal pool fairy shrimp is an omnivorous filter feeder that indiscriminately filters particles of the appropriate size from their surroundings. Diet consists of bacteria and plant and animal particles, including suspended unicellular algae and metazoans (Eriksen and Belk 1999).

A wide variety of animals feed on fairy shrimp: birds, fish, amphibians, other fairy shrimp, dragonfly larvae, backswimmers (*Hemiptera: Notonectidae*), and predaceous diving beetles (*Coleoptera: Dytiscidae*) (Eriksen and Belk 1999).

Common wetland plant species that co-occur with this species include coyote thistle (*Eryngium* spp.), downingia (*Downingia* spp.), goldfields (*Lasthenia* spp.), spikerush (*Eleocharis* spp.), wooly-marbles (*Psilocarphus brevissimus*), hair grass (*Deschampsia* spp.), and Carter's buttercup (*Ranunculus bonariensis* var. *trisepalus*) (County of Sacramento *et al.* 2010).

The vernal pool fairy shrimp is a member of a larger invertebrate community which includes mostly zooplanktonic crustacea such as copepods, cladocerans, and ostracodes, as well as flatworms and water mites, and a suite of insect larvae and adults, including water boatmen (Family: *Corixidae*), herbivorous crawling water beetles (Family: *Haliplidae*), adult backswimmers, water scavenger beetles (Family: *Hydrophilidae*), and predacious diving beetles (*Dytiscidae* spp.) (Helm 1999). Vernal pool fairy shrimp rarely co-occurs with other fairy shrimp species in the genus *Branchinecta* but often co-occurs in larger pools with California fairy shrimp (*Linderiella occidentalis*) (Helm 1998; Helm 1999) and, on the Santa Rosa Plateau in Riverside County, with Santa Rosa Plateau fairy shrimp (*Linderiella santarosae*). Where it is found with other fairy shrimp species, vernal pool fairy shrimp are usually not the most abundant species (USFWS 2005). Vernal pool fairy shrimp has also been observed co-occurring with vernal pool tadpole shrimp (*Lepidurus packardi*) (USFWS 2005).

2.1.6 Distribution

The vernal pool fairy shrimp is found in California in disjunct and fragmented seasonal pools and swales throughout the Central Valley from Shasta County to Tulare County and west to the central and southern Coast Ranges from Solano County to Ventura County (USFWS 2005). Additional populations in the Agate Desert region of Oregon near Medford have also been reported (Helm and Fields 1998). Disjunct populations occur in San Luis Obispo, Santa Barbara, and Riverside counties. Most known locations are in the Sacramento and San Joaquin valleys and along the eastern margin of the central Coast Ranges (Eng *et al.* 1990).

This species was first identified relatively recently in 1990, and there is little information on the historical range of the species (Eng *et al.* 1990). It has the largest geographical range of listed fairy shrimp in California, but is seldom abundant (Eng *et al.* 1990). In 1994, at the time the species was listed as threatened, the U.S. Fish and Wildlife Service (USFWS) reported 32 known occurrences of vernal pool fairy shrimp in California, ranging from the Stillwater Plain in Shasta County through most of the length of the Central Valley to Paisley in Tulare County. Since then, vernal pool fairy shrimp have been reported throughout Sacramento, Colusa and Glenn counties; the Central Valley portions of Tehama, Butte, Sutter, Yuba, Placer, Stanislaus, Madera, Fresno,

and Tulare counties on the east side of the valley; and Alameda, Solano, Yolo, Colusa, and Glenn counties on the west side (USFWS 1994). There are 611 California Natural Diversity Database (CNDDB) occurrences, only three of which are considered extirpated or possibly extirpated (CNDDB 2013).

There are 72 recorded CNDDB occurrences distributed throughout the Permit Area (CNDDB 2013) (Figure 3-15). This species has also been identified at the SMUD Nature Preserve Mitigation Bank.

2.1.7 Population Trend

USFWS (2007) did not have information on range-wide population or abundance trends for the vernal pool fairy shrimp, although the numbers of recorded observations had increased due to project-related surveys. Accurate population trends for this species in Sacramento County are lacking due to limited numbers of surveys, fluctuations with water year, inconsistency in referring to individual seasonal pools and pool complexes, and lack of information on areas that were surveyed with negative results (County of Sacramento *et al.* 2010). The population trend at all CNDDB occurrences, including within the Permit Area, is listed as unknown (CNDDB 2013).

2.1.8 Threats

In the Southeastern Sacramento Vernal Pool Region, which covers a large portion of the Permit Area, the primary threat to vernal pool fairy shrimp is urban development (USFWS 2005). Throughout the species' range in California, principle threats that face vernal pool fairy shrimp are the conversion of its habitat to agricultural uses and urban development, and stochastic extinction due to the small and isolated nature of remaining populations (USFWS 2005, 2006). Because of the limited and disjunct distribution of seasonally inundated pools, any reduction in habitat quantity could adversely affect vernal pool fairy shrimp populations (USFWS 1996).

Activities that directly or indirectly change the ponding duration, salinity, and pH of seasonal pools beyond the tolerance range of vernal pool fairy shrimp can adversely affect this species as well. Such activities include damaging or puncturing the water-restrictive layer at the seasonal pool bottom; filling in the seasonal pool; introducing nonnative, invasive plants; and the destruction or degradation of upland habitats that contribute runoff to seasonal pools (Eriksen and Belk 1999; Brent Helm pers. comm. 2013a; USFWS 1996). Similarly, prolonged disking can reduce ponding duration by "smearing" out the pool (Brent Helm pers. comm. 2013a). The introduction of fish into seasonal pool habitats, either by intentional stocking or through natural or agricultural flooding, also threatens the survival of vernal pool fairy shrimp. Opportunistic fish such as mosquitofish (*Gambusia affinis*), which was originally introduced to control mosquito populations, consume fairy shrimp and can eliminate populations (USFWS 1996).

2.1.9 Existing Conservation and Management

The vernal pool fairy shrimp was federally petitioned as endangered, but listed as threatened on September 19, 1994 (USFWS 1994). The USFWS reduced the listing status of vernal pool fairy shrimp from endangered to threatened in the 1994 final ruling (USFWS 1994).

Critical habitat for vernal pool fairy shrimp was originally designated on August 6, 2003, but was revised on August 11, 2005 (USFWS 2005). The USFWS subsequently published species-specific critical habiat unit descriptions and maps on February 10, 2006 (USFWS 2006). The final designated critical habitat for vernal pool fairy shrimp totals 597,821 acres in 30 critical habitat units and 78 subunits, located in Jackson County, Oregon; and Alameda, Amador, Butte, Contra Costa, Fresno, Kings, Madera, Mariposa, Merced, Monterey, Napa, Placer, Sacramento (figure 3-15), San Benito, San Joaquin, San Luis Obispo, Santa Barbara, Shasta, Solano, Stanislaus, Tehama, Tulare, Ventura, and Yuba counties, California. There are 37,350 acres of critical habitat in the Permit Area. The Permit Area contains all or a portion of critical habitat Units 13 and 14A and 14BUnit 13 is in the Mather Field area, and Units 14A and 14B are in the Rancho Seco area in southeastern Sacramento County and into western Amador County.

The primary constituent elements of critical habitat for vernal pool fairy shrimp are the habitat components that provide:

> "(1) Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools…, providing for dispersal and promoting hydroperiods of adequate length in the pools;
>
> (2) Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days, in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands;
>
> (3) Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding; and
>
> (4) Structure within the pools… consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally

inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter" (USFWS 2006).

The vernal pool fairy shrimp is included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005). The goal for this species in the Western Placer County, Mather, and Cosumnes/Rancho Seco core recovery areas, in which the Permit Area is located, is to protect 85 percent of suitable species habitat.

As of 2005, approximately 13,000 acres (5,261 hectares) of vernal pool habitats, including mitigation banks, had been set aside for this species as a result of Section 7 consultations (USFWS 2005). In the Southeastern Sacramento Valley Vernal Pool Region, vernal pool fairy shrimp are protected from development at a number of private mitigation areas, mitigation banks, and on the Cosumnes River Preserve's Valensin Ranch property within the Permit Area. It also occurs in the Permit Area on the Howard Ranch, owned by a private rancher but protected by a conservation easement (USFWS 2005). The species is protected at Beale Air Force Base in Yuba County, where management and monitoring have recently been implemented (USFWS 2005). The species is also located at the SMUD Nature Preserve Mitigation Bank within the Permit Area.

Vernal pool fairy shrimp is a covered species or proposed as a covered species in the following conservation plans in the vicinity of the Permit Area: San Joaquin County Multi-species Habitat Conservation and Open Space Plan (SJCOG 2000), draft South Sacramento County Habitat Conservation Plan (HCP) (County of Sacramento *et al.* 2010), draft Butte Regional Conservation Plan (BCAG 2012), the Natomas Basin HCP (City of Sacramento *et al.* 2003), the Yolo County Natural Heritage Program (Yolo County H/NCCP JPA 2013), and the draft Placer County Conservation Plan (Placer County 2011).

2.1.10 SMUD HCP Modeled Habitat

Modeled habitat for vernal pool fairy shrimp is the SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type. There are 7,784 acres of vernal pool fairy shrimp modeled habitat within the Permit Area.

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2.2 Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)

2.2.1 Conservation Considerations

Status

Federal: Threatened

State: None

Other: None

2.2.2 Habitat Requirements

Habitat occupied by the valley elderberry longhorn beetle (VELB) tends to be riparian corridors on the level open ground of periodically flooded river and stream terraces and floodplains (USFWS 2006). VELB is dependent on its host plant, elderberry (*Sambucus* sp.), throughout its life cycle. The larvae bore into the elderberry stems and feed on soft tissues from the pith of the plant. Adult VELB feed on elderberry foliage and flowers. Adult VELB and characteristic exit holes, formed when the adult emerges from the pupal chamber, have been observed both in riparian habitats and in savanna habitats adjacent to riparian vegetation (Collinge *et al.* 2001). VELB utilizes both blue elderberry (*Sambucus nigra* ssp. *caerulea*) and red elderberry (*S. racemosa* var. *racemosa*) and does not seem to prefer one to the other (Barr 1991).

2.2.3 Reproduction and Demography

Adult VELB are only active during the flowering period of the elderberry, typically early March through early June (Barr 1991). VELB mate in May and females lay eggs in the cracks and crevices of the bark of living elderberry shrubs. The larvae hatch in a few days and bore into living stems of the shrubs that are at least one inch (2.54 centimeters) in diameter, feeding and creating a characteristic pupal chamber in the center of the stem (Barr 1991). The larvae remain within the stem, feeding on the pith, until they complete their development. After one or two years, the larva chews a hole to the stem surface and returns to the chamber to pupate. After metamorphosing, VELB emerges through the circular exit hole from mid-March to mid-June (Barr 1991; Talley *et al.* 2006).

2.2.4 Movement

Movement by VELB is very limited. Collinge *et al.* (2001) found that colonization of new elderberry sites within occupied drainages is rare and that dispersal between drainages probably does not occur at all.

2.2.5 Community Associations

Current information on VELB habitat indicates that the taxon is found only in association with its host plant, elderberry. Occupancy rates of elderberry shrubs seem to be higher in areas with diverse riparian vegetation, although this may be an indicator of a habitat's relative health and not of a habitat's suitability for VELB (USFWS 2006). Elderberry co-occurs with other riparian woody plants, including Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), California sycamore (*Platanus racemosa*), various willows (*Salix* spp.), wild grape (*Vitis californica*), blackberry (*Rubus* spp.), and poison-oak (*Toxicodendron diversilobum*) (USFWS 1984; Collinge *et al.* 2001).

Huxel (2000) observed a negative relationship between VELB occupancy and the presence of Argentine ant. The invasion of Argentine ant through the riparian corridors of California poses an important threat to the remaining VELB population.

VELB likely is the prey of insectivorous birds, lizards, and European earwigs (*Forficularia auricularia*) (Klasson *et al.* 2005). These three predators move freely up and down elderberry stems searching for food. The European earwig is a scavenger and omnivore that has often been found feeding on tethered mealworm (*Tenebrio molitor*) larvae (Klasson *et al.* 2005). The earwig may be common in riparian areas and may lay its eggs in dead elderberry shrubs. The earwig, like the Argentine ant, requires moisture and is often found in large numbers in riparian and urban areas. Earwig presence and densities tended to be highest in mitigation/compensation sites likely because of irrigation (Klasson *et al.* 2005).

2.2.6 Distribution

VELB is endemic to the upland riparian areas of California's Central Valley from Shasta County in the north to Kern County in the south (Barr 1991).

Subsequent to various surveys throughout the Central Valley, the U.S. Fish and Wildlife Service (USFWS, 1999) prepared a map of the presumed range of VELB. This map encompasses the entire Central Valley and the Sacramento-San Joaquin River Delta, below 3,000 feet (900 meters) in elevation. Additionally, the CNDDB identifies 201 occurrences in a continuous band from Shasta County in the north to Kern County in the southern portion of the state (CNDDB 2013).

Comprehensive surveys in the Permit Area for the species or its host plant, elderberry, have not been conducted and thus the population size and location of the species within the Permit Area is not fully known. Distribution is typically based on the occurrence of elderberry shrubs, which are known to occur along riparian corridors throughout the Permit Area, including the American, Sacramento, and Cosumnes rivers, and along smaller natural and channelized drainages, as well as in upland habitats. VELB are considered to potentially occur in all mature elderberry shrubs, with stems greater than one inch in diameter at the ground level, in the Permit Area. There are 16 recorded

CNDDB occurrences of VELB in the SMUD Permit Area, primarily within riparian zones associated with the Sacramento, American, and Cosumnes rivers (CNDDB 2013).

An elderberry survey conducted at the American River Parkway, which included some shrubs within existing SMUD easements, found exit holes within 33 percent of all elderberry shrubs surveyed (Area West Environmental 2014). This rate of occupancy is higher compared to occupancy surveys conducted throughout the range of VELB between 1991 and 1997 which indicated that only 25 percent of apparently suitable sites were inhabited (Barr, 1991; Collinge et al., 2001). The American River Parkway VELB survey covered a total of 36.39 acres of Modeled Habitat (Valley Foothill Riparian). This habitat was found to contain 325 elderberry shrubs of suitable size for VELB, which equates to a density of 8.93 elderberry shrubs per acre of Modeled Habitat. Given that these densities were established in high quality habitat and would be greater than the shrub densities in the majority of the Permit Area, SMUD is applying this density estimate to the Permit area by rounding up to a maximum density of nine shrubs per acre.

2.2.7 Population Trend

Although it has been estimated that 90 percent of California riparian habitat has been lost over the last century and a half (Barr 1991; Naiman *et al.* 1993; Smith 1980), these losses are difficult to accurately quantify in terms of direct VELB habitat losses (Talley *et al.* 2006). Currently, less than one percent of the original upland riparian habitat remains in the Central Valley, mostly distributed in small, isolated fragments (Collinge *et al.* 2001). Although VELB is widespread across its range, it has been extirpated from many historically occupied drainages. The extant VELB population has a scattered distribution and local populations can be exceedingly isolated.

There are not many long-term population data available for VELB (USFWS 2012). The only available data are the CNDDB occurrence records and limited records from other sources. Collinge *et al.* (2001) provides the only long-term data set for the species. This study found that while proportions of occupancy were similar to the Barr (1991) survey, the number of sites examined containing elderberry and the density of elderberry at sites had decreased, resulting in fewer occupied sites and groups.

2.2.8 Threats

The primary threats to VELB are activities that have resulted in widespread alteration and fragmentation of riparian habitats and, to a lesser extent, upland habitats which support VELB (USFWS 2006). These threats include: loss and alteration of habitat by agricultural conversion; inappropriate grazing; levee construction, stream and river channelization, removal of riparian vegetation, and rip-rapping of shoreline; ongoing maintenance of levees and canals for purposes of flood control and agriculture; non-native animals such as the Argentine ant (*Linepithema humile*), which may eat the early lifestages of VELB; use of insecticides; and recreational, industrial, and urban

development (USFWS 2006). Over the past 25 years, the rate of riparian habitat loss has slowed significantly due to limitations in the amount of riparian habitat remaining, protections provided under the Endangered Species Act, other regulatory protections, and restoration efforts.

Low density and limited dispersal capability may cause VELB to be vulnerable to the negative effects of isolation of small subpopulations. Riparian loss has resulted in fragmented and isolated remnants of VELB habitat. Sub-populations of the species confined to small habitat areas are likely vulnerable to extirpation from random, unpredictable environmental, genetic, and demographic events (Schonewald-Cox *et al.* 1983). The distances between subpopulations and VELB's limited-dispersal ability could make recolonization difficult if extirpation occurs (Collinge *et al.* 2001).

During the period when adults are outside of the shrubs (March through June), individual beetles have been observed dropping from elderberry shrubs to the ground within Covered Acitivty work areas (AWE, pers. comm. 2014). This could increase the risk of prediation on individual beetles.

2.2.9 Existing Conservation and Management

VELB was federally listed as threatened with critical habitat designated in August 1980 (USFWS 1980). There are 514.70 acres of critical habitat designated in two areas that are both entirely within the Permit Area. The Sacramento Zone is 24.3 acres (9.8 hectares) in the City of Sacramento enclosed on the north by the Route 160 Freeway, on the west and southwest by the Western Pacific Railroad tracks, and on the east by Commerce Circle and its extension southward to the railroad tracks. The American River Parkway Zone is 490 acres (198 hectares) and is comprised of the American River Parkway on the south bank of the American River bounded to the south and east by Ambassador Drive and to the north and northeast by River Bend Park. PCEs for this species are populations of elderberry shrubs.

In the USFWS Recovery Plan for VELB, an area along Putah Creek in Solano County and the area west of Nimbus Dam along the American River Parkway in Sacramento County were named as essential habitat, although not officially designated as critical habitat (USFWS 1984). These areas support large numbers of mature elderberry plants with extensive evidence of use by VELB.

Conservation Guidelines for VELB were established by USFWS in 1999 and were designed mainly to mitigate development-related impacts on VELB habitat (USFWS 1999). Using a formula based on stem sizes, habitat association, and presence of emergence holes, the guidelines require losses of elderberry shrubs that meet the minimum standard for potential occupancy to be mitigated through a program that: 1) identifies and secures suitable and approved mitigation land, and 2) includes transplanting of mature elderberry shrubs to the mitigation site and replacement compensation using a standardized stem replacement formula.

In the 2006 Five-year Review, the USFWS recommended delisting the species based on the numbers of sightings throughout the Central Valley and the reduction in the primary threats to the species (USFWS 2006). In 2012, the USFWS proposed the species for delisting (USFWS 2012), but a final rule has not been determined.

VELB occurs on some lands that are protected from development, including the 4,600-acre American River Parkway in the Permit Area, and Solano Lake Park, which include both designated critical habitat and essential habitat (as described in the Recovery Plan); Sacramento River National Wildlife Refuge; San Joaquin River National Wildlife Refuge; Big Chico Creek Ecological Reserve; and in the Permit Area, the Cosumnes River Preserve; and Stone Lakes National Wildlife Refuge. In response to the increasing need for VELB mitigation, numerous private VELB mitigation banks have also become established throughout the Sacramento region.

VELB is a covered species under the approved San Joaquin County Multi-species Habitat Conservation and Open Space Plan (SJCOG 2000), the Natomas Basin Habitat Conservation Plan (HCP) (City of Sacramento *et al.* 2003), and the HCP for the Metro Air Park Project in the Natomas Basin (Thomas Reid Associates 2001). It is also proposed for coverage under the draft South Sacramento County HCP (County of Sacramento *et al.* 2010), the draft Solano County Multispecies HCP (SCWA 2009), the draft Yolo County Natural Heritage Program (Yolo County H/NCCP JPA 2013), the draft Placer County Conservation Plan (Placer County 2011), and the draft Butte Regional Conservation Plan (BCAG 2012).

2.2.10 SMUD HCP Modeled Habitat

Modeled habitat for VELB is SMUD HCP Valley Foothill Riparian and Mine Tailing Riparian Woodland land cover types within the Permit Area. There are 13,543 acres of VELB modeled habitat within the Permit Area.

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2.3 Vernal Pool Tadpole Shrimp (*Lepidurus packardi*)

2.3.1 Conservation Considerations

Status

Federal: Endangered

State: None

Other: None

2.3.2 Habitat Requirements

The vernal pool tadpole shrimp occurs in seasonal pools, vernal pools, vernal lakes, vernal swales, ponded clay flats, alkaline pools, and roadside ditches (CNDDB 2013; Helm 1998). Habitats where vernal pool tadpole shrimp have been observed range in size from small (as small as 6.5 square feet [2 square meters]), clear, well-vegetated vernal pools to highly turbid alkali playa pools to large vernal lakes such as Olcutt Lake at the Jepson Prairie Preserve in Solano County and Dales Lake in Tehama County (100 to more than 250 acres [40 to 100 hectares]) (Helm 1998; Brent Helm pers. comm. 2013). These pools and other ephemeral wetlands must dry out and inundate for vernal pool tadpole shrimp cysts to hatch. Vernal pool tadpole shrimp have been found in pools with water temperatures ranging from 50 degrees Fahrenheit (10 degrees Celsius) to 84 degrees Fahrenheit (29 degrees Celsius) and pH ranging from 6.2 to 8.5 (USFWS 2005). This species has not been reported in pools that contain high concentrations of sodium salts, but may occur in pools with high concentrations of calcium salts. Vernal pool tadpole shrimp occur in wetlands with an average ponding depth of 15.2 inches (39 centimeters) (Helm 1998). Adult tadpole shrimp populations generally persist until the habitat dries up.

2.3.3 Reproduction and Demography

Compared to other vernal pool invertebrates, the vernal pool tadpole shrimp has a significantly longer lifespan, growing throughout their lives, and periodically molting their shells (Helm 1998). During the dry phase of their habitat, vernal pool tadpole shrimp survive as diapausing cysts in and on the substrate (Eriksen and Belk 1999). After winter rains fill seasonal pools, dormant vernal pool tadpole shrimp cysts may hatch in as little as four days (Ahl 1991). Additional cysts produced by adult tadpole shrimp during the wet season may hatch without going through a dormant period (Ahl 1991). Vernal pool tadpole shrimp hatching is temperature dependent with optimal hatching occurring between 50 to 59 degrees Fahrenheit (10 to 15 degrees Celsius). Hatching rates becoming significantly lower at temperatures above 68 degrees Fahrenheit (20 degrees Celsius) (Ahl 1991). Helm (1998) found that vernal pool tadpole shrimp took a minimum of 25 days to mature and the mean age at first reproduction was 54 days.

Reproduction begins when individuals reach 0.4 inches (one centimeter) in length. Each individual is capable of producing viable cysts without sexual reproduction (Longhurst 1955). Females can lay as many as six clutches in one season (USFWS 2005).

2.3.4 Movement

Although not a highly mobile species, both flooding and the movement of wildlife within seasonal pools allow vernal pool tadpole shrimp to move between individual pools. Consumption of cysts by predators aids in the dispersal of the species (Eriksen and 1999). Enzymes in the predators' digestive system do not break down the membranous layers of the cyst; rather the predators expel the cysts in their excrement, often outside the point of consumption. If conditions at the new location are suitable, these transported cysts may hatch and potentially establish a new population. Cysts may also be transported in mud or dirt that gets stuck to the feet of other animals passing through occupied vernal pool habitat (Eriksen and Belk 1999).

2.3.5 Community Associations

Vernal pool tadpole shrimp is a component of the zooplanktonic community within its episodic, ephemeral aquatic habitat; although the larger it grows, the more time it spends at or near the bottom of vernal pools (County of Sacramento *et al.* 2010). Vernal pool tadpole shrimp are omnivores, with a strong preference for animal matter, feeding on plants, various zooplankton (e.g., daphnia and copepods), and insect larvae while digging through sediments at the bottom of the ponds. In addition, vernal pool tadpole shrimp will consume fairy shrimp including vernal pool fairy shrimp (*Branchinecta lynchi*), conservancy fairy shrimp (*B. conservatio*), and California fairy shrimp (*Linderiella occidentalis*) (Brent Helm pers. comm. 2013; County of Sacramento *et al.* 2010; Longhurst 1955).

Common wetland plant species that co-occur with this species include coyote thistle (*Eryngium* spp.), downingia (*Downingia* spp.), goldfields (*Lasthenia* spp.), spikerush (*Eleocharis* spp.), wooly-marbles (*Psilocarphus brevissimus*), hair grass (*Deschampsia* spp.), and Carter's buttercup (*Ranunculus bonariensis* var. *trisepalus*) (County of Sacramento *et al.* 2010).

Vernal pool tadpole shrimp commonly co-occur with fairy shrimp such as California fairy shrimp, conservancy fairy shrimp, and vernal pool fairy shrimp. The midvalley fairy shrimp and longhorn fairy shrimp (*B. longiantenna*) both occur within the range of the vernal pool tadpole shrimp, but are typically found in different habitats (Belk and Fugate 2001; County of Sacramento *et al.* 2010).

2.3.6 Distribution

The vernal pool tadpole shrimp is endemic to seasonal pools and swales in California's Central Valley and San Francisco Bay Area, with the majority of its populations occurring in the Sacramento Valley (Eng *et al.* 1990). The largest concentrations are found in the Southeastern Sacramento Vernal Pool Region (USFWS 2005, 2007), which encompasses a majority of the Permit Area in Sacramento and Placer counties. This species has also been reported from the Sacramento River Delta east of San Francisco Bay and from a few scattered localities in the San Joaquin Valley from San Joaquin County to Tulare and Kings County (Helm 1998; Brent Helm pers. comm. 2013). Vernal pool tadpole shrimp are also known from a few locations in Yuba and Placer counties, including Beale Air Force Base (USFWS 2005). A single location in the San Francisco Bay National Wildlife Refuge in the City of Fremont in Alameda County is the only known population of vernal pool tadpole shrimp outside of the Central Valley (USFWS 2005, 2007).

In 1994, the U.S. Fish and Wildlife Service reported 14 known occurrences of the vernal pool tadpole shrimp in California, ranging from the Vina Plains in Tehama County, through most of the length of the Sacramento Valley to Sacramento, and west to Solano County at the Jepson Prairie (USFWS 1994). Since then, the vernal pool tadpole shrimp has been reported in Sacramento, Colusa, and Glenn counties; as well as Central Valley portions of Tehama, Butte, Sutter, Yuba, Placer, Stanislaus, Madera, Merced, Fresno, and Tulare counties on the east side of the valley (Eriksen and Belk 1999); and Alameda, Solano, Yolo, Colusa, and Glenn counties on the west side (USFWS 2007). In Yolo County, the vernal pool tadpole shrimp has been reported from seasonal pools within or near the southern Yolo Bypass, including the Wilson Park Davis Communications Annex east of Yolo County Grasslands Regional Park, along the Sacramento Northern Electric Railroad grade southwest of Saxon, and at the Tule Ranch Unit of the Yolo Basin Wildlife Area (CNDDB 2013).

There are 274 occurrences in the California Natural Diversity Database (CNDDB), only four of which are considered extirpated or possibly extirpated (CNDDB 2013). Sacramento County has 81 occurrences, Merced County has 45, Solano County has 29, Shasta and Tehama counties each have 21, and Butte County has 18. Occurrences are also found in Alameda, Colusa, Contra Costa, Glenn, Fresno, Kings, Placer, San Joaquin, Stanislaus, Sutter, Tulare, Yolo, and Yuba counties. The easternmost known location is around 3,500 feet (1,067 meters) in elevation in the central Sierra Nevada foothills (Merced County) and the westernmost known location is in the San Francisco Bay Area (Alameda County) (CNDDB 2013).

There are 83 recorded CNDDB occurrences of this species within the Permit Area on a number of public and private lands in Sacramento County (CNDDB 2013). The Mather core area contains possibly the highest density of vernal pool tadpole shrimp occurrences within the range of the species (USFWS 2005). Surveys within the Mather core area report that at least 50 percent of vernal pools were occupied by vernal pool

tadpole shrimp (USFWS 2005). Other studies have found a similar percent occupancy of vernal pool tadpole shrimp in vernal pools on old terrace formations (Helm 1998), which are concentrated in the Mather core area. The species has also been identified at the SMUD Nature Preserve Mitigation Bank.

2.3.7 Population Trend

Annual surveys have not occurred at all sites with known vernal pool tadpole shrimp populations (USFWS 2007). Surveys that have been completed are mainly to determine presence. No trends (either increasing or decreasing) have been reported for any of the monitored sites; however, the accelerated loss and fragmentation of habitat is expected to markedly decrease the long-term viability of this species (USFWS 2007). The population trend at CNDDB occurrences is listed as unknown (CNDDB 2013).

2.3.8 Threats

Threats facing vernal pool tadpole shrimp include the conversion of seasonal pool habitat to agricultural uses and urban development, and stochastic extinction due to the small and isolated nature of remaining populations (USFWS 1994). Because of the limited and disjunct distribution of seasonal pools, any reduction in habitat quantity could adversely affect vernal pool tadpole shrimp. Isolated populations are more susceptible to inbreeding depression which can result in local extinction or reduced fitness (USFWS 1996). Habitat fragmentation can isolate and reduce population size resulting in a process of progressive population extinction. Small or isolated populations are more susceptible to extinction from random environmental disturbance. Activities that directly or indirectly change the ponding duration, salinity, and pH of seasonal pools beyond the tolerance range of vernal pool tadpole shrimp can adversely affect this species. Such activities include damaging or puncturing the hardpan (the water-restrictive layer at the seasonal pool bottom); filling in the seasonal pool; introducing nonnative, undesirable plants; and the destruction or degradation of upland habitats that contribute runoff to vernal pools (USFWS 1996; Eriksen and Belk 1999). Other threats include excessive livestock grazing, predation by non-native bullfrog (*Rana catesbeiana [=Lithobates catesbeianus]*), and off-road vehicles (County of Sacramento *et al.* 2010).

2.3.9 Existing Conservation and Management

The vernal pool tadpole shrimp was listed as federally endangered on September 19, 1994 (USFWS 1994). Critical habitat for vernal pool tadpole shrimp was originally designated on August 6, 2003, but was revised on August 11, 2005 (USFWS 2005). The U.S. Fish and Wildlife Service (USFWS) subsequently published species-specific critical habitat unit descriptions and maps on February 10, 2006 (USFWS 2006). The total designated critical habitat for vernal pool tadpole shrimp is 228,785 acres within 16 critical habitat units and 33 subunits. Critical habitat units are in Shasta, Tehama, Butte,

Colusa, Alameda, Yuba, Yolo, Sacramento, Amador, Solano, Stanislaus, Merced, Mariposa, Madera, Fresno, Kings, and Tulare counties, California. There are 37,351 acres of critical habitat in the Permit Area, 1,699 acres of which are SMUD HCP Modeled Habitat. Critical habitat in the Permit Area includes 8, 9A, and 9B. Unit 8 is in the Mather Airport area, and Units 9A and 9B are in the Rancho Seco area in southeastern Sacramento County and into western Amador County.

The biological and physical features (primary constituent elements) that are essential to the conservation of vernal pool tadpole shrimp in the designated critical habitat are:

> "(1) Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pool…, providing for dispersal and promoting hydroperiods of adequate length in the pools;
>
> (2) Depression features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 41 days, in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands;
>
> (3) Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding; and
>
> (4) Structure within the pools consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter." (USFWS 2006).

The vernal pool tadpole shrimp is included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005). The goal for this species in the Western Placer County, Mather, Cosumnes/Rancho Seco, and Davis Communications Annex core recovery areas, which overlap the Permit Area, is to protect 85 to 95 percent of suitable species habitat.

Vernal pool tadpole shrimp are known to occur on some protected lands outside the Permit Area, including the Vina Plains Preserve, Dales Lake Ecological Reserve, Jepson Prairie, Sacramento National Wildlife Refuge, Grasslands Ecological Area, Stone Corral Ecological Preserve, Big Table Mountain Preserve, and San Francisco National Wildlife Refuge (USFWS 2005).

Vernal pool tadpole shrimp is a covered species or proposed for coverage in the San Joaquin County Multi-species Habitat Conservation and Open Space Plan (SJCOG 2000), draft South Sacramento County Habitat Conservation Plan (HCP) (County of Sacramento *et al.* 2010), the Natomas Basin HCP (City of Sacramento *et al.* 2003), the Yolo County Natural Heritage Program (Yolo County H/NCCP JPA 2013), the draft Placer County Conservation Plan (Placer County 2011), and the draft Butte Regional Conservation Plan (BCAG 2012).

2.3.10 SMUD HCP Modeled Habitat

Modeled habitat for vernal pool tadpole shrimp is the SMUD HCP Vernal Pool, Seasonal Wetland, and Swale land cover type. There are 7,784 acres of vernal pool tadpole shrimp modeled habitat within the Permit Area.

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3.0 Amphibians

3.1 California Tiger Salamander (*Ambystoma californiense*)

3.1.1 Conservation Considerations

Status

Federal: Threatened

State: Threatened

Other: None

3.1.2 Habitat Requirements

CTS occur in annual grassland, oak savanna, and edges of open mixed woodland and lower elevation coniferous forest in lowland and foothill regions of central California where aquatic sites are available for breeding (USFWS 2004). CTS breed and lay their eggs primarily in vernal pools and other ephemeral ponds that fill in winter and often dry out by summer (Loredo *et al*. 1996); they sometimes use permanent human-made ponds (e.g., stock ponds), reservoirs, and small lakesand in some permanent waters, primarily within grassland and woodland areas (Stebbins and McGinnis 2012).

Vernal pools and other seasonal rain pools are the primary breeding habitat of CTS (Barry and Shaffer 1994; Jennings and Hayes 1994). The species requires at least 10 weeks of pool inundation in order to complete metamorphosis of larvae (Anderson 1968). CTS are usually only found in water bodies that are large enough to retain water long enough for CTS to complete metamorphosis (Laabs *et al.* 2001). The species is also known to successfully reproduce in ponds including artificial stockponds (Barry and Shaffer 1994; USFWS 2004). The presence of predatory fish and bullfrogs, however, can affect the suitability of perennial ponds (Fitzpatrick and Shaffer 2004). Barry and Shaffer (1994) note that stockponds can be productive breeding sites as long as they are drained annually, which can prevent predatory species from establishing.

Adult CTS are terrestrial and occur most of their life in grassland and open woodland habitats where they live entirely within the underground burrows of small mammals, such as California ground squirrels (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*) (Loredo and Van Vuren 1996; Petranka 1998; Trenham 1998). Active rodent burrow systems are probably necessary to sustain CTS populations because inactive burrow systems begin to deteriorate and collapse over time (Loredo *et al.* 1996).

Per the U.S. Fish and Wildlife Service (USFWS) and SMUD review of the CNDDB occurrences, the range of CTS in the Permit Area is limited to the areas south of the Cosumnes River (CNDDB 2013; USFWS 2004).

3.1.3 Reproduction and Demography

CTS require both wetland and adjacent upland habitat to complete their life cycle (Shaffer *et al.* 1993). Subadult and adult CTS spend the dry summer and fall months of the year in the burrows of small mammals (Loredo and Van Vuren 1996; Petranka 1998; Trenham 1998). Once fall or winter rains begin, CTS emerge from the upland sites on rainy nights to move to the breeding ponds (Shaffer *et al.* 1993). Adult CTS reproduce in the breeding ponds, after which the females attach their eggs to vegetation or debris in the water (Storer 1925; USFWS 2004). After breeding, adults leave the pool and return to the small mammal burrows (Loredo *et al.* 1996; Trenham 1998). Within the California landscape, drought years (below average rainfall) and mistimed rain events often contribute to less than suitable conditions for breeding (Barry and Shaffer 1994). If environmental conditions are unfavorable, CTS may not breed successfully in a given year (USFWS 2003a).

CTS eggs hatch within 10 to 14 days with newly hatched larvae measuring about 0.5 inches (1.27 centimeters) in total length (Petranka 1998). The larvae are aquatic and feed on zooplankton, small crustaceans, and aquatic insects for about six weeks of hatching, after which they switch to larger prey (Anderson 1968). Larger larvae have been known to consume smaller tadpoles of Sierra treefrog (*Pseudacris sierrae*) and California red-legged frog (*Rana draytonii*) (Anderson 1968), as well as other sympatric amphibian larvae. The larvae are among the top aquatic predators in the seasonal pool ecosystems. In shallow water, they often rest on the bottom, but in deeper water, they also may be found at different layers in the water column.

The larval stage of the CTS usually lasts three to six months, as most seasonal ponds and pools dry up during the summer (Petranka 1998). Amphibian larvae must grow to a critical minimum body size before they can metamorphose to the terrestrial stage. Feaver (1971) found that larvae metamorphosed and left the breeding pools from 60 to 94 days after the eggs had been laid, with larvae developing faster in smaller, more-rapidly drying pools. In some habitats, where conditions are appropriate, CTS larvae will remain in the larval state through the winter and metamorphose 13 to 16 months after hatching (Alvarez 2004). The longer the ponding duration, the larger the larvae and metamorphosed juveniles are able to grow, and the more likely they are to survive and reproduce (USFWS 2004). In the late spring or early summer, before the ponds dry completely, metamorphosed juveniles move to upland habitat. This emigration occurs in both wet and dry conditions (Loredo and Van Vuren 1996; Loredo *et al.* 1996). Unlike winter movement, the wet conditions that CTS prefer do not generally occur during the months when their breeding ponds begin to dry. As a result, juveniles may be forced to leave their ponds on rainless nights. Under these conditions, they may move only short

distances to find temporary upland sites for the dry summer months, waiting until the next winter's rains to move further into suitable upland refugia. Once juvenile CTS leave their birth ponds for upland refugia, they typically do not return to ponds to breed for an average of four to five years (Trenham *et al.* 2000).

Lifetime reproductive success for California and other tiger salamanders is low. Trenham *et al.* (2000) found the average female bred 1.4 times and produced 8.5 young that survived to metamorphosis per reproductive effort. This resulted in approximately 11 metamorphic offspring over the lifetime of a female. Two reasons have been suggested for the low reproductive success: first, preliminary data suggest that most individual CTS require two years to become sexually mature, but some individuals may be slower to mature (Shaffer *et al.* 1993); and second, some animals do not breed until they are four to six years old (Trenham *et al.* 2000).

3.1.4 Movement

For CTS moving from breeding pools to upland refuge, Searcy *et al.* (2013) found the median migration distance for all age classes of CTS to be 1,824 feet (556 meters), with the adult age class having the farthest median migration distance of 2,188 feet (667 meters). The maximum dispersal distance for adult CTS is documented to be 1.3 miles (2 kilometers) (Sweet 1998 as cited in County of Sacramento *et al.* 2010; Trenham *et al.* 2001). Juvenile CTS have been observed to disperse up to 1.0 mile (1.6 kilometers) from breeding pools to uplands areas (USFWS 2004). Non-dispersing salamanders tend to stay close to breeding ponds. Dispersal distance appears to be closely tied to precipitation with CTS travelling farther in years with more precipitation (USFWS 2000). Juvenile CTS disperse at night during the hotter and drier season as the ponds dry, whereas adults migrate from uplands to breeding sites during the rainy season (Loredo *et al.* 1996). Rare early summer rains can stimulate relatively large numbers of juveniles to emigrate from the breeding ponds (Loredo and Van Vuren 1996). When they are not breeding or moving to or from breeding sites these salamanders live in ground squirrel burrows, crevices in the soil, or in other burrows (Loredo *et al.* 1996). Once established in underground burrows, CTS may move short distances within burrows or overland to other burrows, generally during wet weather (USFWS 2000).

3.1.5 Community Associations

Sierra treefrog and western spadefoot (*Spea hammondii*) larvae compete with CTS larvae for some food items. CTS are also known to prey on these species as well (Anderson 1968). Large- and medium-sized CTS larvae are known to eat smaller CTS larvae. Native predators of CTS include great blue heron (*Ardea herodias*), great egret (*Ardea alba*), common garter snake (*Thamnophis sirtalis*), and larger spadefoot larvae (Barry and Shaffer 1994; USFWS 2000). Baldwin and Stanford (1986) observed a western pond turtle (*Actinemys* [=*Emys*] *marmorata*) pursuing a CTS larva and an adult California red-legged frog ingesting a larval CTS. Other predators of the species

include bullfrogs, Louisiana red swamp crayfish (*Procambarus clarkii*), mosquitofish, and other introduced fishes (Anderson 1968; Jennings and Hayes 1994; USFWS 2000).

CTS have a commensal relationship with California ground squirrel and gophers, in which the salamander benefits from the refuge habitat created by the burrowing activity of the squirrels and gophers (Loredo *et al.* 1996). In one study, CTS showed no avoidance of occupied ground squirrel burrows, suggesting that the squirrels pose no threat to the salamanders (Loredo *et al.* 1996). CTS are also commonly associated with California red-legged frog, in aquatic breeding habitat, particularly in the central portion of their distribution (Alvarez *et al.* 2013).

3.1.6 Distribution

The California tiger salamander (CTS) is endemic to vernal pools and other seasonal and perennial ponds and surrounding upland areas in grassland and oak savannah in the San Joaquin-Sacramento river valleys, bordering foothills, and coastal valleys of central California (USFWS 2004). The species occurs from Sonoma County and the Colusa-Yolo County line south to Santa Barbara County in the Coast Ranges and from southern Sacramento County south to Tulare County in the Central Valley (Jennings and Hayes 1994). The species is most commonly found at elevations below 1,500 feet (450 meters), although the known elevational range extends up to 3,455 feet (1,000 meters) (Jennings and Hayes 1994; USFWS 2004).

Because there are only a few historic collections of the species from the 1800s, and the majority of collections have occurred in the last 30 years subsequent to significant changes in historic habitat types, documentation of the historic distribution of CTS does not exist (CNDDB 2013; Shaffer *et al.* 1993). Genetic studies indicate that there are currently six subpopulations of CTS: (1) Santa Rosa area of Sonoma County; (2) Bay Area (central and southern Alameda, Santa Clara, western Stanislaus, western Merced, and the majority of San Benito counties); (3) Central Valley (Yolo, Sacramento, Solano, eastern Contra Costa, northeast Alameda, San Joaquin, Stanislaus, Merced, and northwestern Madera counties); (4) southern San Joaquin Valley (portions of Madera, central Fresno, and northern Tulare and Kings counties); (5) Central Coast Range (southern Santa Cruz, Monterey, northern San Luis Obispo, and portions of western San Benito, Fresno, and Kern counties); and (6) Santa Barbara County (Shaffer and Trenham 2002).

There are 21 recorded California Natural Diversity Database (CNDDB) occurrences of this species within the Permit Area. In the southeastern portion of Sacramento County, there are 21 presumed extant occurrences in the vicinity of Rancho Seco in Sacramento County (CNDDB 2013). There is also one occurrence from 1996 in the city of Davis (Yolo County), about 2.5 miles south of the SMUD Gas Pipeline (CNDDB 2013). This species has also been observed using aquatic and upland habitat at the SMUD Nature Preserve Mitigation Bank at Rancho Seco.

3.1.7 Population Trend

Trends of CNDDB occurrences are reported as unknown within the Permit Area, and throughout the species' range are reported as unknown or decreasing (CNDDB 2013). A study from 1996 suggests that CTS is in the early stages of range contraction and fragmentation (Fisher and Shaffer 1996) and that if this trend continues, the species is vulnerable to extinction (Barry and Shaffer 1994; Loredo *et al.* 1996). It has been estimated that CTS has disappeared from about 55 percent of its historic range in California (Jennings and Hayes 1994).

3.1.8 Threats

Within the Permit Area, threats to the species include development, cattle grazing, presence of bullfrogs, and construction activities. Throughout the species' range, conversion of habitat to urban and agricultural use resulting in habitat loss and fragmentation is considered the most significant threat to CTS (USFWS 2004). These activities result in destruction and fragmentation of upland and/or aquatic breeding habitat and direct loss of individual CTS (Fisher and Shaffer 1996; Jennings and Hayes 1994; Loredo et al. 1996; Shaffer et al. 1993). Roads may fragment breeding habitat and upland dispersal routes. Features of road construction, such as solid road dividers, can further impede movement, as can other potential barriers such as berms, and fences.

Fisher and Shaffer (1996) suggest that elevation may be a factor in local extirpations due to exotic predators. Introduced predators are more common at elevations below 656 feet (200 meters), and habitat modification and low levels of topographic relief may facilitate invasion of predators by increasing opportunities for dispersal through interconnected watersheds or suitable terrestrial habitats or through deposition by floodwaters (Fisher and Shaffer 1996). Exotic species, such as bullfrog (*Rana catesbeiana [=Lithobathes catesbeianus]*), mosquitofish (*Gambusia affinis*), sunfish species (e.g., largemouth bass [*Micropterus salmoides*] and bluegill [*Lepomis macrochirus*]), catfish (*Ictalurus* spp.), and fathead minnows (*Pimephales promelas*) prey on larval salamanders (Fisher and Shaffer 1996; Lawler *et al.* 1999; Laabs *et al.* 2001; Shaffer *et al.* 1993).

Barred tiger salamanders (*Ambystoma tigrinum mavortium*) and Arizona tiger salamanders (*Ambystoma tigrinum nebulosum*), formerly imported into California for sale and use as fishing bait, have become established, via purposeful introductions and bait bucket releases, as wild populations in various locations (Riley *et al*. 2003, Fitzpatrick and Shaffer 2004). The deliberate introduction of nonnative tiger salamanders in California is thought to have contaminated the genome of some CTS through interbreeding (Riley *et al.* 2003). The sale and use of *A. tigrinum* spp. as bait is now illegal in California. Hybridization with nonnative tiger salamanders has been occurring since fishermen and bait shop owners began introducing the species 60 years ago, resulting in 15-30 generations of genetic mixing (Fitzpatrick and Shaffer 2004).

Known hybrids now occupy approximately 20% of CTS range (Fitzpatrick and Shaffer 2007, Ryan *et al*. 2009). Hybrid populations are mostly in the Salinas Valley, where NNTS were intentionally established in the wild, and are found on both public and private lands (CDFW 2010).

Pure CTS must metamorphose to reproduce, but pure NNTS and their hybrids can opportunistically forgo metamorphosis in perennial ponds and reproduce as sexually mature larvae (paedomorphs) (CDFW 2010). Paedomorphs often reach sexual maturity earlier than metamorphs, produce larger clutches, and may breed earlier in a season, any of which may provide an advantage in perennial ponds (Fitzpatrick and Shaffer 2007). Fitzpatrick and Shaffer (2007) determined that the distribution of introduced tiger salamander genes is largely confined to within 7.5 mi (12 km) of introduction sites, where the transition between hybrids and natives is abrupt. Fitzpatrick and Shaffer (2007) suggested some level of hybrid management could be accomplished by private and public land managers converting perennial breeding ponds to more natural seasonal ponds. This would remove an ecological advantage for nonnative tiger salamanders and hybrids, and help select for a “more native” tiger salamander (CDFW 2010).

3.1.9 Existing Conservation and Management

There are three distinct population segments of CTS, Main (Central Valley) population which includes CTS within the Permit Area, Sonoma County population, and Santa Barbara County population. In February 1992, the USFWS received a petition to list CTS as an endangered species (USFWS 1992). The listing of the species was warranted but was precluded by higher priority listing actions. Subsequently, the Santa Barbara County distinct population segment of CTS was listed as endangered on September 21, 2000 (USFWS 2000), and the Sonoma County distinct population segment was listed as endangered on March 19, 2003 (USFWS 2003b). On August 4, 2004, the USFWS listed the CTS as threatened throughout its range (USFWS 2004). In doing so, they changed the status of the Santa Barbara and Sonoma county populations from endangered to threatened (USFWS 2004). On August 19, 2005; however, U.S. District Judge William Alsup vacated the USFWS's downlisting of the Sonoma and Santa Barbara populations. The Sonoma and Santa Barbara populations were again listed as endangered. California listed CTS as threatened on August 19, 2010 (CDFW 2013).

Approximately 199,109 acres (80,577 hectares) of critical habitat for the central population of CTS was designated on August 23, 2005, in 19 California counties, which were divided into four geographic regions: the Central Valley Region, Southern San Joaquin Valley Region, East Bay Region, and Central Coast Geographic Regions (USFWS 2005). The Central Valley Region includes the critical habitat in the Permit Area. The critical habitat for the central population of CTS includes essential aquatic habitat features, essential upland (nonbreeding season) habitat features with

underground refugia, and essential dispersal routes. Within the Central Valley Geographic Region, the Southeastern Sacramento Unit of critical habitat for CTS (Unit 3) is contained within the Permit Area, includes the SMUD Nature Preserve Mitigation Bank, and is approximately 10,202 acres, 7,926 acres of which are SMUD HCP Modeled Habitat (Figure 3-19). This critical habitat is essential to the conservation of the species because it is needed to maintain the current geographic and ecological distribution of the species within the Central Valley Region. A small portion (9.7 acres [3.9 hectares]) of the Northeastern San Joaquin Unit and Amador Counties Unit (Unit 4) is also located in the Permit Area near the Sacramento/San Joaquin County line (Figure 3-19).

Critical Habitat for CTS includes the following three primary constituent elements: "(1) Standing bodies of fresh water including natural and manmade (e.g., stockponds), vernal pools, and other ephemeral or permanent water bodies which typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall; (2) Upland habitats adjacent and accessible to breeding ponds that contain small mammal burrows or other underground habitat that CTS depend upon for food, shelter, and protection from the elements and predation; and (3) Accessible upland dispersal habitat between occupied locations that allow for movement between such sites. At a minimum, the elements found in aquatic and upland habitats and connected dispersal habitats are free of barriers." (USFWS 2005).

CTS occasionally occur in protected lands outside the Permit Area such as the Stone Corral Ecological Reserve in Tulare County, Calhoun Cut Ecological Reserve in Solano County, Mount Diablo State Park in Contra Costa County, Henry W. Coe State Park in Santa Clara County, The Nature Conservancy's Rancho Canada de Pala in Santa Clara County, and Jepson Prairie Preserve in Solano County (CNDDB 2013). CTS also occur in several protected mitigation banks in and out of the Permit Area, including the SMUD Nature Preserve Mitigation Bank (CNDDB 2013).

CTS is a covered species under the approved San Joaquin County Multi-species Habitat Conservation and Open Space Plan (SJCOG 2000) and the Natomas Basin Habitat Conservation Plan (HCP) (City of Sacramento *et al.* 2003), and proposed for coverage under the draft South Sacramento County Habitat Conservation Plan (HCP) (County of Sacramento *et al.* 2010) and Yolo County Natural Heritage Program (Yolo County H/NCCP JPA 2013).

3.1.10 SMUD HCP Modeled Habitat

Modeled aquatic habitat for CTS is the Open Water/Fringe, Other Depressional Wetland, and Vernal Pool, Seasonal Wetland, and Swale land cover types, located south of the Cosumnes River. In Yolo County, the species' range and modeled aquatic habitat is limited to areas west of the Yolo Bypass (Figure 3-19).

Modeled upland habitat for this species is SMUD HCP Blue Oak Woodland, Valley Oak Woodland, Pasture, and Grasses and Forbs land cover types within 1.2 miles of modeled aquatic habitat.

There are 95,327 acres of CTS modeled habitat within the Permit Area.

In addition, this species may occasionally be found in Orchard/Vineyard land cover type. Orchard/Vineyard land cover type is regularly disturbed and maintained by agricultural activities and has very low suitability for CTS. Orchard/Vineyard is not classified as modeled habitat. For the SMUD HCP, habitat models were developed by combining species ecological requirements, species' range and distribution, and suitable land cover types to estimate the amount of habitat that SMUD HCP Covered Activities may affect. For species that have a probability of occurring in anthropomorphic land cover types (i.e., Urban, Barren/Disturbed, Cropland, and Orchard/Vineyard), loss of habitat was not was not calculated; however, when there is a potential for Covered Species to be present, avoidance and minimization measures would be implemented for Covered Activities that occur in those land cover types to avoid or minimize direct take of Covered Species.

3.1.11 References

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4.0 Reptiles

4.1 Giant Garter Snake (*Thamnophis gigas*)

4.1.1 Conservation Considerations

Status

Federal: Threatened

State: Threatened

Other: None

4.1.2 Habitat Requirements

GGS is a California endemic species, closely associated with emergent wetlands in the Central Valley, occurring in marshes, sloughs, ponds, small lakes, and low-gradient waterways such as small streams, irrigation and drainage canals, and rice fields (USFWS 2012; Stebbins and McGinnis 2012). Habitat for GGS consists of adequate water during the active season, emergent herbaceous wetland vegetation (such as tules [*Schoenoplectus* sp.] and cattails [*Typa* spp.]) for escape and foraging habitat; grassy banks and openings in waterside vegetation for basking; and higher elevation upland habitat for cover and refuge from flooding (USFWS 2012). GGS require permanent water during the active season (early spring through mid-fall), which maintains dense populations of food organisms. GGS typically inhabit small mammal burrows and other soil and rock crevices during the colder months of winter (October to April) (Hansen and Brode 1993; Wylie *et al.* 1997; Wylie *et al.* 2003). Large rivers and wetlands with sand, gravel, or rock substrates do not support this species (USFWS 1999).

The GGS is highly aquatic but also occupies a terrestrial niche (USFWS 2012). Aquatic habitat includes remnant native marshes and sloughs, restored wetlands, low gradient streams, and agricultural wetlands including rice fields and irrigation and drainage canals. Terrestrial habitat includes adjacent uplands which provide areas for basking, retreats, and over-wintering. Basking takes place within tules, cattails, saltbush (*Atriplex* spp.), and shrubs over-hanging the water; patches of floating vegetation including waterweed; on rice checks; and on grassy banks (USFWS 2012).

4.1.3 Reproduction and Demography

GGS begin to mate soon after emergence from overwintering sites. The breeding season lasts from March through May and resumes briefly in September (Hansen and Hansen 1990; USFWS 1999). Females give birth to live young from late July through early September. Brood size averages 23 young but can range from 10 to 46 (Hansen

and Hansen 1990). Young immediately scatter into cover and absorb their yolk sacs, after which they begin to feed on their own. Young may double their size by one year of age (USFWS 1999). Sexual maturity is attained at approximately three years in males and five years in females (USFWS 1999).

Population size estimates for GGS are limited (USFWS 1999). However, in one mark-recapture study in the rice lands of the Natomas Basin in Sacramento County, population size was estimated at 1,000 garter snakes in one square mile (2.59 square kilometers) (Hansen and Brode 1993). Population estimates at Colusa National Wildlife Refuge, Badger Creek, and Gilsizer Slough ranged from 119 to 206 individuals (USFWS 1999).

4.1.4 Movement

GGS is typically inactive or greatly reduces its activities during the late fall and winter months (USFWS 2012). This species is most active from early spring through mid-fall, but activity may vary depending on weather conditions. GGS begin to emerge from winter retreats around April 1, and by April 15, most GGS are active and begin searching for food (Hansen and Brode 1993; USFWS 1999). By May 1, all GGS have emerged and are actively foraging. Around October 1 and no later than November 1, most GGS move into upland winter retreats, where they generally remain inactive during the winter months. On warmer days in winter, GGS may occasionally bask or move short distances away from upland winter retreats (USFWS 1999). Giant garter snakes do not hibernate during the winter as much as they go underground to escape unfavorable surface conditions (e.g., cold temperatures); on warm winter days these snakes are often active on the surface (Wylie, 1997). Radio telemetry studies have shown that GGS move very little from day to day. Median home ranges may range from 23 acres (9.2 hectares) to 131 acres (53.2 hectares) (USFWS 1999). However, activity varies substantially among individuals.

Wylie et al. (1997) found that most of their radio-marked snakes moved little from day to day, however, one individual moved 5 miles (8 kilometers) in response to dewatering of its habitat on the Colusa National Wildlife Refuge. This distance is not typicall of upland movement and was in response to dewatering and lack of aquatic habitat on the Colusa National Wildlife Refuge. Wylie et al. (1997) found that giant garter snakes primarily stayed near the Marsh edge, but two snakes used burrows up to 164 ft (50 meters) away from the Marsh as retreats from hot weather during an August heat wave, and one individual moved 820 feet (250 meters) from the Marsh to overwinter in a burrow near the railroad bed. It is evident from Wylie's studies that in general giant garter snakes are fairly sedentary, but capable of moving relatively long distances (i.e., up to 8 km).

The U.S. Fish and Wildlife Service definition of giant garter snake habitat from Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa,

Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California is “The giant garter snake inhabits marshes, sloughs, ponds, small

lakes, low gradient streams, other waterways and agricultural wetlands such as irrigation and drainage canals and rice fields, and the adjacent uplands. Essential habitat components consist of (1) adequate water during the snake's active period (i.e., early spring through mid-fall) to provide a prey base and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat; (3) upland habitat for basking, cover, and retreat sites; and (4) higher elevation uplands for cover and refuge from flood waters. For the purposes of this programmatic opinion, a basic giant garter snake habitat unit will incorporate 2.00 acres (0.81 hectares) of surrounding upland for every 1.00 acre (0.40 hectare) of aquatic habitat. The 2.00 acres (0.81 hectares) of upland also may be defined as 218 linear feet (66 meters) of bankside habitat which incorporates adjacent uplands to a width of 200 feet (61 meters) from the edge of the bank.” (USFWS 1997)

4.1.5 Community Associations

The diet of GGS consists mainly of aquatic prey such as small fish, tadpoles, and frogs (Hansen 1988; Stebbins and McGinnis 2012). GGS may concentrate feeding efforts at pooled areas that trap and concentrate prey (USFWS 1999). Non-native species that are preyed upon by GGS include carp (*Cyprinus carpio*), mosquitofish (*Gambusia affinis*), other small fish, and bullfrog (*Rana catesbeiana* [=*Lithobathes catesbeianus*]). Native prey species include Sacramento blackfish (*Orthodox microlepidotus*) and Sierra treefrog (*Pseudacris sierrae*) (USFWS 1999).

Likely predators of GGS include raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*), northern harrier (*Circus cyaneus*) and other hawks, egrets (Family *Ardeidae*), and great blue heron (*Ardea herodias*).

GGS are not thought to be territorial, though their competitive relationships with other snakes are not well understood. GGS may coexist with valley garter snake (*Thamnophis sirtalis fitchi*) and western terrestrial garter snake (*T. elegans*). Differences in foraging behavior may allow these species to co-occur (USFWS 1999).

4.1.6 Distribution

The giant garter snake (GGS) is endemic to marshes, sloughs, ponds, small lakes, mud-bottom canals adjacent to rice fields, and occasionally slow streams on the valley floors of the Sacramento and San Joaquin valleys of central California, typically below 400 feet (122 meters) in elevation (Hansen and Brode 1980; USFWS 2012). Historically, GGS was found throughout the Central Valley from Butte County south to Kern County (USFWS 1999). Since the 1940s, the species has been extirpated from the southern end of its range. The current range extends from near Chico in Butte County to the Mendota Wildlife Area in Fresno County (USFWS 2012). Occurrence

records indicate that GGS is currently distributed in nine isolated population clusters coinciding with historical flood basins, marshes, wetlands, and tributary streams of the Central Valley (USFWS 2012). These populations are the Butte Basin, Colusa Basin, Sutter Basin, American Basin, Yolo Basin, Cosumnes-Mokelumne Watershed, Delta Basin, San Joaquin Basin, and Tulare Basin (USFWS 2012). No occurrences of GGS are known from the northern portion of the San Joaquin Valley north to the eastern fringe of the Sacramento-San Joaquin River Delta (Hansen and Brode 1980; USFWS 2012). The resulting gap of approximately 60 miles (100 kilometers) separates populations in Merced County from those along the eastern fringes in the Sacramento-San Joaquin River Delta in San Joaquin County, with no GGS known from the lowland regions of Stanislaus County (Hansen and Brode 1980; CNDDB 2013).

There are 54 documented occurrences of GGS within Sacramento County, six of which are extirpated (CNDDB 2013). The majority of these occurrences are located in northern Sacramento County (i.e., north of Interstate 80) and constitute the southern portion of the American Basin population-the largest extant population of GGS (USFWS 1999). Reconnaissance-level surveys of this area conducted by the U.S. Fish and Wildlife Service (USFWS) prior to 1991 indicated that approximately 1,408 acres (570 hectares) of GGS habitat existed in the form of man-made irrigation channels and drainage ditches, and an undetermined number of acres of suitable habitat within approximately 13,000 acres (5,260 hectares) of adjoining rice fields; however, much of this habitat has been developed or converted to other agricultural uses. The other CNDDB known occurrences in Sacramento County (i.e., south of Interstate 80) are located in the following general locations: just north of the Antioch Bridge, Horseshoe Bend, Stone Lake, Laguna Creek, Morrison Creek, Snodgrass Slough, Willow Creek, Badger Creek, Hadselville Creek, and Elk Grove Creek (County of Sacramento *et al.* 2010) (Figure 3-22). Together, these occurrences suggest that Sacramento County supports a substantial proportion of the current range wide distribution of GGS (County of Sacramento *et al.* 2010).

There are 54 California Natural Diversity Data Base (CNDDB) occurrences of this species throughout the Permit Area, with over 25 occurrences concentrated in the northwestern corner of the Permit Area (CNDDB 2013) (Figure 3-22). Locality records in the southern Sacramento Valley occurred between 10 and 40 feet (3 and 12 meters) elevation (G. Hansen 1986 as cited in USFWS 1999) and may have be constrained to about 70 feet (22 meters) elevation which conforms to historic boundaries of low level tule marsh areas. In the Permit Area, one GGS occurrence was recorded at 90 feet elevation in the southern portion of the Permit Area (CNDDB 2013); therefore, the range in the Permit Area is restricted to areas below 90 feet (27 meters) elevation in the Permit Area. Within the SMUD HCP Permit Area, the range of this species is limited to the area west of the Natomas East Main Drainage Canal (NEMDC) in the northern portion of the Permit Area (including Yolo County) (Figure 3-22), and to areas below 90 feet (27 meters) in elevation in the southern portion of the Permit Area (Figure 3-22).

4.1.7 Population Trend

The current distribution and abundance of GGS has been reduced significantly from historic levels. Agriculture and flood control measures have extirpated the species from the southern third of its range, which comprised the historic Buena Vista, Tulare, and Kern lakebeds. Almost no suitable freshwater habitat remains south of Fresno (USFWS 1999). Some populations may not be viable because they are small, highly fragmented, and restricted to small patches of marginal habitat. GGS populations north of the Delta Basin are believed to be relatively stable compared to those in the San Joaquin Valley where the populations appear to be in a serious and notable decline (USFWS 2012). The Natomas Basin Conservancy property has been monitored for GGS since 2000 (USFWS 2012). Surveys show that GGS are persisting and continue to occupy restored habitat and rice fields in this area. Population trends for CNDDB occurrences are listed as unknown (CNDDB 2013).

4.1.8 Threats

Habitat loss from agricultural development and flood control activities has been the primary factor in the decline of GGS populations. Upstream watershed modifications, water storage and diversion projects, and urban and agricultural development cumulatively affect wetland habitat for GGS on the valley floor. Other factors contributing to the decline of GGS include interrupted water supply, poor water quality, and contaminants. Small remaining populations are susceptible to predation by mammals, birds, and introduced game fish such as largemouth bass (*Micropterus salmoides*) and catfish (*Ictalurus* spp.). Additional causes of mortality include vehicular traffic, agricultural practices, and maintenance of water channels (e.g., scraping canal banks, mowing, and applying herbicides) (USFWS 1999). Rice fields have become important habitat for GGS, particularly those associated canals and their banks for both spring and summer active periods and winter hibernation (Hansen 2004). Recently, rice lands have been converted to residential and commercial development resulting in additional habitat loss. Habitat fragmentation and population isolation also threatened GGS (USFWS 2012).

4.1.9 Existing Conservation and Management

The GGS was federally listed as threatened on October 20, 1993 (USFWS 1993). California listed the species as rare on June 27, 1971, and reclassified it to threatened on October 2, 1980 (CDFW 2013). Critical habitat has not yet been designated for this species.

The Draft Recovery Plan for GGS defines four recovery units: Sacramento Valley, Mid-Valley, San Joaquin Valley, and South Valley (USFWS 1999). In the Sacramento Valley, the USFWS calls for protection of known populations on private lands, monitoring of the populations, protection from threats that limit the population, and adaptive management and monitoring of habitat (USFWS 1999).

The Service's 2012 Five Year Review for the species determined that because GGS continues to be threatened by the loss and fragmentation of habitat; by water management activities, agricultural practices, flood control and maintenance actions, and road mortality; and potentially threatened by climate change and water quality; it continues to meet the definition of a threatened species and its status should remain unchanged (USFWS 2012).

GGS occurs on some protected lands including the Stone Lakes National Wildlife Refuge in the Permit Area, and Colusa National Wildlife Refuge, Yolo Bypass Wildlife Area, Sutter Bypass Wildlife Area, Cosumnes River Ecological Reserve, Los Banos Wildlife Area, Howard Slough Wildlife Area, Gray Lodge Wildlife Area, Upper Butte Basin Wildlife Area, land owned by the Natomas Basin Conservancy, and other conservation and mitigation banks such as the Pope Ranch and Ridge Cut conservation banks (CNDDB 2013; USFWS 2012). Acquisition and restoration of GGS habitat has occurred in the Natomas Basin portion of the Permit Area through implementation of the Natomas Basin Habitat Conservation Plan (HCP) (City of Sacramento *et al.* 2003) and Metro Air Park HCP (Thomas Reid Associates 2001).

GGS is a covered species or a proposed covered species in the following conservation plans: the draft South Sacramento County HCP (County of Sacramento *et al.* 2010), the Natomas Basin HCP, the HCP for the Metro Air Park Project in the Natomas Basin, the draft Yolo County Natural Heritage Program (Yolo County H/NCCP JPA 2013), the draft Placer County Conservation Plan (Placer County 2011), and the draft Butte Regional Conservation Plan (BCAG 2012).

4.1.10 SMUD HCP Modeled Habitat

HCP Modeled aquatic habitat for GGS is Rice, Riverine, Open Water/Fringe, and Other Depressional Wetland land cover types, located west of the NEMDC in the Permit Area (including Yolo County), and below 90 feet in elevation for the southern portion of the permit area.

The USFWS recommends avoiding construction activities within 200 feet (61 meters) from the banks of giant garter snake aquatic habitat, when feasible (USFWS 2005). The 200 foot (61 meters) buffer from the edge of giant garter snake aquatic habitat is incorporated to include essential habitat components and determine potential take (USFWS 1997). Therefore, the SMUD HCP modeled habitat includes suitable upland land cover within 200 feet (61 meters) of suitable aquatic land cover.

HCP Modeled upland habitat for GGS is Valley Foothill Riparian, Blue Oak Woodland, Valley Oak Woodland, Pasture, and Grasses and Forbs land cover types located within 200 feet (61 meters) of modeled aquatic habitat.

The Permit Area supports 19,344 acres of aquatic Modeled Habitat and 22,170 acres of upland Modeled Habitat.

In addition, this species may occasionally be found in Urban and Barren/Disturbed land cover types. Urban and Barren/Disturbed landcover types are regularly disturbed and maintained by anthropogenic activities and have low suitability for GGS. Urban and Barren/Disturbed are not classified as modeled habitat. For the SMUD HCP, habitat models were developed by combining species ecological requirements, species' range and distribution, and suitable land cover types to estimate the amount of habitat that SMUD HCP Covered Activities may affect. For species that have a probability of occurring in anthropomorphic land cover types (i.e., Urban, Barren/Disturbed, Cropland, and Orchard/Vineyard), loss of habitat was not was not calculated; however, when there is a potential for Covered Species to be present, avoidance and minimization measures would be implemented for Covered Activities that occur in those land cover types to avoid or minimize direct take of Covered Species.

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APPENDIX D LAND COVER IMPACTS IN THE PERMIT AREA

SMUD HCP Impact Calculations for Land Cover, Covered Species and Critical Habitat

Introduction

This document provides a detailed description on the format, content of and approach for the impact calculation tables and final impact numbers for the SMUD HCP. Appendix D provides the Land Cover acreage impacted for the Permit Area per event, annually, and over the 30-year Permit Term. Appendices E and H provide Covered Species Modeled Habitat and Critical Habitat acreages impacted, respectively. The impact acreages presented in Appendix E and H were calculated in the same manner and follow the same format as Appendix D using each species' Modeled Habitat and Modeled Habitat within Critical Habitat; therefore, calculations and tables presented in Appendices E and H are not described in additional detail, except where calculations were refined.

SMUD utilized a systematic approach to quantify Land Cover and Modeled Habitat impacts from Covered Activities. The approach to quantifying habitat impacts for Covered Species involves the following.

1. Developing annual estimates of temporary and permanent impacts resulting from each Covered Activity using the estimated size of the Covered Activity and the estimated frequency with which it occurs in a given year.

2. Quantifying the amount of Modeled Habitat by Covered Species and facility type.

3. Estimating potential habitat loss based on the proportion of the facility easement that falls within the modeled habitat of each Covered Species.

4. Adjusting impact estimates based on Covered Activity practices and input from subject matter experts to adjust the impact estimates.

5. Estimating potential impacts on Critical Habitat for Covered Species that have designated critical habitat.

As described in Chapter 4, SMUD used GIS software to electronically overlay SMUD's existing easements and facilities on the land cover types within the Permit Area. The total acreage of each land cover type within SMUD easements was calculated using this GIS methodology, as was the total number and location of facilities (e.g., poles, towers, pull boxes, etc.) within the Permit Area. SMUD calculated acres of impacts for each covered activity by multiplying the impact (permanent and temporary) acreage of a single Covered Activity event by the total number of times that the Covered Activity would occur each year or the number of times the activity is expected to occur over the 30-year permit term (frequency).

SMUD assumed impact locations for each Covered Activity based off the land cover types within its existing easements or at facility locations. SMUD determined the proportion of each land cover type within its existing easements (total acres of the land cover type in easements divided by the total acres of easements). For example, one-third of SMUD's gas pipeline easements occur in the Cropland land cover type, therefore SMUD is assuming that one-third of the Covered Activities in SMUD's gas pipeline easements would occur in the Cropland land cover type. This proportion was then used to extrapolate the acres of each Covered Species' Modeled Habitat and Critical Habitat that would be affected by each of SMUD's Covered Activities that occur in existing easements. The calculation results in annual impacts for each Covered Activity in land cover types throughout the Permit Area. This exercise was carried out for each Covered Activity. The acreages were then summed to generate the total temporary and permanent habitat loss expected from Covered Activities annually and over the Permit Term.

Annual impacts represent an average, with some years being higher and other years being lower. Thirty-year impacts represent a ceiling of impacts (i.e., a cap) that cannot be exceeded without a major amendment to the permits. This impact analysis uses the following conservative assumptions to present potential impacts from covered activities: (1) All Modeled Habitat is assumed to be occupied; (2) habitat loss calculations used for various Covered Activities are conservative and, therefore, overestimate the amount of habitat loss that would result from Covered Activities; and (3) larger-scale Covered Activities would be infrequent and, thus, calculations may overestimate total annual impacts.

Appendix Overview

Appendices D, E, and H consist of tables which present impact data calculated for the Permit Area, each Covered Species, and Critical Habitat for those species that have designated critical habitat. There are nine tables for land cover and each species, including:

1. *Land Cover or Modeled Habitat in the Permit Area*;
2. *Percentage of Land Cover or Modeled Habitat in the Permit Area*;
3. *Land Cover or Modeled Habitat Loss by Covered Activity*;
4. *Land Cover or Modeled Habitat Temporary Habitat Loss by Covered Activity – Per Event*;
5. *Land Cover or Modeled Habitat, Temporary Habitat Loss by Covered Activity – Annual*;
6. *Land Cover or Modeled Habitat, Temporary Habitat Loss by Covered Activity – Permit Term*;
7. *Land Cover or Modeled Habitat, Permanent Habitat Loss by Covered Activity – Per Event*;
8. *Land Cover or Modeled Habitat, Permanent Habitat Loss by Covered Activity – Annual*; and

9. *Land Cover or Modeled Habitat, Permanent Habitat Loss by Covered Activity – Permit Term.*

Appendix H provides the summary tables for critical habitat impacts for each Covered Species with critical habitat, by critical habitat unit.

Appendix D also includes *Table D-10: SMUD HCP Total Land Cover Loss by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term Summary of Land Cover Area by Facility, Table D-11: SMUD HCP Total Land Cover Loss by Covered Activity, Permanent Land Cover Loss – Wetland Reduction - Entire Permit Term, Table D-12: Summary: SMUD HCP Summary Land Cover Area by Facility*, *Table D-13 Summary: SMUD HCP Total Land Cover Loss by Covered Activity*, and *Table D-14 Summary: SMUD HCP Total Land Cover Loss by Covered Activity Types*.

Appendices E and H include a summary table, *Table E-10: Covered Species Total Modeled Habitat Loss* and F-10 *Covered Species Total Critical Habitat Loss*. The content of each of these tables is described in detail below. All data were obtained through analysis using ArcGIS.

Description of Data Included in each Table

Table D-1: Land Cover in the Permit Area

Table D-1 consists of three sections. The first section, *Lines*, contains the acreage of land cover types within SMUD's easements. The second section, *Facilities*, contains the number of SMUD facilities such as poles, towers, vaults, or valve stations that lie within each land cover type within the Permit Area. The third section, *Other Facilities*, contains the acreage of land cover types within "Other Facilities". The "Other Facilities" category refers to SMUD facilities within the Permit Area that are not associated with the electric or gas facilities and include the Cosumnes Power Plant, Mitigation Bank – Oak Tree Planting Area, and Cosumnes Power Plant Water Pipeline.

Table D-2: Percentage of Land Cover in the Permit Area

Table D-2 presents the percentages of land cover types within easements and facilities, and land cover types within Other Facilities. The first section, *Lines*, shows the percentage or proportion of land cover in each easement type (acreage of land cover type in easement divided by the total acreage of the easement). The second section, *Facilities*, presents the percent of point facilities in Land Cover, and the third section, *Other Facilities*, presents the percent of Land Cover within other facilities.

Table D-3: SMUD HCP Total Land Cover Loss by Covered Activity

Table D-3 presents the estimated Land Cover Loss by Covered Activity per event, annually, and over the 30-year Permit Term. The table provides detailed information specific to each Covered Activity including: *Duration, Frequency, Acreage of Temporary Habitat Loss,* and *Acreage of Permanent Habitat Loss*. A description of each column is presented below.

Duration

The “Duration” column contains the length of time that SMUD estimated each Covered Activity would take to complete based on past project records. The majority of the Covered Activities would be completed in less than one to two days, but some activities are estimated to require multiple days, weeks, or months.

Frequency

The “Frequency” column includes the number of times that the Covered Activity would be completed, either on an annual basis or over the 30-year permit term. Some Covered Activities occur on a regular basis and have a high annual frequency, while others may only occur a few times during the Permit Term.

Temporary Habitat Loss

The “Temporary Habitat Loss” columns include the estimated temporary habitat loss that could occur for each Covered Activity over three different time intervals; per event, annually, and over the Permit Term. SMUD used its data from *Chapter 2. Covered Activities*, to populate these columns.

Permanent Habitat Loss

As with the Temporary Habitat Loss columns, the “Permanent Habitat Loss” columns include the estimated permanent habitat loss that could occur for each Covered Activity over three different time intervals; per event, annually, and over the Permit Term. SMUD used its data from *Chapter 2. Covered Activities*, to populate these columns.

Tables D-4 through D-11 and E9:

In Tables *D4* though *D6* (*Temporary Habitat Loss*), and *D7* through *D9* (*Permanent Habitat Loss*), SMUD calculated temporary and permanent acres of land cover type impacted by Covered Activities per event, annually, and over the Permit Term. SMUD calculated acres of impacts for each Covered Activity by multiplying the impact acreage of a single Covered Activity event by the total numbers of times that the Covered Activity would occur each year or, if less frequent, over the 30-year Permit Term. Then the acres impacted were multiplied by the proportion (*Table D2*) of each land cover type throughout the Permit Area. This exercise was carried out for each covered activity. The impacts were then summed to generate the total temporary and permanent habitat loss expected from Covered Activities per event, annually, and over the permit term.

Tables D-10 and *D11* present temporary and permanent impacts to aquatic land cover types that were adjusted for each Covered Activity. The additional analysis was performed to determine whether those Covered Activities were in fact, likely to occur in those land cover types (Riverine; Open Water/Fringe; Other Depressional Wetlands; and Vernal Pool, Seasonal Wetland and Swale). For example, SMUD would not construct a new substation in the Riverine Land Cover type. The first 4 columns of the table present the reduction amounts. The second 4 columns of the table present a final acreage of impacts. The last column provides justification for the reduction.

For each of the Covered Species that have Vernal Pool, Seasonal Wetland, and Swale as a Modeled Habitat, *Table E-9* provides the permanent impacts associated with Covered Activities and has additional revisions. It was assumed that if specific Covered Activities (E13. New and Relocated Overhead Subtransmission and Distribution Line Construction) would occur in the Vernal Pool, Seasonal Wetland, or Swale land cover type, that the entirety of the feature would be impacted, not just the acreage that corresponds to the Covered Activity impact. SMUD used ArcGIS and calculated the average size of a feature in the Vernal Pool, Seasonal Wetland, or Swale land cover type to total 0.3602 acre. Therefore, the impact acreage to Vernal Pool, Seasonal Wetland, and Swale was increased to account for impacting the entire feature.

Tables D12 through D-14: Summary Tables

Tables D-12, D-13, and D-14 present a summary of the Land Cover Area by Facility, Land Cover Loss by Covered Activity, and Land Cover Loss by Covered Activity Types, respectively.

Table E-10: Summary Table

Table E-10 presents a summary of the estimated temporary and permanent land cover loss for each land cover type associated with each Covered Species.

Table D-1: Land Cover in the Permit Area

	Easement Width (feet)	Land Cover (acres)																	
		Eucalyptus Woodland	Valley Foothill Riparian	Blue Oak Foothill Pine	Blue Oak Woodland	Valley Oak Woodland	Mine Tailing Riparian Woodland	Orchard/ Vineyard	Cropland	Rice	Pasture	Grasses and Forbs	Urban	Barren/ Disturbed	Riverine	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Total Permit Area
Total Land Cover		**53.93**	**10,356.62**	**104.28**	**17,715.10**	**1,089.22**	**3,186.39**	**31,417.51**	**69,172.77**	**5,312.61**	**21,239.58**	**168,230.12**	**197,265.01**	**17,893.19**	**10,793.52**	**6,502.02**	**9,437.22**	**7,784.11**	**577,553.21**
LINES		**Land Cover in Easement (acres)**																	
Transmission																			
Easement OH Transmission	200	-	90.56	1.79	79.33	5.01	-	148.61	220.63	4.22	253.50	1,069.37	1,517.42	56.89	45.16	14.22	65.75	233.91	3,806.37
Easement UG Transmission in Conduit	200	-	-	-	-	-	-	-	-	-	-	-	346.79	-	0.51	-	-	-	347.30
Subtotal Transmission		**-**	**90.56**	**1.79**	**79.33**	**5.01**	**-**	**148.61**	**220.63**	**4.22**	**253.50**	**1,069.37**	**1,864.20**	**56.89**	**45.67**	**14.22**	**65.75**	**233.91**	**4,153.66**
Subtransmission and Distribution																			
Easement OH Distribution - without 69kV Overbuild	12.5	0.69	39.48	0.53	19.13	8.91	1.67	141.37	258.53	6.89	106.15	601.20	3,512.16	48.05	57.12	6.15	18.24	16.35	4,842.62
Easement OH Subtransmission and Distribution	25	0.37	10.80	0.50	5.77	1.85	5.89	16.49	63.57	8.91	22.99	299.14	1,164.18	45.76	17.12	2.08	2.68	5.48	1,673.59
Easement UG Subtransmission and Distribution in Conduit	25	0.39	14.95	1.23	33.46	10.53	0.20	9.03	39.30	2.14	85.33	666.49	8,973.18	397.94	47.87	12.40	26.58	8.67	10,329.69
Easement UG Subtransmission and Distribution Direct Buried	25	0.57	12.69	3.86	50.26	4.04	0.07	5.49	10.12	0.04	10.93	189.31	6,703.94	6.60	18.25	3.16	10.67	1.11	7,031.11
Total Easement OH Subtransmission and Distribution	--	*1.06*	*50.28*	*1.03*	*24.90*	*10.76*	*7.57*	*157.86*	*322.10*	*15.81*	*129.15*	*900.34*	*4,676.34*	*93.81*	*74.23*	*8.22*	*20.91*	*21.83*	*6,516.21*
Total Easement UG Subtransmission and Distribution	--	*0.96*	*27.64*	*5.10*	*83.72*	*14.56*	*0.27*	*14.52*	*49.42*	*2.18*	*96.26*	*855.80*	*15,677.12*	*404.54*	*66.12*	*15.56*	*37.26*	*9.77*	*17,360.80*
Subtotal Subtransmission and Distribution	**--**	**2.02**	**77.92**	**6.13**	**108.62**	**25.32**	**7.84**	**172.38**	**371.52**	**17.99**	**225.41**	**1,756.14**	**20,353.46**	**498.36**	**140.36**	**23.78**	**58.17**	**31.60**	**23,877.01**

Table D-1: Land Cover in the Permit Area (cont.)

	Easement Width (feet)	Land Cover (acres)																	
		Eucalyptus Woodland	Valley Foothill Riparian	Blue Oak Foothill Pine	Blue Oak Woodland	Valley Oak Woodland	Mine Tailing Riparian Woodland	Orchard/ Vineyard	Cropland	Rice	Pasture	Grasses and Forbs	Urban	Barren/ Disturbed	Riverine	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Total Permit Area
Total Easement OH Transmission, Subtransmission, Distribution	--	*1.06*	*140.84*	*2.82*	*104.22*	*15.77*	*7.57*	*306.48*	*542.73*	*20.02*	*382.65*	*1,969.71*	*6,193.76*	*150.71*	*119.39*	*22.45*	*86.67*	*255.74*	*10,322.58*
Total Easement UG in Conduit	--	*0.39*	*14.95*	*1.23*	*33.46*	*10.53*	*0.20*	*9.03*	*39.30*	*2.14*	*85.33*	*666.49*	*9,319.96*	*397.94*	*48.38*	*12.40*	*26.58*	*8.67*	*10,676.99*
Total Easement UG Direct Buried	--	*0.57*	*12.69*	*3.86*	*50.26*	*4.04*	*0.07*	*5.49*	*10.12*	*0.04*	*10.93*	*189.31*	*6,703.94*	*6.60*	*18.25*	*3.16*	*10.67*	*1.11*	*7,031.11*
Total Easement Total UG in Conduit and Direct Buried	--	*0.96*	*27.64*	*5.10*	*83.72*	*14.56*	*0.27*	*14.52*	*49.42*	*2.18*	*96.26*	*855.80*	*16,023.91*	*404.54*	*66.63*	*15.56*	*37.26*	*9.77*	*17,708.10*
Total Electrical Line Easement	***--***	***2.02***	***168.48***	***7.92***	***187.95***	***30.33***	***7.84***	***320.99***	***592.15***	***22.20***	***478.91***	***2,825.51***	***22,217.66***	***555.25***	***186.03***	***38.01***	***123.92***	***265.51***	***28,030.68***
Fiber-optic Line																			
OH Fiber-optic Line	25	-	7.20	-	7.91	1.56	-	9.23	15.25	0.52	25.95	119.37	190.97	9.36	4.32	1.38	6.49	22.84	422.35
UG Fiber-optic Line	25	-	0.37	-	-	-	-	11.51	25.12	-	5.01	15.80	50.64	1.50	1.22	0.21	0.26	0.02	111.65
Total Fiber-optic Line Easement		***-***	***7.57***	***-***	***7.91***	***1.56***	***-***	***20.74***	***40.36***	***0.52***	***30.97***	***135.17***	***241.61***	***10.85***	***5.55***	***1.58***	***6.74***	***22.86***	***534.00***
Gas Pipeline																			
Gas Pipeline Easement	35	-	1.78	-	-		-	26.66	98.84	13.29	50.90	32.81	64.03	2.64	7.32	5.39	17.60	0.04	321.30
Total Gas Pipeline Easement		***-***	***1.78***	***-***	***-***	***-***	***-***	***26.66***	***98.84***	***13.29***	***50.90***	***32.81***	***64.03***	***2.64***	***7.32***	***5.39***	***17.60***	***0.04***	***321.30***

Table D-1: Land Cover in the Permit Area (cont.)

FACILITIES	Numbers of Facilities in Land Cover																	
	Eucalyptus Woodland	Valley Foothill Riparian	Blue Oak Foothill Pine	Blue Oak Woodland	Valley Oak Woodland	Mine Tailing Riparian Woodland	Orchard/Vineyard	Cropland	Rice	Pasture	Grasses and Forbs	Urban	Barren / Disturbed	Riverine	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Total Facilities in Permit Area
Transmission																		
Lattice Towers	-	22	-	16	-	-	24	21	1	39	191	182	7	5	2	6	44	560
Wood Poles	-	12	-	-	-	-	-	10	-	-	14	102	-	-	1	5	-	144
All other Transmission Poles	-	5	1	4	-	-	7	26	-	22	132	512	2	7	-	-	5	723
Subtotal Transmission Towers and Poles	**-**	**39**	**1**	**20**	**-**	**-**	**31**	**57**	**1**	**61**	**337**	**796**	**9**	**12**	**3**	**11**	**49**	**1,427**
Subtransmission and Distribution																		
Wood Poles	12	738	12	352	183	65	2,071	4,153	156	1,764	12,414	106,587	1,037	1,057	75	251	286	131,213
Other Poles	-	105	15	236	19	4	69	190	11	133	1,101	10,612	129	51	38	43	29	12,785
Subtotal Subtransmission and Distribution Poles	**12**	**843**	**27**	**588**	**202**	**69**	**2,140**	**4,343**	**167**	**1,897**	**13,515**	**117,199**	**1,166**	**1,108**	**113**	**294**	**315**	**143,998**
Total Towers and Poles	*12*	*882*	*28*	*608*	*202*	*69*	*2,171*	*4,400*	*168*	*1,958*	*13,852*	*117,995*	*1,175*	*1,120*	*116*	*305*	*364*	*145,425*
Above Ground Pads	3	52	12	199	32	1	42	48	4	202	1,653	39,414	870	113	40	76	15	42,776
Box-pads	-	4	1	5	12	-	-	22	-	19	188	2,210	102	12	1	5	3	2,584
Manholes	-	3	-	-	-	-	-	2	-	-	25	1,515	16	8	-	-	-	1,569
Subsurface Pads	-	1	-	8	-	-	-	4	-	-	9	177	6	-	2	1	-	208
Vaults	-	-	-	-	-	-	-	-	-	-	1	214	-	-	-	-	-	215
Subtotal Substructures	**3**	**60**	**13**	**212**	**44**	**1**	**42**	**76**	**4**	**221**	**1,876**	**43,530**	**994**	**133**	**43**	**82**	**18**	**47,352**
Pull Boxes																		
Pull Boxes	-	51	1	60	40	1	18	131	2	184	1,676	21,634	859	172	22	50	25	24,926
Subtotal Pull Boxes	**-**	**51**	**1**	**60**	**40**	**1**	**18**	**131**	**2**	**184**	**1,676**	**21,634**	**859**	**172**	**22**	**50**	**25**	**24,926**
Electrical Substations																		
Transmission Substations	-	-	-	-	-	-	-	-	-	-	-	17	1	-	-	-	-	18
Distribution Substations	-	-	-	-	1	-	-	3	-	2	9	187	6	3	-	-	-	211
Subtotal Electrical Substations	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**3**	**-**	**2**	**9**	**204**	**7**	**3**	**-**	**-**	**-**	**229**
Gas Pipeline Valve Stations	-	-	-	-	-	-	1	4	-	-	2	5	-	-	-	-	-	12
Poles in State Responsibility Area	-	13	2	15	-	-	41	6	-	17	469	347	8	6	-	-	3	927
Cosumnes Power Plant Cathodic Test Protection Stations	-	-	-	-	-	-	1	-	-	4	9	2	-	-	-	1	-	17
Total Facilities	***15***	***1,006***	***44***	***895***	***289***	***71***	***2,274***	***4,626***	***174***	***2,390***	***17,911***	***184,091***	***3,055***	***1,440***	***181***	***438***	***410***	***218,888***

Table D-1: Land Cover in the Permit Area (cont.)

OTHER FACILITIES*	Easement Width (feet)	Land Cover in Other Facilities (acres)																	
		Eucalyptus Woodland	Valley Foothill Riparian	Blue Oak Foothill Pine	Blue Oak Woodland	Valley Oak Woodland	Mine Tailing Riparian Woodland	Orchard/Vineyard	Cropland	Rice	Pasture	Grasses and Forbs	Urban	Barren/Disturbed	Riverine	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Total Facilities in Permit Area
Cosumnes Power Plant	n/a	-	-	-	-	-	-	-	-	-	-	1.70	26.59	-	0.77	-	-	-	29.05
Mitigation Bank - Oak Tree Planting Area	n/a	-	-	-	-	-	-	-	-	-	-	278.20	-	-	1.87	0.76	0.34	1.31	282.47
Rancho Seco Photovoltaic 5 Removal	n/a	-	-	-	-	-	-	-	-	-	-	10.65						0.001	10.65
Cosumnes Power Plant Water Pipeline	25	-	-	-	-	-	-	1.79	-	-	4.82	7.82	0.47	-	0.32	0.01	0.20	0.06	15.49
Total Other Facilities*		**-**	**-**	**-**	**-**	**-**	**-**	***1.79***	**-**	**-**	***4.82***	***298.36***	***27.06***	**-**	***2.96***	***0.77***	***0.53***	***1.37***	***337.66***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table D-2 Percentage of Land Cover in the Permit Area

	Easement Width (feet)	Land Cover (% of total acres)																	
		Eucalyptus Woodland	Valley Foothill Riparian	Blue Oak Foothill Pine	Blue Oak Woodland	Valley Oak Woodland	Mine Tailing Riparian Woodland	Orchard/ Vineyard	Cropland	Rice	Pasture	Grasses and Forbs	Urban	Barren/ Disturbed	Riverine	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Percentage of Total Acreage in Permit Area
Total Land Cover		**0.01%**	**1.79%**	**0.02%**	**3.07%**	**0.19%**	**0.55%**	**5.44%**	**11.98%**	**0.92%**	**3.68%**	**29.13%**	**34.16%**	**3.10%**	**1.87%**	**1.13%**	**1.63%**	**1.35%**	**100.00%**
LINES		**Percent of Land Cover in Easement (acres)**																	
Transmission																			
Easement OH Transmission	200	-	2.38%	0.05%	2.08%	0.13%	-	3.90%	5.80%	0.11%	6.66%	28.09%	39.87%	1.49%	1.19%	0.37%	1.73%	6.15%	0.66%
Easement UG Transmission in Conduit	200	-	-	-	-	-	-	-	-	-	-	-	99.85%	-	0.15%	-	-	-	0.06%
Subtotal Transmission		**-**	**2.18%**	**0.04%**	**1.91%**	**0.12%**	**-**	**3.58%**	**5.31%**	**0.10%**	**6.10%**	**25.75%**	**44.88%**	**1.37%**	**1.10%**	**0.34%**	**1.58%**	**5.63%**	**0.72%**
Subtransmission and Distribution																			
Easement OH Distribution - without 69kV Overbuild	12.5	0.01%	0.82%	0.01%	0.39%	0.18%	0.03%	2.92%	5.34%	0.14%	2.19%	12.41%	72.53%	0.99%	1.18%	0.13%	0.38%	0.34%	0.84%
Easement OH Subtransmission and Distribution	25	0.02%	0.65%	0.03%	0.34%	0.11%	0.35%	0.99%	3.80%	0.53%	1.37%	17.87%	69.56%	2.73%	1.02%	0.12%	0.16%	0.33%	0.29%
Easement UG Subtransmission and Distribution in Conduit	25	0.004%	0.14%	0.01%	0.32%	0.10%	0.002%	0.09%	0.38%	0.02%	0.83%	6.45%	86.87%	3.85%	0.46%	0.12%	0.26%	0.08%	1.79%
Easement UG Subtransmission and Distribution Direct Buried	25	0.01%	0.18%	0.05%	0.71%	0.06%	0.001%	0.08%	0.14%	0.0006%	0.16%	2.69%	95.35%	0.09%	0.26%	0.04%	0.15%	0.02%	1.22%
Total Easement OH Subtransmission and Distribution	--	*0.02%*	*0.77%*	*0.02%*	*0.38%*	*0.17%*	*0.12%*	*2.42%*	*4.94%*	*0.24%*	*1.98%*	*13.82%*	*71.76%*	*1.44%*	*1.14%*	*0.13%*	*0.32%*	*0.34%*	*1.13%*
Total Easement UG Subtransmission and Distribution	--	*0.01%*	*0.16%*	*0.03%*	*0.48%*	*0.08%*	*0.00%*	*0.08%*	*0.28%*	*0.01%*	*0.55%*	*4.93%*	*90.30%*	*2.33%*	*0.38%*	*0.09%*	*0.21%*	*0.06%*	*3.01%*
Subtotal Subtransmission and Distribution	**--**	**0.01%**	**0.33%**	**0.03%**	**0.45%**	**0.11%**	**0.03%**	**0.72%**	**1.56%**	**0.08%**	**0.94%**	**7.35%**	**85.24%**	**2.09%**	**0.59%**	**0.10%**	**0.24%**	**0.13%**	**4.13%**
Total Easement OH Transmission, Subtransmission, Distribution	--	*0.01%*	*1.36%*	*0.03%*	*1.01%*	*0.15%*	*0.07%*	*2.97%*	*5.26%*	*0.19%*	*3.71%*	*19.08%*	*60.00%*	*1.46%*	*1.16%*	*0.22%*	*0.84%*	*2.48%*	*1.79%*
Total Easement UG in Conduit	--	*0.00%*	*0.14%*	*0.01%*	*0.31%*	*0.10%*	*0.00%*	*0.08%*	*0.37%*	*0.02%*	*0.80%*	*6.24%*	*87.29%*	*3.73%*	*0.45%*	*0.12%*	*0.25%*	*0.08%*	*1.85%*
Total Easement UG Direct Buried	--	*0.01%*	*0.18%*	*0.05%*	*0.71%*	*0.06%*	*0.00%*	*0.08%*	*0.14%*	*0.0006%*	*0.16%*	*2.69%*	*95.35%*	*0.09%*	*0.26%*	*0.04%*	*0.15%*	*0.02%*	*1.22%*
Total Easement Total UG in Conduit and Direct Buried	--	*0.01%*	*0.16%*	*0.03%*	*0.47%*	*0.08%*	*0.00%*	*0.08%*	*0.28%*	*0.01%*	*0.54%*	*4.83%*	*90.49%*	*2.28%*	*0.38%*	*0.09%*	*0.21%*	*0.06%*	*3.07%*
Total Electrical Line Easement	**--**	***0.01%***	***0.60%***	***0.03%***	***0.67%***	***0.11%***	***0.03%***	***1.15%***	***2.11%***	***0.08%***	***1.71%***	***10.08%***	***79.26%***	***1.98%***	***0.66%***	***0.14%***	***0.44%***	***0.95%***	***4.85%***
Fiber-optic Line																			
OH Fiber-optic Line	25	-	1.70%	-	1.87%	0.37%	-	2.19%	3.61%	0.12%	6.15%	28.26%	45.22%	2.22%	1.02%	0.33%	1.54%	5.41%	0.07%
UG Fiber-optic Line	25	-	0.33%	-	-	-	-	10.31%	22.50%	-	4.49%	14.15%	45.36%	1.34%	1.09%	0.18%	0.23%	0.02%	0.02%
Total Fiber-optic Line Easement		***-***	***1.42%***	***-***	***1.48%***	***0.29%***	***-***	***3.88%***	***7.56%***	***0.10%***	***5.80%***	***25.31%***	***45.24%***	***2.03%***	***1.04%***	***0.30%***	***1.26%***	***4.28%***	***0.09%***
Gas Pipeline																			
Gas Pipeline Easement	35	-	0.55%	-	-	-	-	8.30%	30.76%	4.14%	15.84%	10.21%	19.93%	0.82%	2.28%	1.68%	5.48%	0.01%	0.06%
Total Gas Pipeline Easement		***-***	***0.55%***	***-***	***-***	***-***	***-***	***8.30%***	***30.76%***	***4.14%***	***15.84%***	***10.21%***	***19.93%***	***0.82%***	***2.28%***	***1.68%***	***5.48%***	***0.01%***	***0.06%***

Table D-2: Percentage of Land Cover in the Permit Area (cont.)

FACILITIES	Percent of Facilities in Land Cover																	
	Eucalyptus Woodland	Valley Foothill Riparian	Blue Oak Foothill Pine	Blue Oak Woodland	Valley Oak Woodland	Mine Tailing Riparian Woodland	Orchard/Vineyard	Cropland	Rice	Pasture	Grasses and Forbs	Urban	Barren / Disturbed	Riverine	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Percentage of Total Facilities in Permit Area
Transmission																		
Lattice Towers	-	3.93%	-	2.86%	-	-	4.29%	3.75%	0.18%	6.96%	34.11%	32.50%	1.25%	0.89%	0.36%	1.07%	7.86%	100.00%
Wood Poles	-	8.33%	-	-	-	-	-	6.94%	-	-	9.72%	70.83%	-	-	0.69%	3.47%	-	100.00%
All other Transmission Poles	-	0.69%	0.14%	0.55%	-	-	0.97%	3.60%	-	3.04%	18.26%	70.82%	0.28%	0.97%	-	-	0.69%	100.00%
Subtotal Transmission Towers and Poles	**-**	**2.73%**	**0.07%**	**1.40%**	**-**	**-**	**2.17%**	**3.99%**	**0.07%**	**4.27%**	**23.62%**	**55.78%**	**0.63%**	**0.84%**	**0.21%**	**0.77%**	**3.43%**	**100.00%**
Subtransmission and Distribution																		
Wood Poles	0.01%	0.56%	0.01%	0.27%	0.14%	0.05%	1.58%	3.17%	0.12%	1.34%	9.46%	81.23%	0.79%	0.81%	0.06%	0.19%	0.22%	100.00%
Other Poles	-	0.82%	0.12%	1.85%	0.15%	0.03%	0.54%	1.49%	0.09%	1.04%	8.61%	83.00%	1.01%	0.40%	0.30%	0.34%	0.23%	100.00%
Subtotal Subtransmission and Distribution Poles	**0.01%**	**0.59%**	**0.02%**	**0.41%**	**0.14%**	**0.05%**	**1.49%**	**3.02%**	**0.12%**	**1.32%**	**9.39%**	**81.39%**	**0.81%**	**0.77%**	**0.08%**	**0.20%**	**0.22%**	**100.00%**
Total Towers and Poles	*0.01%*	*0.61%*	*0.02%*	*0.42%*	*0.14%*	*0.05%*	*1.49%*	*3.03%*	*0.12%*	*1.35%*	*9.53%*	*81.14%*	*0.81%*	*0.77%*	*0.08%*	*0.21%*	*0.25%*	*100.00%*
Substructures																		
Above Ground Pads	0.01%	0.12%	0.03%	0.47%	0.07%	0.002%	0.10%	0.11%	0.01%	0.47%	3.86%	92.14%	2.03%	0.26%	0.09%	0.18%	0.04%	100.00%
Box-pads	-	0.15%	0.04%	0.19%	0.46%	-	-	0.85%	-	0.74%	7.28%	85.53%	3.95%	0.46%	0.04%	0.19%	0.12%	100.00%
Manholes	-	0.19%	-	-	-	-	-	0.13%	-	-	1.59%	96.56%	1.02%	0.51%	-	-	-	100.00%
Subsurface Pads	-	0.48%	-	3.85%	-	-	-	1.92%	-	-	4.33%	85.10%	2.88%	-	0.96%	0.48%	-	100.00%
Vaults	-	-	-	-	-	-	-	-	-	-	0.47%	99.53%	-	-	-	-	-	100.00%
Subtotal Substructures	**0.01%**	**0.13%**	**0.03%**	**0.45%**	**0.09%**	**0.00%**	**0.09%**	**0.16%**	**0.01%**	**0.47%**	**3.96%**	**91.93%**	**2.10%**	**0.28%**	**0.09%**	**0.17%**	**0.04%**	**100.00%**
Pull Boxes																		
Pull Boxes	-	0.20%	0.004%	0.24%	0.16%	0.004%	0.07%	0.53%	0.01%	0.74%	6.72%	86.79%	3.45%	0.69%	0.09%	0.20%	0.10%	100.00%
Subtotal Pull Boxes	**-**	**0.20%**	**0.004%**	**0.24%**	**0.16%**	**0.004%**	**0.07%**	**0.53%**	**0.01%**	**0.74%**	**6.72%**	**86.79%**	**3.45%**	**0.69%**	**0.09%**	**0.20%**	**0.10%**	**100.00%**
Electrical Substations																		
Transmission Substations	-	-	-	-	-	-	-	-	-	-	-	94.44%	5.56%	-	-	-	-	100.00%
Distribution Substations	-	-	-	-	0.47%	-	-	1.42%	-	0.95%	4.27%	88.63%	2.84%	1.42%	-	-	-	100.00%
Subtotal Electrical Substations	**-**	**-**	**-**	**-**	**0.44%**	**-**	**-**	**1.31%**	**-**	**0.87%**	**3.93%**	**89.08%**	**3.06%**	**1.31%**	**-**	**-**	**-**	**100.00%**
Gas Pipeline Valve Stations	-	-	-	-	-	-	8.33%	33.33%	-	-	16.67%	41.67%	-	-	-	-	-	100.00%
Poles in State Responsibility Area	-	1.40%	0.22%	1.62%	-	-	4.42%	0.65%	-	1.83%	50.59%	37.43%	0.86%	0.65%	-	-	0.32%	100.00%
Cosumnes Power Plant Cathodic Test Protection Stations	-	-	-	-	-	-	5.88%	-	-	23.53%	52.94%	11.76%	-	-	-	5.88%	-	100.00%
Total Facilities	***0.01%***	***0.46%***	***0.02%***	***0.41%***	***0.13%***	***0.03%***	***1.04%***	***2.11%***	***0.08%***	***1.09%***	***8.18%***	***84.10%***	***1.40%***	***0.66%***	***0.08%***	***0.20%***	***0.19%***	***100.19%***

Table D-2: Percentage of Land Cover in the Permit Area (cont.)

OTHER FACILITIES*	Easement Width (feet)	Percentage of Land Cover in Special Areas (acres)																	
		Eucalyptus Woodland	Valley Foothill Riparian	Blue Oak Foothill Pine	Blue Oak Woodland	Valley Oak Woodland	Mine Tailing Riparian Woodland	Orchard/Vineyard	Cropland	Rice	Pasture	Grasses and Forbs	Urban	Barren/Disturbed	Riverine	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Percentage of Total Acreage in Permit Area
Cosumnes Power Plant	n/a	-	-	-	-	-	-	-	-	-	-	5.84%	91.51%	-	2.65%	-	-	-	100.00%
Mitigation Bank - Oak Tree Planting Area	n/a	-	-	-	-	-	-	-	-	-	-	98.49%	-	-	0.66%	0.27%	0.12%	0.46%	100.00%
Rancho Seco Photovoltaic 5 Removal	n/a	-	-	-	-	-	-	-	-	-	-	99.99%	-	-	-	-	-	0.01%	100.00%
Cosumnes Power Plant Water Pipeline	25	-	-	-	-	-	-	11.56%	-	-	31.13%	50.48%	3.04%	-	2.08%	0.06%	1.28%	0.36%	100.00%
Total Other Facilities*		**-**	**-**	**-**	**-**	**-**	**-**	***0.53%***	**-**	**-**	***1.43%***	***88.36%***	***8.01%***	**-**	***0.88%***	***0.23%***	***0.16%***	***0.41%***	***100.00%***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table D-3: SMUD HCP Total Land Cover Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Loss (acres)			Permanent Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E1a [1]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	drive-by inspection and detailed on 1/5 of the lines annually		-	-	-	-	-
E1a [2]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	Inspection on 1/2 of the lines annually	-	-	-	-	-	-
E1b. Overhead Facilities Inspections - Air-based Overhead Facilities Inspection	less than 1 day	every 6 years	-	n/a	-	-	n/a	-
E2a [1]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/5 of the facilities annually	-	-	-	-	-	-
E2a [2]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/3 of the facilities annually	-	-	-	-	-	-
E2b. Underground Facilities Inspection - Underground Transmission Lines	less than 1 day	weekly	-	-	-	-	-	-
E3. Substation Insulator Washing	less than 1 day	3 substations, once every 5 years	-	n/a	-	-	n/a	-
E4. Substation Inspection, Maintenance, and Minor Upgrades	3 days or less	Inspection, once per month; Maintenance once every 6 years; Upgrade; 20 substations every year	-	-	-	-	-	-
E5. Emergency Outage Inspection and Minor Repair	less than 1 day	3,523 per year	-	-	-	-	-	-
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	0.00008	1.09	32.70	-	-	-
E6b. Wood Pole Treatment - Fiber Wrapping	20 minutes	as needed	-	-	-	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	0.000007	0.004	0.12

Table D-3: SMUD HCP Total Land Cover Disturbance by Covered Activity (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Loss (acres)			Permanent Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E7. Overhead Component Repair and Replacement	up to 1 day	10,000 per year	-	-	-	-	-	-
E8. Pole Replacement	less than 1 day	671 per year	0.002	1.34	40.20	0.009	0.18	5.40
E9a. Underground Component Repair and Replacement - Cable Replacement in Conduit	less than 1 day	50 per year	-	-	-	-	-	-
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	0.04	6.00	180.00	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.57	171.00	5130.00	0.001	0.60	18.00
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.12	19.68	590.40	0.001	0.33	9.84
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.0006	0.01	0.30	-	-	-
E10a. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Superstructure Repair	7 days	2 per year	-	-	-	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.02	0.6	0.0002	0.0004	0.01
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	n/a	1.84	0.001	n/a	0.008
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	n/a	0.50	0.002	n/a	0.0004

Table D-3: SMUD HCP Total Land Cover Disturbance by Covered Activity (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Loss (acres)			Permanent Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	1.08	6.48	194.40	-	-	-
E12. Electrical Facility Operations	indefinitely	continuous	-	-	-	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.460	30.36	910.80	0.00007	0.02	0.60
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.09	0.72	21.60	0.001	0.02	0.60
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	1.26	n/a	3.78	0.001	n/a	0.01
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.24	7.20	0.001	0.004	0.12
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.23	n/a	1.38	0.30	n/a	1.80
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	n/a	1.36	11.00	n/a	44.00
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.23	n/a	0.46	0.50	n/a	1.00
G1a. Pipeline Inspections - Abnormal Operation Conditions Inspections	less than 1 day	4 per year (entire pipeline)	-	-	-	-	-	-
G1b. Pipeline Inspections - Gas Leak Inspections	less than 1 day	1 per year (entire pipeline)	-	-	-	-	-	-
G1c. Pipeline Inspections - Storm-related Inspections	less than 1 day	8 per year	-	-	-	-	-	-
G2. Pipeline Valve Station Inspections	less than 1 day	5 per year	-	-	-	-	-	-
G3. Pipeline Cathodic Protection Test Station Inspection	no more than 0.5 day	1 per year	-	-	-	-	-	-

Table D-3: SMUD HCP Total Land Cover Disturbance by Covered Activity (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Loss (acres)			Permanent Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	n/a	0.72	-	n/a	-
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	0.00002	0.0005	0.02
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.07	0.35	10.50	0.003	0.003	0.09
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.009	n/a	0.09	0.000002	n/a	0.00002
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	n/a	3.18	-	n/a	-
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	0.23	n/a	0.46	-	n/a	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	n/a	1.50	0.04	n/a	0.12
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	n/a	42.00	0.00008	n/a	0.0005
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	n/a	1.38	0.000006	n/a	0.00001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	n/a	1.38	0.000004	n/a	0.00001
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	n/a	4.08	-	n/a	-
V1. Electrical Subtransmission and Distribution Easement Vegetation Management Inspections	less than 1 day	1 time per year	-	-	-	-	-	-
V2. Electrical Subtransmission and Distribution Easement Vegetation Management	less than 1 day	every 3 years, area 47 annually	-	-	-	-	-	-
V3a. Transmission Easement Vegetation Management - Inspections	less than 1 day	1 time per year	-	-	-	-	-	-

Table D-3: SMUD HCP Total Land Cover Disturbance by Covered Activity (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Loss (acres)			Permanent Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
V3b. Transmission Easement Vegetation Management - Tree Trimming	less than 1 day	140 trees per year	-	-	-	-	-	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	-	31.50	-	-	-
V4. Tree Removal Projects	less than 2 days	11,190 times per year	-	-	-	-	-	-
V5a. Elderberry Shrub Trimming and Removal - Trimming Stems	less than 1 day	23 times per year	-	-	-	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	n/a	0.04	-	n/a	-
V5c. Elderberry Shrub Trimming and Removal - Removal by Cutting	less than 1 day	10 times over the permit term	-	n/a	-	-	n/a	-
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	0.009	n/a	8.34
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	n/a	79.98	-	n/a	-
T1. Telecommunication Tower Maintenance	less than 2 days	7 times per year	-	-	-	-	-	-
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.06	n/a	0.12	-	n/a	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	0.73	1.46	43.80	-	-	-
T4. Underground Fiber-optic Replacement and New Installation	1-3 days	1 time per year	0.47	0.47	15.6	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	n/a	0.50	0.28	n/a	0.28
C2. SMUD Bank Management	indefinitely	continuous	-	-	-	-	-	-
M1. Operation of the Cosumnes Power Plant (CPP)	indefinitely	continuous	-	-	-	-	-	-

Table D-3: SMUD HCP Total Land Cover Disturbance by Covered Activity (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Loss (acres)			Permanent Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	-	n/a	-	10.65	n/a	10.65
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	0.05	n/a	0.26	0.00002	n/a	0.0001
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	n/a	0.78	0.009	n/a	0.009
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	n/a	0.46	-	-	-
M4. Rancho Seco Property Operation and Maintenance	indefinitely	continuous	-	-	-	-	-	-
TOTALS	**--**	**--**	**35.22**	**238.75**	**7,340.25**	**22.81**	**1.16**	**101.02**

Table D-4: SMUD HCP Total Land Cover Loss by Covered Activity. Temporary Land Cover Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E1a [1]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	drive-by inspection and detailed on 1/5 of the lines annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E1a [2]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	Inspection on 1/2 of the lines annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E1b. Overhead Facilities Inspections - Air-based Overhead Facilities Inspection	less than 1 day	every 6 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2a [1]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/5 of the facilities annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2a [2]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/3 of the facilities annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2b. Underground Facilities Inspection - Underground Transmission Lines	less than 1 day	weekly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E3. Substation Insulator Washing	less than 1 day	3 substations, once every 5 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E4. Substation Inspection, Maintenance, and Minor Upgrades	3 days or less	Inspection, once per month; Maintenance once every 6 years; Upgrade; 20 substations every year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-4: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E5. Emergency Outage Inspection and Minor Repair	up to 1 day	3,566 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6b. Wood Pole Treatment - Fiber Wrapping	20 minutes	as needed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E7. Overhead Component Repair and Replacement	up to 1 day	10,000 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E8. Pole Replacement	less than 1 day	671 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9a. Underground Component Repair and Replacement - Cable Replacement in Conduit	less than 1 day	50 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-4: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	-	0.0090	-	0.0066	-	-	0.0100	0.0090	0.0004	0.0160	0.0784	0.0748	0.0029	0.0021	0.0008	0.0025	0.0181
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	-	0.0098	-	0.0071	-	-	0.0107	0.0094	0.0004	0.0174	0.0853	0.0813	0.0031	0.0022	0.0009	0.0027	0.0196
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E12. Electrical Facility Operations	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E14a[1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	1.26	-	0.1050	-	-	-	-	-	0.0875	-	-	0.1225	0.8925	-	-	0.0088	0.0438	-
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.23	-	-	-	-	0.0011	-	-	0.0033	-	0.0022	0.0098	0.2038	0.0065	0.0033	-	-	-

Table D-4: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	-	-	-	-	-	-	-	-	-	-	0.3361	-	-	-	-	-	0.0039
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.23	-	-	-	-	-	-	-	-	-	-	0.2300	-	-	-	-	-	-
G1a. Pipeline Inspections - Abnormal Operation Conditions Inspections	less than 1 day	4 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1b. Pipeline Inspections - Gas Leak Inspections	less than 1 day	1 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1c. Pipeline Inspections - Storm-related Inspections	less than 1 day	8 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2. Pipeline Valve Station Inspections	less than 1 day	5 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G3. Pipeline Cathodic Protection Test Station Inspection	no more than 0.5 day	1 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	-	0.0007	-	-	-	-	0.0100	0.0369	0.0050	0.0190	0.0123	0.0239	0.0010	0.0027	0.0020	0.0066	0.00002
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.01	-	0.00005	-	-	-	-	0.0007	0.0028	0.0004	0.0014	0.0009	0.0018	0.0001	0.0002	0.0002	0.0005	0.000001
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	-	0.0003	-	-	-	-	0.0050	0.0185	0.0025	0.0095	0.0061	0.0120	0.0005	0.0014	0.0010	0.0033	0.00001
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	0.23	-	-	-	-	-	-	0.0192	0.0767	-	-	0.0383	0.0958	-	-	-	-	-

Table D-4: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	-	0.0028	-	-	-	-	0.0415	0.1538	0.0207	0.0792	0.0511	0.0996	0.0041	0.0114	0.0084	0.0274	0.0001
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	-	0.0388	-	-	-	-	0.5808	2.1533	0.2896	1.1090	0.7147	1.3951	0.0576	0.1594	0.1174	0.3834	0.0010
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	-	0.0025	-	-	-	-	0.0382	0.1415	0.0190	0.0729	0.0470	0.0917	0.0038	0.0105	0.0077	0.0252	0.0001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	-	0.0025	-	-	-	-	0.0382	0.1415	0.0190	0.0729	0.0470	0.0917	0.0038	0.0105	0.0077	0.0252	0.0001
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	-	0.0019	-	-	-	-	0.0282	0.1046	0.0141	0.0539	0.0347	0.0678	0.0028	0.0077	0.0057	0.0186	0.00005
V1. Electrical Subtransmission and Distribution Easement Vegetation Management Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V2. Electrical Subtransmission and Distribution Easement Vegetation Management	less than 1 day	every 3 years, area 47 annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3a. Transmission Easement Vegetation Management - Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3b. Transmission Easement Vegetation Management - Tree Trimming	less than 1 day	140 trees per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-4: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	-	5.2500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V4. Tree Removal Projects	less than 2 days	11,190 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5a. Elderberry Shrub Trimming and Removal - Trimming Stems	less than 1 day	23 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	-	0.0002	-	-	0.0002	-	-	-	-	0.0001	0.0003	0.0032	-	0.0001	-	-	-
V5c. Elderberry Shrub Trimming and Removal - Removal by Cutting	less than 1 day	10 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	-	0.0738	-	-	-	-	1.1061	4.1005	0.5514	2.1119	1.3611	2.6566	0.1097	0.3035	0.2236	0.7300	0.0018
T1. Telecommunication Tower Maintenance	less than 2 days	7 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.06	-	-	-	-	-	-	-	-	-	-	0.0600	-	-	-	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	-	-	-	-	-	-	-	-	-	-	0.4924	-	-	0.0033	0.0013	0.0006	0.0023
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-4: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	17 times over the permit term	0.05	-	-	-	-	-	-	0.0004	-	-	0.0490	0.0004	-	-	-	-	-	-
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	-	-	-	-	-	-	-	-	-	-	0.7699	-	-	0.0101	-	-	-
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	-	-	-	-	-	-	0.0276	-	-	0.0713	0.1150	0.0069	-	0.0046	0.0002	0.0023	0.0009
TOTALS	**--**	**--**	**31.92**	**-**	**5.4970**	**-**	**0.0137**	**0.0012**	**-**	**1.9164**	**7.0388**	**0.9225**	**3.6856**	**4.6133**	**5.7983**	**0.1959**	**0.5329**	**0.3857**	**1.2719**	**0.0479**

Table D-5: SMUD HCP Total Land Cover Disturbance by Covered Activity, Temporary Land Cover Loss – Annual

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Annual (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E1a [1]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	drive-by inspection and detailed on 1/5 of the lines annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E1a [2]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	Inspection on 1/2 of the lines annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E1b. Overhead Facilities Inspections - Air-based Overhead Facilities Inspection	less than 1 day	every 6 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2a [1]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/5 of the facilities annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2a [2]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/3 of the facilities annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2b. Underground Facilities Inspection - Underground Transmission Lines	less than 1 day	weekly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E3. Substation Insulator Washing	less than 1 day	3 substations, once every 5 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E4. Substation Inspection, Maintenance, and Minor Upgrades	3 days or less	Inspection, once per month; Maintenance once every 6 years; Upgrade; 20 substations every year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-5: SMUD HCP Total Land Cover Disturbance by Covered Activity, Temporary Land Cover Loss – Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Annual (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E5. Emergency Outage Inspection and Minor Repair	up to 1 day	3,566 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	1.09	0.0001	0.0062	0.0001	0.0029	0.0015	0.0005	0.0172	0.0345	0.0013	0.0146	0.1031	0.8853	0.0086	0.0088	0.0006	0.0021	0.0024
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E7. Overhead Component Repair and Replacement	up to 1 day	10,000 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E8. Pole Replacement	less than 1 day	671 per year	1.34	0.0001	0.0080	0.0003	0.0055	0.0019	0.0006	0.0199	0.0405	0.0015	0.0178	0.1264	1.0898	0.0108	0.0103	0.0011	0.0028	0.0030
E9a. Underground Component Repair and Replacement - Cable Replacement in Conduit	less than 1 day	50 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	6.00	0.0004	0.0073	0.0017	0.0279	0.0045	0.0001	0.0059	0.0067	0.0006	0.0283	0.2319	5.5284	0.1220	0.0159	0.0056	0.0107	0.0021
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	171.00	0.0139	0.3086	0.0939	1.2223	0.0982	0.0018	0.1334	0.2461	0.0010	0.2657	4.6041	163.0432	0.1606	0.4439	0.0768	0.2596	0.0269
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	19.68	0.0016	0.0355	0.0108	0.1407	0.0113	0.0002	0.0154	0.0283	0.0001	0.0306	0.5299	18.7643	0.0185	0.0511	0.0088	0.0299	0.0031
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.01	0.000001	0.00002	0.000003	0.00005	0.00001	0.0000002	0.00001	0.00003	0.000001	0.0001	0.0005	0.0090	0.0002	0.00004	0.00001	0.00002	0.00001
E10a. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Superstructure Repair	7 days	2 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.02	-	0.0009	-	0.0006	-	-	0.0009	0.0008	0.00004	0.0015	0.0075	0.0072	0.0003	0.0002	0.0001	0.0002	0.0017

Table D-5: SMUD HCP Total Land Cover Disturbance by Covered Activity, Temporary Land Cover Loss – Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Annual (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	6.48	0.0010	0.0500	0.0010	0.0248	0.0107	0.0075	0.1570	0.3203	0.0157	0.1284	0.8953	4.6504	0.0933	0.0738	0.0082	0.0208	0.0217
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	30.36	0.0049	0.2343	0.0048	0.1160	0.0501	0.0353	0.7355	1.5007	0.0737	0.6017	4.1948	21.7878	0.4371	0.3459	0.0383	0.0974	0.1017
E14a[1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.72	0.0000	0.0011	0.0002	0.0035	0.0006	0.00001	0.0006	0.0020	0.0001	0.0040	0.0355	0.6502	0.0168	0.0027	0.0006	0.0015	0.0004
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.24	0.00001	0.0004	0.0001	0.0012	0.0002	0.000004	0.0002	0.0007	0.00003	0.0013	0.0118	0.2167	0.0056	0.0009	0.0002	0.0005	0.0001
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1a. Pipeline Inspections - Abnormal Operation Conditions Inspections	less than 1 day	4 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-5: SMUD HCP Total Land Cover Disturbance by Covered Activity, Temporary Land Cover Loss – Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Annual (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
G1b. Pipeline Inspections - Gas Leak Inspections	less than 1 day	1 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1c. Pipeline Inspections - Storm-related Inspections	less than 1 day	8 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2. Pipeline Valve Station Inspections	less than 1 day	5 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G3. Pipeline Cathodic Protection Test Station Inspection	no more than 0.5 day	1 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.35	-	0.0019	-	-	-	-	0.0290	0.1077	0.0145	0.0555	0.0357	0.0698	0.0029	0.0080	0.0059	0.0192	0.00005
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-5: SMUD HCP Total Land Cover Disturbance by Covered Activity, Temporary Land Cover Loss – Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Annual (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V1. Electrical Subtransmission and Distribution Easement Vegetation Management Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V2. Electrical Subtransmission and Distribution Easement Vegetation Management	less than 1 day	every 3 years, area 47 annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3a. Transmission Easement Vegetation Management - Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3b. Transmission Easement Vegetation Management - Tree Trimming	less than 1 day	140 trees per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V4. Tree Removal Projects	less than 2 days	11,190 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5a. Elderberry Shrub Trimming and Removal - Trimming Stems	less than 1 day	23 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5c. Elderberry Shrub Trimming and Removal - Removal by Cutting	less than 1 day	10 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-5: SMUD HCP Total Land Cover Disturbance by Covered Activity, Temporary Land Cover Loss – Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Annual (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
T1. Telecommunication Tower Maintenance	less than 2 days	7 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	1.46	-	0.0249	-	0.0274	0.0054	-	0.0319	0.0527	0.0018	0.0897	0.4126	0.6601	0.0323	0.0149	0.0048	0.0224	0.0790
T4. Underground Fiber-optic Replacement and New Installation	1-3 days	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C2. SMUD Bank Management	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M1. Operation of the Cosumnes Power Plant (CPP)	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M4. Rancho Seco Property Operation and Maintenance	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTALS	--	--	**238.75**	**0.0222**	**0.6791**	**0.1129**	**1.5727**	**0.1844**	**0.0461**	**1.1469**	**2.3412**	**0.1103**	**1.2393**	**11.1892**	**217.3620**	**0.9090**	**0.9764**	**0.1511**	**0.4671**	**0.2421**

Table D-6: SMUD HCP Total Land Cover Loss by Covered Activity. Temporary Land Cover Loss – Raw Acreages - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E1a [1]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	drive-by inspection and detailed on 1/5 of the lines annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E1a [2]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	Inspection on 1/2 of the lines annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E1b. Overhead Facilities Inspections - Air-based Overhead Facilities Inspection	less than 1 day	every 6 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2a [1]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/5 of the facilities annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2a [2]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/3 of the facilities annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2b. Underground Facilities Inspection - Underground Transmission Lines	less than 1 day	weekly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E3. Substation Insulator Washing	less than 1 day	3 substations, once every 5 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E4. Substation Inspection, Maintenance, and Minor Upgrades	3 days or less	Inspection, once per month; Maintenance once every 6 years; Upgrade; 20 substations every year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E5. Emergency Outage Inspection and Minor Repair	up to 1 day	3,566 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	32.70	0.0030	0.1867	0.0030	0.0876	0.0456	0.0162	0.5156	1.0363	0.0388	0.4391	3.0938	26.5592	0.2582	0.2631	0.0189	0.0637	0.0712
E6b. Wood Pole Treatment - Fiber Wrapping	20 minutes	as needed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-6: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Raw Acreages - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E7. Overhead Component Repair and Replacement	up to 1 day	10,000 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E8. Pole Replacement	less than 1 day	671 per year	40.20	-	0.2786	0.0697	0.3483	0.8359	-	-	1.5325	-	1.3235	13.0960	153.9474	7.1053	0.8359	0.0697	0.3483	0.2090
E9a. Underground Component Repair and Replacement - Cable Replacement in Conduit	less than 1 day	50 per year	-	0.4179	9.2567	2.8172	36.6698	2.9446	0.0527	4.0031	7.3833	0.0291	7.9715	138.1232	4891.2954	4.8190	13.3171	2.3054	7.7874	0.8068
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	180.00	0.0481	1.0653	0.3242	4.2202	0.3389	0.0061	0.4607	0.8497	0.0033	0.9174	15.8963	562.9280	0.5546	1.5326	0.2653	0.8962	0.0928
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	5,130.00	0.00002	0.0005	0.0001	0.0014	0.0003	0.000005	0.0003	0.0009	0.00004	0.0017	0.0148	0.2709	0.0070	0.0011	0.0003	0.0006	0.0002
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	590.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.30	-	0.0236	-	0.0171	-	-	0.0257	0.0225	0.0011	0.0418	0.2046	0.1950	0.0075	0.0054	0.0021	0.0064	0.0471
E10a. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Superstructure Repair	7 days	2 per year	-	-	0.0723	-	0.0526	-	-	0.0789	0.0690	0.0033	0.1281	0.6276	0.5980	0.0230	0.0164	0.0066	0.0197	0.1446
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.60	-	0.0196	-	0.0143	-	-	0.0214	0.0188	0.0009	0.0348	0.1705	0.1625	0.0063	0.0045	0.0018	0.0054	0.0393
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	1.84	0.0315	1.5001	0.0308	0.7427	0.3210	0.2258	4.7096	9.6094	0.4716	3.8529	26.8600	139.5105	2.7987	2.2147	0.2454	0.6239	0.6513
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	194.40	0.1476	7.0283	0.1443	3.4799	1.5041	1.0579	22.0654	45.0217	2.2095	18.0517	125.8441	653.6327	13.1124	10.3761	1.1496	2.9233	3.0514

Table D-6: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Raw Acreages - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E12. Electrical Facility Operations	indefinitely	continuous	-	0.0012	0.0344	0.0063	0.1042	0.0181	0.0003	0.0181	0.0615	0.0027	0.1198	1.0648	19.5052	0.5033	0.0823	0.0194	0.0464	0.0122
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	910.80	-	0.2786	0.0697	0.3483	0.8359	-	-	1.5325	-	1.3235	13.0960	153.9474	7.1053	0.8359	0.0697	0.3483	0.2090
E14a[1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	21.60	0.4179	9.2567	2.8172	36.6698	2.9446	0.0527	4.0031	7.3833	0.0291	7.9715	138.1232	4891.2954	4.8190	13.3171	2.3054	7.7874	0.8068
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	3.78	0.0002	0.0060	0.0011	0.0182	0.0032	0.0001	0.0032	0.0108	0.0005	0.0210	0.1863	3.4134	0.0881	0.0144	0.0034	0.0081	0.0021
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	7.20	0.0004	0.0115	0.0021	0.0347	0.0060	0.0001	0.0060	0.0205	0.0009	0.0399	0.3549	6.5017	0.1678	0.0274	0.0065	0.0155	0.0041
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	1.38	-	-	-	-	-	-	-	-	-	-	1.3800	-	-	-	-	-	-
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	1.36	-	-	-	-	-	-	-	-	-	-	1.3415	-	-	-	-	-	0.0155
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.46	-	-	-	-	-	-	-	-	-	-	0.4600	-	-	-	-	-	-
G1a. Pipeline Inspections - Abnormal Operation Conditions Inspections	less than 1 day	4 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1b. Pipeline Inspections - Gas Leak Inspections	less than 1 day	1 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1c. Pipeline Inspections - Storm-related Inspections	less than 1 day	8 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2. Pipeline Valve Station Inspections	less than 1 day	5 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G3. Pipeline Cathodic Protection Test Station Inspection	no more than 0.5 day	1 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.72	-	0.0040	-	-	-	-	0.0597	0.2215	0.0298	0.1141	0.0735	0.1435	0.0059	0.0164	0.0121	0.0394	0.0001

Table D-6: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Raw Acreages - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	10.50	-	0.0581	-	-	-	-	0.8713	3.2300	0.4344	1.6635	1.0721	2.0926	0.0864	0.2391	0.1761	0.5750	0.0015
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.09	-	0.0005	-	-	-	-	0.0075	0.0277	0.0037	0.0143	0.0092	0.0179	0.0007	0.0020	0.0015	0.0049	0.00001
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	3.18	-	0.0176	-	-	-	-	0.2639	0.9782	0.1315	0.5038	0.3247	0.6338	0.0262	0.0724	0.0533	0.1742	0.0004
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	0.46	-	-	-	-	-	-	0.0383	0.1533	-	-	0.0767	0.1917	-	-	-	-	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	1.50	-	0.0083	-	-	-	-	0.1245	0.4614	0.0621	0.2376	0.1532	0.2989	0.0123	0.0342	0.0252	0.0821	0.0002
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	42.00	-	0.2325	-	-	-	-	3.4851	12.9199	1.7374	6.6541	4.2884	8.3703	0.3457	0.9563	0.7044	2.3001	0.0058
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	1.38	-	0.0076	-	-	-	-	0.1145	0.4245	0.0571	0.2186	0.1409	0.2750	0.0114	0.0314	0.0231	0.0756	0.0002
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	1.38	-	0.0076	-	-	-	-	0.1145	0.4245	0.0571	0.2186	0.1409	0.2750	0.0114	0.0314	0.0231	0.0756	0.0002
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	4.08	-	0.0226	-	-	-	-	0.3385	1.2551	0.1688	0.6464	0.4166	0.8131	0.0336	0.0929	0.0684	0.2234	0.0006
V1. Electrical Subtransmission and Distribution Easement Vegetation Management Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V2. Electrical Subtransmission and Distribution Easement Vegetation Management	less than 1 day	every 3 years, area 47 annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3a. Transmission Easement Vegetation Management - Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3b. Transmission Easement Vegetation Management - Tree Trimming	less than 1 day	140 trees per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-6: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Raw Acreages - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	31.50	-	31.5000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V4. Tree Removal Projects	less than 2 days	11,190 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5a. Elderberry Shrub Trimming and Removal - Trimming Stems	less than 1 day	23 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.04	-	0.0016	-	-	0.0016	-	-	-	-	0.0008	0.0032	0.0320	-	0.0008	-	-	-
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	79.98	-	0.4428	-	-	-	-	6.6365	24.6032	3.3085	12.6712	8.1664	15.9395	0.6583	1.8210	1.3414	4.3801	0.0111
T1. Telecommunication Tower Maintenance	less than 2 days	7 times per year	-																	
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.12	-	-	-	-	-	-	-	-	-	-	0.1200	-	-	-	-	-	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	43.80	-	0.7467	-	0.8207	0.1623	-	0.9576	1.5810	0.0544	2.6917	12.3788	19.8042	0.9702	0.4485	0.1426	0.6726	2.3688
T4. Underground Fiber-optic Replacement and New Installation	1-3 days	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	-	-	-	-	-	-	-	-	-	-	0.4924	-	-	0.0033	0.0013	0.0006	0.0023
C2. SMUD Bank Management	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M1. Operation of the Cosumnes Power Plant (CPP)	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	17 times over the permit term	0.26	-	-	-	-	-	-	0.0020	-	-	0.2548	0.0020	-	-	-	-	-	-

Table D-6: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Raw Acreages - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	-	-	-	-	-	-	-	-	-	-	0.7699	-	-	0.0101	-	-	-
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.46	-	-	-	-	-	-	0.0552	-	-	0.1426	0.2300	0.0138	-	0.0092	0.0005	0.0046	0.0018
M4. Rancho Seco Property Operation and Maintenance	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTALS	**--**	**--**	**7,340.25**	**0.6532**	**52.7723**	**3.4066**	**46.7761**	**6.2375**	**1.3783**	**45.5727**	**113.1324**	**8.8529**	**59.5079**	**361.3681**	**6540.1144**	**31.9374**	**32.7695**	**6.6989**	**21.4360**	**7.6293**

Table D-7: SMUD HCP Total Land Cover Loss by Covered Activity. Permanent Land Cover Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E1a [1]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	drive-by inspection and detailed on 1/5 of the lines annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E1a [2]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	Inspection on 1/2 of the lines annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E1b. Overhead Facilities Inspections - Air-based Overhead Facilities Inspection	less than 1 day	every 6 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2a [1]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/5 of the facilities annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2a [2]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/3 of the facilities annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2b. Underground Facilities Inspection - Underground Transmission Lines	less than 1 day	weekly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E3. Substation Insulator Washing	less than 1 day	3 substations, once every 5 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E4. Substation Inspection, Maintenance, and Minor Upgrades	3 days or less	Inspection, once per month; Maintenance once every 6 years; Upgrade; 20 substations every year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E5. Emergency Outage Inspection and Minor Repair	up to 1 day	3,566 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-7: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6b. Wood Pole Treatment - Fiber Wrapping	20 minutes	as needed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E7. Overhead Component Repair and Replacement	up to 1 day	10,000 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E8. Pole Replacement	less than 1 day	671 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9a. Underground Component Repair and Replacement - Cable Replacement in Conduit	less than 1 day	50 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-7: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E10a. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Superstructure Repair	7 days	2 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.001	-	0.00004	-	0.00003	-	-	0.00004	0.00004	0.000002	0.0001	0.0003	0.0003	0.00001	0.00001	0.00003	0.00001	0.0001
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.002	-	0.0001	-	0.0001	-	-	0.0001	0.0001	0.000004	0.0001	0.0007	0.0007	0.00003	0.00002	0.00001	0.00002	0.0002
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E12. Electrical Facility Operations	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-7: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E14a[1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.001	-	0.0001	-	-	-	-	-	0.0001	-	-	0.0001	0.0007	-	-	0.00001	0.00003	-
E14b [2]. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.30	-	-	-	-	-	-	-	-	-	-	0.3000	-	-	-	-	-	-
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	11.00	-	-	-	-	-	-	-	-	-	-	10.8750	-	-	-	-	-	0.1250
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.50	-	-	-	-	-	-	-	-	-	-	0.5000	-	-	-	-	-	-
G1a. Pipeline Inspections - Abnormal Operation Conditions Inspections	less than 1 day	4 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1b. Pipeline Inspections - Gas Leak Inspections	less than 1 day	1 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1c. Pipeline Inspections - Storm-related Inspections	less than 1 day	8 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2. Pipeline Valve Station Inspections	less than 1 day	5 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-7: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
G3. Pipeline Cathodic Protection Test Station Inspection	no more than 0.5 day	1 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.000002	-	0.00000001	-	-	-	-	0.0000002	0.0000006	0.0000001	0.0000003	0.0000002	0.0000004	0.00000002	0.00000005	0.00000003	0.0000001	-
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.04	-	0.0002	-	-	-	-	0.0033	0.0123	0.0017	0.0063	0.0041	0.0080	0.0003	0.0009	0.0007	0.0022	0.000006
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.0001	-	0.0000004	-	-	-	-	0.000007	0.00002	0.000003	0.00001	0.00001	0.00002	0.000001	0.000002	0.000001	0.000004	0.00000001
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	-	0.00000003	-	-	-	-	0.0000005	0.000002	0.0000003	0.0000010	0.000001	0.000001	0.00000005	0.0000001	0.0000001	0.0000003	-
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.000004	-	0.00000002	-	-	-	-	0.0000003	0.000001	0.0000002	0.0000006	0.0000004	0.000001	0.00000003	0.0000001	0.0000001	0.0000002	-

Table D-7: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V1. Electrical Subtransmission and Distribution Easement Vegetation Management Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V2. Electrical Subtransmission and Distribution Easement Vegetation Management	less than 1 day	every 3 years, area 47 annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3a. Transmission Easement Vegetation Management - Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3b. Transmission Easement Vegetation Management - Tree Trimming	less than 1 day	140 trees per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V4. Tree Removal Projects	less than 2 days	11,190 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5a. Elderberry Shrub Trimming and Removal - Trimming Stems	less than 1 day	23 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5c. Elderberry Shrub Trimming and Removal - Removal by Cutting	less than 1 day	10 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-7: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	0.01	-	0.0001	0.00002	0.0001	-	-	0.0004	0.0001	-	0.0002	0.0046	0.0034	0.0001	0.0001	-	-	0.00003
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T1. Telecommunication Tower Maintenance	less than 2 days	7 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T4. Underground Fiber-optic Replacement and New Installation	1-3 days	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	-	-	-	-	-	-	-	-	-	-	0.2758	-	-	0.0019	0.0007	0.0003	0.0013
C2. SMUD Bank Management	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M1. Operation of the Cosumnes Power Plant (CPP)	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	10.65	-	-	-	-	-	-	-	-	-	-	10.6486	-	-	-	-	-	-
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	17 times over the permit term	0.00002	-	-	-	-	-	-	0.000004	-	-	0.00001	0.000004	-	-	-	-	-	-

Table D-7: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Per Event (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.01	-	-	-	-	-	-	-	-	-	-	0.0090	-	-	-	-	-	-
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M4. Rancho Seco Property Operation and Maintenance	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTALS	**--**	**--**	**22.79**	**-**	**0.0005**	**0.00002**	**0.0002**	**-**	**-**	**0.0039**	**0.0126**	**0.0017**	**0.0067**	**22.6181**	**0.0130**	**0.0004**	**0.0029**	**0.0014**	**0.0026**	**0.1266**

Table D-8: SMUD HCP Total Land Cover Loss by Covered Activity. Permanent Land Cover Loss – Annual

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Annual (acres)	Eucalyptus Woodland(acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland(acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban(acres)	Barren/Disturbed(acres)	Riverine(acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool ,Seasonal Wetland ,and Swale(acres)
E1a [1]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	drive-by inspection and detailed on 1/5 of the lines annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E1a [2]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	Inspection on 1/2 of the lines annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E1b. Overhead Facilities Inspections - Air-based Overhead Facilities Inspection	less than 1 day	every 6 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2a [1]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/5 of the facilities annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2a [2]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/3 of the facilities annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2b. Underground Facilities Inspection - Underground Transmission Lines	less than 1 day	weekly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E3. Substation Insulator Washing	less than 1 day	3 substations , once every 5 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E4. Substation Inspection, Maintenance, and Minor Upgrades	3 days or less	Inspection, once per month; Maintenanc e once every 6 years; Upgrade; 20 substations every year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-8: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss – Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Annual (acres)	Eucalyptus Woodland(acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland(acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban(acres)	Barren/Disturbed(acres)	Riverine(acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool ,Seasonal Wetland ,and Swale(acres)
E5. Emergency Outage Inspection and Minor Repair	up to 1 day	3,566 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6b. Wood Pole Treatment - Fiber Wrapping	20 minutes	as needed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.004	0.0000004	0.00002	0.0000004	0.000011	0.000006	0.000002	0.0001	0.0001	0.000005	0.0001	0.0004	0.0032	0.00003	0.00003	0.000002	0.00001	0.00001
E7. Overhead Component Repair and Replacement	up to 1 day	10,000 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E8. Pole Replacement	less than 1 day	671 per year	0.18	0.00002	0.0011	0.00003	0.0007	0.0003	0.0001	0.0027	0.0054	0.0002	0.0024	0.0170	0.1464	0.0015	0.0014	0.0001	0.0004	0.0004
E9a. Underground Component Repair and Replacement - Cable Replacement in Conduit	less than 1 day	50 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.60	0.00005	0.0011	0.0003	0.0043	0.0003	0.000006	0.0005	0.0009	0.000003	0.0009	0.0162	0.5721	0.0006	0.0016	0.0003	0.0009	0.0001
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.33	0.000027	0.0006	0.0002	0.0023	0.0002	0.000003	0.0003	0.0005	0.000002	0.0005	0.0088	0.3127	0.0003	0.0009	0.0001	0.0005	0.0001
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-8: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss – Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Annual (acres)	Eucalyptus Woodland(acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland(acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban(acres)	Barren/Disturbed(acres)	Riverine(acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool ,Seasonal Wetland ,and Swale(acres)
E10a. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Superstructure Repair	7 days	2 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.0004	-	0.00002	-	0.00001	-	-	0.00002	0.00002	0.000001	0.00003	0.0001	0.0001	0.000005	0.000004	0.000001	0.000004	0.00003
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E12. Electrical Facility Operations	indefinite ly	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.02	0.000003	0.0002	0.000003	0.0001	0.00003	0.00002	0.0005	0.001	0.00005	0.0004	0.0028	0.0144	0.0003	0.0002	0.00003	0.0001	0.0001
E14a[1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.02	0.000001	0.00003	0.000006	0.0001	0.00002	0.0000003	0.00002	0.0001	0.000003	0.0001	0.0010	0.0181	0.0005	0.0001	0.00002	0.00004	0.00001
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-8: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss – Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Annual (acres)	Eucalyptus Woodland(acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland(acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban(acres)	Barren/Disturbed(acres)	Riverine(acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool ,Seasonal Wetland ,and Swale(acres)
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.004	0.0000002	0.000006	0.000001	0.00002	0.000003	0.000000	0.000003	0.00001	0.0000005	0.00002	0.0002	0.0036	0.0001	0.00002	0.000004	0.00001	0.000002
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1a. Pipeline Inspections - Abnormal Operation Conditions Inspections	less than 1 day	4 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1b. Pipeline Inspections - Gas Leak Inspections	less than 1 day	1 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1c. Pipeline Inspections - Storm-related Inspections	less than 1 day	8 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2. Pipeline Valve Station Inspections	less than 1 day	5 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G3. Pipeline Cathodic Protection Test Station Inspection	no more than 0.5 day	1 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.001	-	0.000003	-	-	-	-	0.00004	0.0002	0.00002	0.00008	0.00005	0.0001	0.000004	0.00001	0.00001	0.00003	0.0000001
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.003	-	0.00002	-	-	-	-	0.0002	0.0009	0.0001	0.0005	0.0003	0.0006	0.00002	0.0001	0.0001	0.0002	0.0000004
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-8: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss – Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Annual (acres)	Eucalyptus Woodland(acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland(acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban(acres)	Barren/Disturbed(acres)	Riverine(acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool ,Seasonal Wetland ,and Swale(acres)
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V1. Electrical Subtransmission and Distribution Easement Vegetation Management Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V2. Electrical Subtransmission and Distribution Easement Vegetation Management	less than 1 day	every 3 years, area 47 annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3a. Transmission Easement Vegetation Management - Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3b. Transmission Easement Vegetation Management - Tree Trimming	less than 1 day	140 trees per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-8: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss – Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Annual (acres)	Eucalyptus Woodland(acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland(acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban(acres)	Barren/Disturbed(acres)	Riverine(acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool ,Seasonal Wetland ,and Swale(acres)
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V4. Tree Removal Projects	less than 2 days	11,190 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5a. Elderberry Shrub Trimming and Removal - Trimming Stems	less than 1 day	23 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5c. Elderberry Shrub Trimming and Removal - Removal by Cutting	less than 1 day	10 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T1. Telecommunication Tower Maintenance	less than 2 days	7 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T4. Underground Fiber-optic Replacement and New Installation	1-3 days	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C2. SMUD Bank Management	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-8: SMUD HCP Total Land Cover Disturbance by Covered Activity. Permanent Land Cover Loss – Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Annual (acres)	Eucalyptus Woodland(acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland(acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban(acres)	Barren/Disturbed(acres)	Riverine(acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool ,Seasonal Wetland ,and Swale(acres)
M1. Operation of the Cosumnes Power Plant (CPP)	indefinite ly	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M4. Rancho Seco Property Operation and Maintenance	indefinit ely	continuou s	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTALS	**--**	**--**	**1.16**	**0.0001**	**0.0030**	**0.0006**	**0.0076**	**0.0008**	**0.0001**	**0.0043**	**0.0091**	**0.0004**	**0.0050**	**0.0468**	**1.0713**	**0.0032**	**0.0042**	**0.0007**	**0.0021**	**0.0007**

Table D-9: SMUD HCP Total Land Cover Loss by Covered Activity, Permanent Land Cover Loss – Raw Acreages - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E1a [1]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	drive-by inspection and detailed on 1/5 of the lines annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E1a [2]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	Inspection on 1/2 of the lines annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E1b. Overhead Facilities Inspections - Air-based Overhead Facilities Inspection	less than 1 day	every 6 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2a [1]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/5 of the facilities annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2a [2]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/3 of the facilities annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E2b. Underground Facilities Inspection - Underground Transmission Lines	less than 1 day	weekly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E3. Substation Insulator Washing	less than 1 day	3 substations, once every 5 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E4. Substation Inspection, Maintenance, and Minor Upgrades	3 days or less	Inspection, once per month; Maintenance once every 6 years; Upgrade; 20 substations every year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E5. Emergency Outage Inspection and Minor Repair	up to 1 day	3,566 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E6b. Wood Pole Treatment - Fiber Wrapping	20 minutes	as needed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-9: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Raw Acreages – Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.12	0.00001	0.0007	0.00001	0.0003	0.0002	0.0001	0.0019	0.0038	0.0001	0.0016	0.0114	0.0975	0.0009	0.0010	0.0001	0.0002	0.0003
E7. Overhead Component Repair and Replacement	up to 1 day	10,000 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E8. Pole Replacement	less than 1 day	671 per year	5.40	0.0004	0.0321	0.0010	0.0221	0.0075	0.0026	0.0800	0.1632	0.0062	0.0715	0.5092	4.3916	0.0435	0.0416	0.0042	0.0111	0.0119
E9a. Underground Component Repair and Replacement - Cable Replacement in Conduit	less than 1 day	50 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	18.00	0.0015	0.0325	0.0099	0.1287	0.0103	0.0002	0.0140	0.0259	0.0001	0.0280	0.4846	17.1624	0.0169	0.0467	0.0081	0.0273	0.0028
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	9.84	0.0008	0.0178	0.0054	0.0703	0.0056	0.0001	0.0077	0.0142	0.0001	0.0153	0.2649	9.3821	0.0092	0.0255	0.0044	0.0149	0.0015
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E10a. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Superstructure Repair	7 days	2 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	-	0.0004	-	0.0003	-	-	0.0004	0.0004	0.00002	0.0007	0.0034	0.0033	0.0001	0.0001	0.00004	0.0001	0.0008
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.01	-	0.0003	-	0.0002	-	-	0.0003	0.0003	0.00001	0.0006	0.0027	0.0026	0.0001	0.0001	0.00003	0.0001	0.0006

Table D-9: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Raw Acreages – Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.0004	-	0.00002	-	0.00001	-	-	0.00002	0.00002	0.000001	0.00003	0.0001	0.0001	0.00001	0.000004	0.000001	0.000004	0.00003
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E12. Electrical Facility Operations	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.60	0.0001	0.0046	0.0001	0.0023	0.0010	0.0007	0.0145	0.0297	0.0015	0.0119	0.0829	0.4306	0.0086	0.0068	0.0008	0.0019	0.0020
E14a[1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.60	0.00003	0.0010	0.0002	0.0029	0.0005	0.00001	0.0005	0.0017	0.0001	0.0033	0.0296	0.5418	0.0140	0.0023	0.0005	0.0013	0.0003
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.01	0.000001	0.00002	0.000003	0.00005	0.00001	0.0000002	0.00001	0.00003	0.000001	0.0001	0.0005	0.0090	0.0002	0.00004	0.00001	0.00002	0.00001
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.00001	0.0002	0.00004	0.0006	0.0001	0.000002	0.0001	0.0003	0.00002	0.0007	0.0059	0.1084	0.0028	0.0005	0.0001	0.0003	0.0001
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	1.80	-	-	-	-	-	-	-	-	-	-	1.8000	-	-	-	-	-	-
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	44.00	-	-	-	-	-	-	-	-	-	-	43.5000	-	-	-	-	-	0.5000

Table D-9: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Raw Acreages – Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	1.00	-	-	-	-	-	-	-	-	-	-	1.0000	-	-	-	-	-	-
G1a. Pipeline Inspections - Abnormal Operation Conditions Inspections	less than 1 day	4 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1b. Pipeline Inspections - Gas Leak Inspections	less than 1 day	1 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G1c. Pipeline Inspections - Storm-related Inspections	less than 1 day	8 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2. Pipeline Valve Station Inspections	less than 1 day	5 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G3. Pipeline Cathodic Protection Test Station Inspection	no more than 0.5 day	1 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.02	-	0.0001	-	-	-	-	0.0017	0.0062	0.0008	0.0032	0.0020	0.0040	0.0002	0.0005	0.0003	0.0011	0.000003
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.09	-	0.0005	-	-	-	-	0.0075	0.0277	0.0037	0.0143	0.0092	0.0179	0.0007	0.0020	0.0015	0.0049	0.00001
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.00002	-	0.0000001	-	-	-	-	0.000002	0.00001	0.000001	0.000003	0.000002	0.000004	0.0000002	0.0000005	0.0000003	0.000001	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.12	-	0.0007	-	-	-	-	0.0100	0.0369	0.0050	0.0190	0.0123	0.0239	0.0010	0.0027	0.0020	0.0066	0.00002
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.001	-	0.000003	-	-	-	-	0.00004	0.0002	0.00002	0.0001	0.0001	0.0001	0.000004	0.00001	0.00001	0.00003	0.0000001
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	-	0.0000001	-	-	-	-	0.000001	0.000003	0.0000004	0.000002	0.000001	0.000002	0.0000001	0.0000002	0.0000002	0.0000006	-

Table D-9: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Raw Acreages – Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.00001	-	0.0000001	-	-	-	-	0.000001	0.000003	0.0000004	0.000002	0.000001	0.000002	0.0000001	0.0000002	0.0000002	0.0000006	-
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V1. Electrical Subtransmission and Distribution Easement Vegetation Management Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V2. Electrical Subtransmission and Distribution Easement Vegetation Management	less than 1 day	every 3 years, area 47 annually	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3a. Transmission Easement Vegetation Management - Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3b. Transmission Easement Vegetation Management - Tree Trimming	less than 1 day	140 trees per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V4. Tree Removal Projects	less than 2 days	11,190 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5a. Elderberry Shrub Trimming and Removal - Trimming Stems	less than 1 day	23 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V5c. Elderberry Shrub Trimming and Removal - Removal by Cutting	less than 1 day	10 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	8.34	-	-	-	-	-	-	0.6950	2.7800	-	-	1.3900	3.4750	-	-	-	-	-
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T1. Telecommunication Tower Maintenance	less than 2 days	7 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-9: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Raw Acreages – Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Eucalyptus Woodland (acres)	Valley Foothill Riparian (acres)	Blue Oak Foothill Pine (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Mine Tailing Riparian Woodland (acres)	Orchard/ Vineyard (acres)	Cropland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Urban (acres)	Barren/ Disturbed (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T4. Underground Fiber-optic Replacement and New Installation	1-3 days	1 time per year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	-	-	-	-	-	-	-	-	-	-	0.2758	-	-	0.0019	0.0007	0.0003	0.0013
C2. SMUD Bank Management	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M1. Operation of the Cosumnes Power Plant (CPP)	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	10.65	-	-	-	-	-	-	-	-	-	-	10.6500	-	-	-	-	-	-
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	17 times over the permit term	0.0001	-	-	-	-	-	-	0.00002	-	-	0.00006	0.00002	-	-	-	-	-	-
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.01	-	-	-	-	-	-	-	-	-	-	0.009	-	-	-	-	-	-
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M4. Rancho Seco Property Operation and Maintenance	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTALS	**--**	**--**	**101.02**	**0.0029**	**0.0908**	**0.0167**	**0.2277**	**0.0253**	**0.0036**	**0.8337**	**3.0904**	**0.0176**	**0.1702**	**60.0437**	**35.6504**	**0.0984**	**0.1317**	**0.0229**	**0.0703**	**0.5218**

Table D-10: SMUD HCP Total Land Cover Loss by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term

				Reduced Acreages				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
E1a [1]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	drive-by inspection and detailed on 1/5 of the lines annually	-	-	-	-	-	-	-	-	-	
E1a [2]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	Inspection on 1/2 of the lines annually	-	-	-	-	-	-	-	-	-	
E1b. Overhead Facilities Inspections - Air-based Overhead Facilities Inspection	less than 1 day	every 6 years	-	-	-	-	-	-	-	-	-	
E2a [1]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/5 of the facilities annually	-	-	-	-	-	-	-	-	-	
E2a [2]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/3 of the facilities annually	-	-	-	-	-	-	-	-	-	
E2b. Underground Facilities Inspection - Underground Transmission Lines	less than 1 day	weekly	-	-	-	-	-	-	-	-	-	

Table D-10: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Reduced Acreages				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
E3. Substation Insulator Washing	less than 1 day	3 substations, once every 5 years	-	-	-	-	-	-	-	-	-	
E4. Substation Inspection, Maintenance, and Minor Upgrades	3 days or less	Inspection, once per month; Maintenance once every 6 years; Upgrade; 20 substations every year	-	-	-	-	-	-	-	-	-	
E5. Emergency Outage Inspection and Minor Repair	up to 1 day	3,566 times per year	-	-	-	-	-	-	-	-	-	
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	32.70	-	-	-	-	0.2631	0.0189	0.0637	0.0712	
E6b. Wood Pole Treatment - Fiber Wrapping	20 minutes	as needed	-	-	-	-	-	-	-	-	-	
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	-	-	-	-	-	-	
E7. Overhead Component Repair and Replacement	up to 1 day	10,000 per year	-	-	-	-	-	-	-	-	-	
E8. Pole Replacement	less than 1 day	671 per year	40.20	-	-	-	-	0.3094	0.0316	0.0830	0.0888	

Table D-10: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Reduced Acreages				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
E9a. Underground Component Repair and Replacement - Cable Replacement in Conduit	less than 1 day	50 per year	-	-	-	-	-	-	-	-	-	
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	180.00	-	-	-	-	0.8359	0.0697	0.3483	0.2090	
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	5,130.00	-13.3171	-2.3054	-7.7874		-	-	-	0.8068	Trenching would not occur in perennial aquatic habitat; HDD would be used to avoid impacts.
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	590.40	-1.5326	-0.2653	-0.8962	-0.0928	-	-	-	-	SMUD would not set up the HDD pad such that it would impact aquatic features
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.30	-	-	-	-	0.0011	0.0003	0.0006	0.0002	

Table D-10: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Reduced Acreages				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
E10a. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Superstructure Repair	7 days	2 per year	-	-	-	-	-	-	-	-	-	
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.60	-	-	-	-	0.0054	0.0021	0.0064	0.0471	
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	1.84	-	-	-	-	0.0164	0.0066	0.0197	0.1446	
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.50	-	-	-	-	0.0045	0.0018	0.0054	0.0393	

Table D-10: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Reduced Acreages				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	194.40	-1.3288	-0.1472	-0.3744	-0.3908	0.8859	0.0981	0.2496	0.2605	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the traveler installation could still affect aquatic habitats. The numbers here = 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites
E12. Electrical Facility Operations	indefinitely	continuous	-	-	-	-	-	-	-	-	-	
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	910.80	-10.3761	-1.1496	-2.9233		-	-	-	3.0514	pull sites would not be placed in perennial aquatic habitat

Table D-10: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Reduced Acreages				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
E14a[1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	21.60	-0.0823	-0.0194	-0.0464	-	-	-	-	0.0122	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	3.78	-0.0144	-0.0034	-0.0081	-	-	-	-	0.0021	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	7.20	-0.0274	-0.0065	-0.0155	-0.0041	-	-	-	-	HDD temporary work sites would be located outside of wetlands
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	1.38	-	-	-	-	-	-	-	-	

Table D-10: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Reduced Acreages				Final Acreages (After Reduction)				
Covered Activity Number and Title	**Duration**	**Frequency**	**Temporary Land Cover Loss - Entire Permit Term (acres)**	**Riverine (acres)**	**Open Water/Fringe (acres)**	**Other Depressional Wetland (acres)**	**Vernal Pool, Seasonal Wetland, and Swale (acres)**	**Riverine (acres)**	**Open Water/Fringe (acres)**	**Other Depressional Wetland (acres)**	**Vernal Pool, Seasonal Wetland, and Swale (acres)**	**Justification**
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	1.36	-	-	-	-	-	-	-	0.0155	
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.46	-	-	-	-	-	-	-	-	
G1a. Pipeline Inspections - Abnormal Operation Conditions Inspections	less than 1 day	4 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	
G1b. Pipeline Inspections - Gas Leak Inspections	less than 1 day	1 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	
G1c. Pipeline Inspections - Storm-related Inspections	less than 1 day	8 per year	-	-	-	-	-	-	-	-	-	
G2. Pipeline Valve Station Inspections	less than 1 day	5 per year	-	-	-	-	-	-	-	-	-	
G3. Pipeline Cathodic Protection Test Station Inspection	no more than 0.5 day	1 per year	-	-	-	-	-	-	-	-	-	
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.72	-0.0164	-0.0121	-0.0394	-0.0001	-	-	-	-	Staging areas would not be sited in aquatic features

Table D-10: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Reduced Acreages				Final Acreages (After Reduction)				
Covered Activity Number and Title	**Duration**	**Frequency**	**Temporary Land Cover Loss - Entire Permit Term (acres)**	**Riverine (acres)**	**Open Water/Fringe (acres)**	**Other Depressional Wetland (acres)**	**Vernal Pool, Seasonal Wetland, and Swale (acres)**	**Riverine (acres)**	**Open Water/Fringe (acres)**	**Other Depressional Wetland (acres)**	**Vernal Pool, Seasonal Wetland, and Swale (acres)**	**Justification**
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	-	-	-	-	-	-	
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	10.50	-	-	-	-	0.2391	0.1761	0.5750	0.0015	
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.09	-0.0020	-0.0015	-0.0049	0.00001	-	-	-	-	Cathodic protection test stations would not be sited in aquatic features
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	3.18	-0.0724	-0.0533	-0.1742	-0.0004	-	-	-	-	pipeline anode beds would not be installed in aquatic features
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	0.46	-	-	-	-	-	-	-	-	
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	1.50	-	-	-	-	0.0342	0.0252	0.0821	0.0002	
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	42.00	-0.9563	-0.7044	-2.3001	-0.0058	-	-	-	-	We wouldn't trench through aquatic habitats for pipeline relocation

Table D-10: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Reduced Acreages				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	1.38	-0.0314	-0.0231	-0.0756	-0.0002	-	-	-	-	Temporary work areas for HDD would avoid aquatic habitats
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	1.38	-0.0314	-0.0231	-0.0756	-0.0002	-	-	-	-	Temporary work areas for directional boring would avoid aquatic habitats
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	4.08	-0.0929	-0.0684	-0.2234	-0.0006	-	-	-	-	temporary areas for hydrostatic testing would avoid aquatic habitats
V1. Electrical Subtransmission and Distribution Easement Vegetation Management Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	
V2. Electrical Subtransmission and Distribution Easement Vegetation Management	less than 1 day	every 3 years, area 47 annually	-	-	-	-	-	-	-	-	-	
V3a. Transmission Easement Vegetation Management - Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	

Table D-10: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Reduced Acreages				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Temporary Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
V3b. Transmission Easement Vegetation Management - Tree Trimming	less than 1 day	140 trees per year	-	-	-	-	-	-	-	-	-	
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	31.50	-	-	-	-	-	-	-	-	
V4. Tree Removal Projects	less than 2 days	11,190 times per year	-	-	-	-	-					
V5a. Elderberry Shrub Trimming and Removal - Trimming Stems	less than 1 day	23 times per year	-	-	-	-	-					
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.04	-	-	-	-	0.0008	-	-	-	
V5c. Elderberry Shrub Trimming and Removal - Removal by Cutting	less than 1 day	10 times over the permit term	-	-	-	-	-					
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	-	-					
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	79.98	-	-	-	-	1.8210	1.3413	4.3801	0.0111	

Table D-10: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Reduced Acreages				Final Acreages (After Reduction)				
Covered Activity Number and Title	**Duration**	**Frequency**	**Temporary Land Cover Loss - Entire Permit Term (acres)**	**Riverine (acres)**	**Open Water/Fringe (acres)**	**Other Depressional Wetland (acres)**	**Vernal Pool, Seasonal Wetland, and Swale (acres)**	**Riverine (acres)**	**Open Water/Fringe (acres)**	**Other Depressional Wetland (acres)**	**Vernal Pool, Seasonal Wetland, and Swale (acres)**	**Justification**
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.12	-	-	-	-	-	-	-	-	
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	43.80	-0.2691	-0.0856	-0.4035	-1.4213	0.1794	0.0570	0.2690	0.9475	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the traveler installation could still affect aquatic habitats. The numbers here = 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	-0.0033	-0.0013	-0.0006	-0.0023	-	-	-	-	Temporary work areas would avoid aquatic impacts

Table D-10: SMUD HCP Total Land Cover Disturbance by Covered Activity. Temporary Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Reduced Acreages				Final Acreages (After Reduction)				
Covered Activity Number and Title	**Duration**	**Frequency**	**Temporary Land Cover Loss - Entire Permit Term (acres)**	**Riverine (acres)**	**Open Water/Fringe (acres)**	**Other Depressional Wetland (acres)**	**Vernal Pool, Seasonal Wetland, and Swale (acres)**	**Riverine (acres)**	**Open Water/Fringe (acres)**	**Other Depressional Wetland (acres)**	**Vernal Pool, Seasonal Wetland, and Swale (acres)**	**Justification**
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	17 times over the permit term	0.26	-	-	-	-	-	-	-	-	
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	-	-	-	-	0.0101	-	-	-	
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.46	-	-	-	-	0.0092	0.0005	0.0046	0.0018	
TOTALS	**--**	**--**	**7,340.25**	**-28.1540**	**-4.8696**	**-15.3485**	**-1.9186**	**4.6155**	**1.8292**	**6.0876**	**5.7107**	

Table D-11: SMUD HCP Total Land Cover Loss by Covered Activity, Permanent Land Cover Loss – Wetland Reduction - Entire Permit Term

				Wetland Reduction				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
E1a [1]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	drive-by inspection and detailed on 1/5 of the lines annually	-	-	-	-	-	-	-	-	-	-
E1a [2]. Overhead Facilities Inspections - Ground-based Overhead Line Inspections	less than 1 day	Inspection on 1/2 of the lines annually	-	-	-	-	-	-	-	-	-	-
E1b. Overhead Facilities Inspections - Air-based Overhead Facilities Inspection	less than 1 day	every 6 years	-	-	-	-	-	-	-	-	-	-
E2a [1]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/5 of the facilities annually	-	-	-	-	-	-	-	-	-	-
E2a [2]. Underground Facilities Inspection - Underground Subtransmission and Distribution Components	less than 1 day	Inspection on 1/3 of the facilities annually	-	-	-	-	-	-	-	-	-	-

Table D-11: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Wetland Reduction				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
E2b. Underground Facilities Inspection - Underground Transmission Lines	less than 1 day	weekly	-	-	-	-	-	-	-	-	-	-
E3. Substation Insulator Washing	less than 1 day	3 substations, once every 5 years	-	-	-	-	-	-	-	-	-	-
E4. Substation Inspection, Maintenance, and Minor Upgrades	3 days or less	Inspection, once per month; Maintenance once every 6 years; Upgrade; 20 substations every year	-	-	-	-	-	-	-	-	-	-
E5. Emergency Outage Inspection and Minor Repair	up to 1 day	3,566 times per year	-	-	-	-	-	-	-	-	-	-
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	-	-	-	-	-	-	-	-	-	-
E6b. Wood Pole Treatment - Fiber Wrapping	20 minutes	as needed	-	-	-	-	-	-	-	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.12					0.0010	0.0001	0.0002	0.0003	
E7. Overhead Component Repair and Replacement	up to 1 day	10,000 per year	-	-	-	-	-	-	-	-	-	-

Table D-11: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Wetland Reduction				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
E8. Pole Replacement	less than 1 day	671 per year	5.40	-	-	-	-	0.0416	0.0042	0.0111	0.0119	-
E9a. Underground Component Repair and Replacement - Cable Replacement in Conduit	less than 1 day	50 per year										
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	-	-	-	-	-	-	-	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	18.00	-0.0467	-0.0081	-0.0273	-	-	-	-	0.0028	Pull boxes would not be placed in perennial aquatic habitat
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	9.84	-0.0255	-0.0044	-0.0149	-0.0015	-	-	-	-	Pull boxes would not be placed in] aquatic habitat

Table D-11: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Wetland Reduction				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	-	-	-	-	-	-	-	-	-	-
E10a. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Superstructure Repair	7 days	2 per year	-	-	-	-	-	-	-	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	-	-	-	-	0.0001	0.00004	0.0001	0.0008	-
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.01	-	-	-	-	0.0001	0.00003	0.0001	0.0006	-
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.0004	-	-	-	-	0.000004	0.000001	0.000004	0.00003	-
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	-	-	-	-	-	-	-	-	-	-

Table D-11: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Wetland Reduction				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
E12. Electrical Facility Operations	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.60	-0.0068	-0.0008	-0.0019	-	-	-	-	0.0020	-
E14a[1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.60	-0.0023	-0.0005	-0.0013		-	-	-	0.0003	pull boxes would not be placed in perennial aquatic habitat
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.01	0.00004	0.00001	0.00002		-	-	-	0.00001	pull boxes would not be placed in perennial aquatic habitat
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	-0.0005	-0.0001	-0.0003		-	-	-	0.0001	pull boxes would not be placed in perennial aquatic habitat
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	1.80	-	-	-	-	-	-	-	-	-

Table D-11: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Wetland Reduction				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	44.00	-	-	-	-	-	-	-	0.5000	-
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	1.00	-	-	-	-	-	-	-	-	-
G1a. Pipeline Inspections - Abnormal Operation Conditions Inspections	less than 1 day	4 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-
G1b. Pipeline Inspections - Gas Leak Inspections	less than 1 day	1 per year (entire pipeline)	-	-	-	-	-	-	-	-	-	-
G1c. Pipeline Inspections - Storm-related Inspections	less than 1 day	8 per year	-	-	-	-	-	-	-	-	-	-
G2. Pipeline Valve Station Inspections	less than 1 day	5 per year	-	-	-	-	-	-	-	-	-	-
G3. Pipeline Cathodic Protection Test Station Inspection	no more than 0.5 day	1 per year	-	-	-	-	-	-	-	-	-	-
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	-	-	-	-	-	-	-	-	-	-

Table D-11: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Wetland Reduction				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.02	-	-	-	-	0.0005	0.0003	0.0011	0.000002	-
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.09	-	-	-	-	0.0020	0.0015	0.0049	0.00001	-
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.00002	-0.0000005	-0.0000003	-0.000001	-	-	-	-	-	Cathodic protection test stations would not be sited in aquatic features
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term		-	-	-	-	-	-	-	-	-
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term		-	-	-	-	-	-	-	-	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.12	-	-	-	-	0.0027	0.0020	0.0066	0.00002	-
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.001	-0.00001	-0.000008	-0.00003	-0.0000001	-	-	-	-	pipeline markers would not be placed in aquatic habitat

Table D-11: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Wetland Reduction				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	-0.0000002	-0.0000002	-0.0000006	-	-	-	-	-	pipeline markers would not be placed in aquatic habitat
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.00001	-0.0000002	-0.0000002	-0.0000006	-	-	-	-	-	pipeline markers would not be placed in aquatic habitat
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	-	-	-	-	-	-	-	-	-	
V1. Electrical Subtransmission and Distribution Easement Vegetation Management Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	
V2. Electrical Subtransmission and Distribution Easement Vegetation Management	less than 1 day	every 3 years, area 47 annually	-	-	-	-	-	-	-	-	-	
V3a. Transmission Easement Vegetation Management - Inspections	less than 1 day	1 time per year	-	-	-	-	-	-	-	-	-	

Table D-11: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Wetland Reduction				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
V3b. Transmission Easement Vegetation Management - Tree Trimming	less than 1 day	140 trees per year	-	-	-	-	-	-	-	-	-	
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	-	-	-	-	-	-	-	-	-	
V4. Tree Removal Projects	less than 2 days	11,190 times per year	-	-	-	-	-	-	-	-	-	
V5a. Elderberry Shrub Trimming and Removal - Trimming Stems	less than 1 day	23 times per year	-	-	-	-	-	-	-	-	-	
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	-	-	-	-	-	-	-	-	-	
V5c. Elderberry Shrub Trimming and Removal - Removal by Cutting	less than 1 day	10 times over the permit term	-	-	-	-	-	-	-	-	-	
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	8.34	-	-	-	-	-	-	-	-	

Table D-11: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Wetland Reduction				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	-	-	-	-	-	-	-	-	-	
T1. Telecommunication Tower Maintenance	less than 2 days	7 times per year	-	-	-	-	-	-	-	-	-	
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	-	-	-	-	-	-	-	-	-	
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	-	-	-	-	-	-	-	-	-	-
T4. Underground Fiber-optic Replacement and New Installation	1-3 days	1 time per year	-	-	-	-	-	-	-	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	-0.0019	-0.0007	-0.0003	-0.0013	-	-	-	-	trees would not be planted in aquatic habitat
C2. SMUD Bank Management	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-
M1. Operation of the Cosumnes Power Plant (CPP)	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-

Table D-11: SMUD HCP Total Land Cover Disturbance by Covered Activity, Permanent Land Cover Loss – Wetland Reduction - Entire Permit Term (cont.)

				Wetland Reduction				Final Acreages (After Reduction)				
Covered Activity Number and Title	Duration	Frequency	Permanent Land Cover Loss - Entire Permit Term (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Justification
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	10.65	-	-	-	-	-	-	-	-	-
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	17 times over the permit term	0.0001	-	-	-	-	-	-	-	-	-
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.01	-	-	-	-	-	-	-	-	-
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	-	-	-	-	-	-	-	-	-	-
M4. Rancho Seco Property Operation and Maintenance	indefinitely	continuous	-	-	-	-	-	-	-	-	-	-
TOTALS	**--**	**--**	**101.02**	**-0.0838**	**-0.0147**	**-0.0461**	**-0.0028**	**0.0479**	**0.0082**	**0.0242**	**0.5189**	

Table D-12 Summary: SMUD HCP Summary Land Cover Area by Facility

SMUD HCP Land Cover Types	Land Cover Area by Facility (acres)						Numbers of Facilities in Land Cover Types						
	Transmission Line Easement	Subtransmission and Distribution Easement	Total Electrical Line Easement	Total Fiber-optic Line Easement	Total Gas Pipeline Easement	Other Facilities*	Transmission Towers and Poles	Subtransmission and Distribution Poles	Total Substructures	Total Pull Boxes	Electrical Substations	Gas Pipeline Valve Stations	Poles in State Responsibility Area (SRA)
Eucalyptus Woodland	-	2.0192	2.0192	-	-	-	-	12	3	-	-	-	-
Valley Foothill Riparian	90.5587	77.9201	168.4788	7.5715	1.7787	-	39	843	60	51	-	-	13
Blue Oak Foothill Pine	1.7914	6.1272	7.9186	-	-	-	1	27	13	1	-	-	2
Blue Oak Woodland	79.3256	108.6203	187.9459	7.9138	-	-	20	588	212	60	-	-	15
Valley Oak Woodland	5.0060	25.3225	30.3285	1.5646	-	-	-	202	44	40	1	-	-
Mine Tailing Riparian Woodland	-	7.8395	7.8395	-	-	-	-	69	1	1	-	-	-
Orchard/Vineyard	148.6131	172.3798	320.9929	20.7432	26.6607	1.7909	31	2,140	42	18	-	1	41
Cropland	220.6257	371.5216	592.1473	40.3618	98.8376	-	57	4,343	76	131	3	4	6
Rice	4.2169	17.9875	22.2043	0.5244	13.2912	-	1	167	4	2	-	-	-
Pasture	253.5035	225.4062	478.9097	30.9666	50.9036	4.8226	61	1,897	221	184	2	-	17
Grasses and Forbs	1,069.3688	1,756.1382	2,825.5071	135.1652	32.8064	298.3631	337	13,515	1,876	1,676	9	2	469
Urban	1,864.2032	20,353.4581	22,217.6613	241.6073	64.0332	27.0598	796	117,199	43,530	21,634	204	5	347
Barren/Disturbed	56.8946	498.3554	555.2500	10.8545	2.6446	-	9	1,166	994	859	7	-	8
Riverine	45.6713	140.3574	186.0287	5.5452	7.3156	2.9596	12	1,108	133	172	3	-	6
Open Water/Fringe	14.2248	23.7840	38.0088	1.5816	5.3886	0.7664	3	113	43	22	-	-	-
Other Depressional Wetland	65.7533	58.1713	123.9246	6.7405	17.5959	0.5344	11	294	82	50	-	-	-
Vernal Pool, Seasonal Wetland, and Swale	233.9068	31.6040	265.5108	22.8612	0.0444	1.3676	49	315	18	25	-	-	3
TOTAL	**4,153.6637**	**23,877.0125**	**28,030.6762**	**534.0012**	**321.3005**	**337.6642**	**1,427**	**143,998**	**47,352**	**24,926**	**229**	**12**	**927**

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Cosumnes Photovoltaic Removal Site, Cosumnes Power Plant Water Pipeline.

Table D-13 Summary: SMUD HCP Total Land Cover Loss by Covered Activity

Covered Activities Impact Categories	Total Acreage	Eucalyptus Woodland	Valley Foothill Riparian	Blue Oak Foothill Pine	Blue Oak Woodland	Valley Oak Woodland	Mine Tailing Riparian Woodland	Orchard/ Vineyard	Cropland	Rice	Pasture	Grasses and Forbs	Urban	Barren/ Disturbed	Riverine	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale
Temporary Land Cover Loss - Covered Activities Occur Infrequently (Acres)	31.9230	-	5.4974	-	0.0137	0.0013	-	1.9164	7.0388	0.9225	3.6856	4.6133	5.7983	0.1959	0.5329	0.3857	1.2719	0.0479
Temporary Land Cover Loss - Covered Activities Occur Annually (Acres)	238.7520	0.0222	0.6791	0.1129	1.5727	0.1844	0.0461	1.1469	2.3412	0.1103	1.2393	11.1892	217.3620	0.9090	0.9764	0.1511	0.4671	0.2421
Temporary Land Cover Loss Over Entire Permit Term (Acres)	7,340.2500	0.6532	52.7723	3.4066	46.7761	6.2375	1.3783	45.5727	113.1324	8.8529	59.5079	361.3681	6,540.1144	31.9374	32.7695	6.6989	21.4360	7.6293
Temporary Land Cover Loss Over Entire Permit Term - Annualized (Acres)	244.6750	0.0218	1.7591	0.1136	1.5592	0.2079	0.0459	1.5191	3.7711	0.2951	1.9836	12.0456	218.0038	1.0646	1.0923	0.2233	0.7145	0.2543
Permanent Land Cover Loss - Covered Activities Occur Infrequently (Acres)	22.7921	-	0.0005	0.0000	0.0002	-	-	0.0039	0.0126	0.0017	0.0067	22.6181	0.0130	0.0004	0.0029	0.0014	0.0026	0.1266
Permanent Land Cover Loss - Covered Activities Occur Annually (Acres)	1.1599	0.0001	0.0030	0.0006	0.0076	0.0008	0.0001	0.0043	0.0091	0.0004	0.0050	0.0468	1.0713	0.0032	0.0042	0.0007	0.0021	0.0007
Permanent Land Cover Loss Over Entire Permit Term (Acres)	101.0180	0.0029	0.0908	0.0167	0.2277	0.0253	0.0036	0.8337	3.0904	0.0176	0.1702	60.0437	35.6504	0.0984	0.1317	0.0229	0.0703	0.5218
Permanent Land Cover Loss Over Entire Permit Term - Annualized (Acres)	3.3673	0.0001	0.0030	0.0006	0.0076	0.0008	0.0001	0.0278	0.1030	0.0006	0.0057	2.0015	1.1883	0.0033	0.0044	0.0008	0.0023	0.0174

Table D-14 Summary: SMUD HCP Total Land Cover Loss by Covered Activity Types

SMUD HCP Land Cover Types	Permit Term Covered Activities		Final Term Covered Activities	
	Temporary Land Cover Loss (acres)	Permanent Land Cover Loss (acres)	REVISED Temporary Land Cover Loss (acres)	REVISED Permanent Land Cover Loss (acres)
Eucalyptus Woodland	0.6532	0.0029	0.6532	0.0029
Valley Foothill Riparian	52.7723	0.0908	52.7723	0.0908
Blue Oak Foothill Pine	3.4066	0.0167	3.4066	0.0167
Blue Oak Woodland	46.7761	0.2277	46.7761	0.2277
Valley Oak Woodland	6.2375	0.0253	6.2375	0.0253
Mine Tailing Riparian Woodland	1.3783	0.0036	1.3783	0.0036
Orchard/Vineyard	45.5727	0.8337	45.5727	0.8337
Cropland	113.1324	3.0904	113.1324	3.0904
Rice	8.8529	0.0176	8.8529	0.0176
Pasture	59.5079	0.1702	59.5079	0.1702
Grasses and Forbs	361.3681	60.0437	361.3681	60.0437
Urban	6,540.1144	35.6504	6,540.1144	35.6504
Barren/Disturbed	31.9374	0.0984	31.9374	0.0984
Riverine	32.7695	0.1317	4.6155	0.0479
Open Water/Fringe	6.6989	0.0229	1.8292	0.0082
Other Depressional Wetland	21.4360	0.0703	6.0876	0.0242
Vernal Pool, Seasonal Wetland, and Swale	7.6293	0.5218	5.7107	0.5189
TOTAL	**7,340.2434**	**101.0180**	**7,289.9527**	**100.8706**

APPENDIX E COVERED SPECIES MODELED HABITAT IMPACTS IN THE PERMIT AREA

Table E-1a: Slender Orcutt Grass Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Total Permit Area
Total Land Cover		**7,784.11**	**577,553.21**
LINES			
Transmission			
Easement OH Transmission	200	9.20	3,806.37
Easement UG Transmission in Conduit	200	-	347.30
Subtotal Transmission		**9.20**	**4,153.66**
Subtransmission and Distribution			
Easement OH Distribution - without 69kV Overbuild	12.5	2.86	4,842.62
Easement OH Subtransmission and Distribution	25	1.37	1,673.59
Easement UG Subtransmission and Distribution in Conduit	25	0.50	10,329.69
Easement UG Subtransmission and Distribution Direct Buried	25	0.10	7,031.11
Total Easement OH Subtransmission and Distribution	-	*4.23*	*6,516.21*
Total Easement UG Subtransmission and Distribution	-	*0.59*	*17,360.80*
Subtotal Subtransmission and Distribution	-	**4.82**	**23,877.01**
Total Easement OH Transmission, Subtransmission, Distribution	-	*13.43*	*10,322.58*
Total Easement UG in Conduit	-	*0.50*	*10,676.99*
Total Easement UG Direct Buried	-	*0.10*	*7,031.11*
Total Easement Total UG in Conduit and Direct Buried	-	*0.59*	*17,708.10*
Total Electrical Line Easement	-	***14.02***	***28,030.68***
Fiber-optic Line			
OH Fiber-optic Line	25	1.12	422.35
UG Fiber-optic Line	25	-	111.65
Total Fiber-optic Line Easement		***1.12***	***534.00***
Gas Pipeline			
Gas Pipeline Easement	35	-	321.30
Total Gas Pipeline Easement	**-**	**-**	***321.30***

Table E-1a: Slender Orcutt Grass Modeled Habitat in the Permit Area (cont.)

FACILITIES	Numbers of Facilities in Modeled Habitat	
	Vernal Pool, Seasonal Wetland, and Swale	**Total Facilities in Permit Area**
Transmission		
Lattice Towers	1	560
Wood Poles	-	144
All other Transmission Poles	-	723
Subtotal Transmission Towers and Poles	**1**	**1,427**
Subtransmission and Distribution		
Wood Poles	26	131,213
Other Poles	9	12,785
Subtotal Subtransmission and Distribution Poles	**35**	**143,998**
Total Towers and Poles	*36*	*145,425*
Substructures		
Above Ground Pads	1	42,776
Box-pads	-	2,584
Manholes	-	1,569
Subsurface Pads	-	208
Vaults	-	215
Subtotal Substructures	**1**	**47,352**
Pull Boxes		
Pull Boxes	1	24,926
Subtotal Pull Boxes	**1**	**24,926**
Electrical Substations		
Transmission Substations	-	18
Distribution Substations	-	211
Subtotal Electrical Substations	**-**	**229**
Gas Pipeline Valve Stations	-	12
Poles in State Responsibility Area	-	927
Cosumnes Power Plant Cathodic Test Protection Stations	-	17
Total Facilities	***38***	***218,888***

Table E-1a: Slender Orcutt Grass Modeled Habitat in the Permit Area (cont.)

OTHER FACILITIES*	Easement Width (feet)	Modeled Habitat in Other Facilities (acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Total Facilities in Permit Area
Cosumnes Power Plant	n/a	-	29.05
Mitigation Bank - Oak Tree Planting Area	n/a	1.31	282.47
Rancho Seco Photovoltaic 5 Removal	n/a	0.00	10.65
Cosumnes Power Plant Water Pipeline	25	0.03	15.49
Total Other Facilities*		***1.34***	***337.66***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-2a: Percentage of Slender Orcutt Grass Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (% total acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Percentage of Total Acreage in Permit Area
Total Land Cover		**1.35%**	**100.00%**
LINES			
Transmission			
Easement OH Transmission	200	0.24%	0.66%
Easement UG Transmission in Conduit	200	-	0.06%
Subtotal Transmission		**0.22%**	**0.72%**
Subtransmission and Distribution			
Easement OH Distribution - without 69kV Overbuild	12.5	0.06%	0.84%
Easement OH Subtransmission and Distribution	25	0.08%	0.29%
Easement UG Subtransmission and Distribution in Conduit	25	0.00%	1.79%
Easement UG Subtransmission and Distribution Direct Buried	25	0.00%	1.22%
Total Easement OH Subtransmission and Distribution	-	*0.06%*	*1.13%*
Total Easement UG Subtransmission and Distribution	-	*0.00%*	*3.01%*
Subtotal Subtransmission and Distribution	-	**0.02%**	**4.13%**
Total Easement OH Transmission, Subtransmission, Distribution	-	*0.13%*	*1.79%*
Total Easement UG in Conduit	-	*0.00%*	*1.85%*
Total Easement UG Direct Buried	-	*0.00%*	*1.22%*
Total Easement Total UG in Conduit and Direct Buried	-	*0.00%*	*3.07%*
Total Electrical Line Easement	**-**	***0.05%***	***4.85%***
Fiber-optic Line			
OH Fiber-optic Line	25	0.27%	0.07%
UG Fiber-optic Line	25	-	0.02%
Total Fiber-optic Line Easement		***0.21%***	***0.09%***
Gas Pipeline			
Gas Pipeline Easement	35	-	0.06%
Total Gas Pipeline Easement	**-**	**-**	***0.06%***

Table E-2a: Percentage of Slender Orcutt Grass Modeled Habitat in the Permit Area (cont.)

FACILITIES	Percent of Facilities in Modeled Habitat	
	Vernal Pool, Seasonal Wetland, and Swale	**Percentage of Total Facilities in Permit Area**
Transmission		
Lattice Towers	0.18%	0.18%
Wood Poles	-	-
All other Transmission Poles	-	-
Subtotal Transmission Towers and Poles	**0.07%**	**0.07%**
Subtransmission and Distribution		
Wood Poles	0.02%	0.02%
Other Poles	0.07%	0.07%
Subtotal Subtransmission and Distribution Poles	**0.02%**	**0.02%**
Total Towers and Poles	*0.02%*	*0.02%*
Substructures		
Above Ground Pads	0.00%	0.00%
Box-pads	-	-
Manholes	-	-
Subsurface Pads	-	-
Vaults	-	-
Subtotal Substructures	**0.00%**	**0.00%**
Pull Boxes		
Pull Boxes	0.00%	0.00%
Subtotal Pull Boxes	**0.00%**	**0.00%**
Electrical Substations		
Transmission Substations	-	-
Distribution Substations	-	-
Subtotal Electrical Substations	-	-
Gas Pipeline Valve Stations		
Poles in State Responsibility Area	-	-
Cosumnes Power Plant Cathodic Test Protection Stations	-	-
Total Facilities	***0.02%***	***0.02%***

Table E-2a: Percentage of Slender Orcutt Grass Modeled Habitat in the Permit Area (cont.)

OTHER FACILITIES*	Easement Width (feet)	Percentage of Modeled Habitat in Special Areas	
		Vernal Pool, Seasonal Wetland, and Swale	Percentage of Total Acreage in Permit Area
Cosumnes Power Plant	n/a	-	-
Mitigation Bank - Oak Tree Planting Area	n/a	0.46%	0.46%
Rancho Seco Photovoltaic 5 Removal	n/a	0.01%	0.01%
Cosumnes Power Plant Water Pipeline	25	0.16%	0.16%
Total Other Facilities*		***0.40%***	***100.00%***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-3a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	0.00008	1.09	32.70	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	0.000007	0.004	0.12
E8. Pole Replacement	less than 1 day	671 per year	0.002	1.34	40.20	0.009	0.18	5.40
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	0.04	6.00	180.00	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.57	171.00	5130.00	0.001	0.60	18.00
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.12	19.68	590.40	0.001	0.33	9.84
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.0006	0.01	0.30	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.02	0.6	0.0002	0.0004	0.01
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	n/a	1.84	0.001	n/a	0.008
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	n/a	0.50	0.002	n/a	0.0004
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	1.08	6.48	194.40	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.460	30.36	910.80	0.00007	0.02	0.60
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.09	0.72	21.60	0.001	0.02	0.60
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	1.26	n/a	3.78	0.001	n/a	0.01

Table E-3a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.24	7.20	0.001	0.004	0.12
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.23	n/a	1.38	0.30	n/a	1.80
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	n/a	1.36	11.00	n/a	44.00
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.23	n/a	0.46	0.50	n/a	1.00
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	n/a	0.72	-	n/a	-
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	0.00002	0.0005	0.02
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.07	0.35	10.50	0.003	0.003	0.09
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.009	n/a	0.09	0.000002	n/a	0.00002
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	n/a	3.18	-	n/a	-
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	0.23	n/a	0.46	-	n/a	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	n/a	1.50	0.04	n/a	0.12
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	n/a	42.00	0.00008	n/a	0.0005
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	n/a	1.38	0.000006	n/a	0.00001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	n/a	1.38	0.000004	n/a	0.00001
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	n/a	4.08	-	n/a	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	-	31.50	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	n/a	0.04	-	n/a	-
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	0.009	n/a	8.34
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	n/a	79.98	-	n/a	-

Table E-3a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.06	n/a	0.12	-	n/a	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	0.73	1.46	43.80	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	n/a	0.50	0.28	n/a	0.28
M. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	-	n/a	-	10.65	n/a	10.65
M2a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	0.05	n/a	0.26	0.00002	n/a	0.0001
M2b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	n/a	0.78	0.009	n/a	0.009
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	n/a	0.46	-	-	-
TOTALS	**-**	**-**	**35.22**	**238.75**	**7,340.25**	**22.81**	**1.16**	**101.02**

Table E-4a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity, Temporary Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Per Event (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	0.0004
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	0.0004
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	0.0039
M6. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	0.0023
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	0.0009
TOTALS	**-**	**-**	**31.92**	**0.0080**

* Total Habitat Loss for activities is based on all activities listed in Table E-3c regardless of whether or not it affects modeled habitat shown for this species.

Table E-5a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity, Temporary Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Annual (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	1.09	0.0002
E8. Pole Replacement	less than 1 day	671 per year	1.34	0.0003
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	6.00	0.0001
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	171.00	0.0023
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	19.68	0.0003
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.01	0.0000003
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.02	0.00004
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	6.48	0.0042
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	30.36	0.0197
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.72	0.00002
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.24	0.00001
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	1.46	0.0039
TOTALS	**-**	**-**	**238.75**	**0.0311**

* Total Habitat Loss for activities is based on all activities listed in Table E-3c regardless of whether or not it affects modeled habitat shown for this species.

Table E-6a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity, Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Revised Acreages	Notes
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	32.70	0.0065	-	0.0065	
E8. Pole Replacement	less than 1 day	671 per year	40.20	0.0097	-	0.0097	
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	5,130.00	0.0702	-0.0702	-	Trenching would not occur in perennial aquatic habitat. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	590.40	0.0081	-0.0081	-	SMUD would not set up the HDD pad such that it would impact aquatic features
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.30	0.00001	-0.00001	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.60	0.0011		0.0011	

Table E-6a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity, Temporary Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Revised Acreages	Notes
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	1.84	0.0033		0.0033	
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.50	0.0009		0.0009	
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	194.40	0.1261	-0.0757	0.0504	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the traveler installation could still affect aquatic habitats. The numbers here equal 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	910.80	0.5909	-0.5909	-	Pull sites would not be placed in perennial aquatic habitat; any impacts in Vernal Pool, Seasonal Wetland and Swale habitat would be considered permanent.
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	21.60	0.0007	-0.0007	-	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.

Table E-6a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity, Temporary Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Revised Acreages	Notes
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	3.78	0.0001	-0.0001	-	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	7.20	0.0002	-0.0002	-	HDD temporary work sites would be located outside of wetlands
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	1.36	0.0155	-0.0155	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	43.80	0.1163	-0.0698	0.0465	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the traveler installation could still affect aquatic habitats. The numbers here equal 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	0.0023	-0.0023	-	Temporary work areas would avoid aquatic impacts

Table E-6a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity, Temporary Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Revised Acreages	Notes
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.46	0.0018	-0.0018	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
TOTALS	**-**	**-**	**7,340.25**	**0.9538**	**-0.8354**	**0.1184**	

* Total Habitat Loss for activities is based on all activities listed in Table E-3c regardless of whether or not it affects modeled habitat shown for this species.

Table E-7a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity, Permanent Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Per Event (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.001	0.000002
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.002	0.000004
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	11.00	0.1250
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	0.0013
TOTALS	**-**	**-**	**22.79**	**0.1263**

* Total Habitat Loss for activities is based on all activities listed in Table E-3c regardless of whether or not it affects modeled habitat shown for this species.

Table E-8a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity, Permanent Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Annual (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.004	0.000001
E8. Pole Replacement	less than 1 day	671 per year	0.18	0.00004
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.60	0.00001
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.33	0.000004
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.0004	0.000001
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.02	0.00001
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.02	0.000001
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.004	0.0000001
TOTALS	**-**	**-**	**1.16**	**0.0001**

* Total Habitat Loss for activities is based on all activities listed in Table E-3c regardless of whether or not it affects modeled habitat shown for this species.

Table E-9a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity, Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.12	0.00002	-	0.00002	
E8. Pole Replacement	less than 1 day	671 per year	5.40	0.0013	-	0.0013	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	18.00	0.0002	-	0.3602	Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	9.84	0.0001	-0.0001	-	SMUD would not set up the HDD pad such that it would impact aquatic features; pull boxes would not be placed in aquatic habitats
E9e.Underground Component Repair and Replacement – Cable Repair (Third Party Damage/Dig In	Less than 1 day	20 per year	-	-	-	0.3602	This would typically be considered a temporary impact, but SMUD recognizes that if it occurs in Vernal Pool, Seasonal Wetland and Swale features, it would result in a permanent impact. One feature assumed to be impacted; average feature size of 0.3602
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.00002	-	0.00002	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.

Table E-9a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity, Permanent Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.01	0.00001	-	0.00001	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.0004	0.000001	-	0.000001	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.60	0.0004	-	2.1612	Assumes that when this Covered Activity occurs in Vernal Pool, Seasonal Wetland and Swale features, it would permanently impact the whole feature. 6 features assumed to be impacted; average feature size of 0.3602
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.60	0.00002	-	0.3602	Pull boxes would not be placed in perennial aquatic habitat. Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.01	0.0000003	-	0.3602	Pull boxes would not be placed in perennial aquatic habitat. Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre

Table E-9a: Slender Orcutt Grass Modeled Habitat Loss by Covered Activity, Permanent Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.000004	-	0.3602	Pull boxes would not be placed in perennial aquatic habitat. Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	44.00	0.5000	-	0.3602	Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	0.0013	-0.0013	-	Trees would not be planted in aquatic habitat
TOTALS	**-**	**-**	**101.02**	**0.5035**	**-0.0014**	**4.3238**	

* Total Habitat Loss for activities is based on all activities listed in Table E-3c regardless of whether or not it affects modeled habitat shown for this species.

Table E-10a: Total Slender Orcutt Grass Modeled Habitat Loss

SMUD HCP Land Cover Types	Permit Term Covered Activities	
	Temporary Land Cover Loss (acres)	Permanent Land Cover Loss (acres)
Vernal Pool, Seasonal Wetland, and Swale	0.1	4.3
TOTAL	**0.1**	**4.3**

Table E-1b: Sacramento Orcutt Grass Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Total Permit Area
Total Land Cover		**7,784.11**	**577,553.21**
LINES			
Transmission			
Easement OH Transmission	200	9.20	3,806.37
Easement UG Transmission in Conduit	200	-	347.30
Subtotal Transmission		**9.20**	**4,153.66**
Subtransmission and Distribution			
Easement OH Distribution - without 69kV Overbuild	12.5	2.86	4,842.62
Easement OH Subtransmission and Distribution	25	1.37	1,673.59
Easement UG Subtransmission and Distribution in Conduit	25	0.50	10,329.69
Easement UG Subtransmission and Distribution Direct Buried	25	0.10	7,031.11
Total Easement OH Subtransmission and Distribution	-	*4.23*	*6,516.21*
Total Easement UG Subtransmission and Distribution	-	*0.59*	*17,360.80*
Subtotal Subtransmission and Distribution	**-**	**4.82**	**23,877.01**
Total Easement OH Transmission, Subtransmission, Distribution	-	*13.43*	*10,322.58*
Total Easement UG in Conduit	-	*0.50*	*10,676.99*
Total Easement UG Direct Buried	-	*0.10*	*7,031.11*
Total Easement Total UG in Conduit and Direct Buried	-	*0.59*	*17,708.10*
Total Electrical Line Easement	-	***14.02***	***28,030.68***
Fiber-optic Line			
OH Fiber-optic Line	25	1.12	422.35
UG Fiber-optic Line	25	-	111.65
Total Fiber-optic Line Easement		***1.12***	***534.00***
Gas Pipeline			
Gas Pipeline Easement	35	-	321.30
Total Gas Pipeline Easement		**-**	***321.30***

Table E-1b: Sacramento Orcutt Grass Modeled Habitat in the Permit Area (cont.)

FACILITIES	Numbers of Facilities in Modeled Habitat	
	Vernal Pool, Seasonal Wetland, and Swale	**Total Facilities in Permit Area**
Transmission		
Lattice Towers	1	560
Wood Poles	-	144
All other Transmission Poles	-	723
Subtotal Transmission Towers and Poles	**1**	**1,427**
Subtransmission and Distribution		
Wood Poles	26	131,213
Other Poles	9	12,785
Subtotal Subtransmission and Distribution Poles	**35**	**143,998**
Total Towers and Poles	*36*	*145,425*
Substructures		
Above Ground Pads	1	42,776
Box-pads	-	2,584
Manholes	-	1,569
Subsurface Pads	-	208
Vaults	-	215
Subtotal Substructures	**1**	**47,352**
Pull Boxes		
Pull Boxes	1	24,926
Subtotal Pull Boxes	**1**	**24,926**
Electrical Substations		
Transmission Substations	-	18
Distribution Substations	-	211
Subtotal Electrical Substations	**-**	**229**
Gas Pipeline Valve Stations	-	12
Poles in State Responsibility Area	-	927
Cosumnes Power Plant Cathodic Test Protection Stations	-	17
Total Facilities	***38***	***218,888***

Table E-1b: Sacramento Orcutt Grass Modeled Habitat in the Permit Area (cont.)

OTHER FACILITIES*	Easement Width (feet)	Modeled Habitat in Other Facilities (acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Total Facilities in Permit Area
Cosumnes Power Plant	n/a	-	29.05
Mitigation Bank - Oak Tree Planting Area	n/a	1.31	282.47
Rancho Seco Photovoltaic 5 Removal	n/a	0.00	10.65
Cosumnes Power Plant Water Pipeline	25	0.03	15.49
Total Other Facilities*		***1.34***	***337.66***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-2b: Percentage of Sacramento Orcutt Grass Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (% of total acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Percentage of Total Acreage in Permit Area
Total Land Cover		**1.35%**	**100.00%**
LINES			
Transmission			
Easement OH Transmission	200	0.24%	0.66%
Easement UG Transmission in Conduit	200		0.06%
Subtotal Transmission		**0.22%**	**0.72%**
Subtransmission and Distribution			
Easement OH Distribution - without 69kV Overbuild	12.5	0.06%	0.84%
Easement OH Subtransmission and Distribution	25	0.08%	0.29%
Easement UG Subtransmission and Distribution in Conduit	25	0.00%	1.79%
Easement UG Subtransmission and Distribution Direct Buried	25	0.00%	1.22%
Total Easement OH Subtransmission and Distribution	-	*0.06%*	*1.13%*
Total Easement UG Subtransmission and Distribution	-	*0.00%*	*3.01%*
Subtotal Subtransmission and Distribution	-	**0.02%**	**4.13%**
Total Easement OH Transmission, Subtransmission, Distribution	-	*0.13%*	*1.79%*
Total Easement UG in Conduit	-	*0.00%*	*1.85%*
Total Easement UG Direct Buried	-	*0.00%*	*1.22%*
Total Easement Total UG in Conduit and Direct Buried	-	*0.00%*	*3.07%*
Total Electrical Line Easement	**-**	***0.05%***	***4.85%***
Fiber-optic Line			
OH Fiber-optic Line	25	0.27%	0.07%
UG Fiber-optic Line	25	-	0.02%
Total Fiber-optic Line Easement		***0.21%***	***0.09%***
Gas Pipeline			
Gas Pipeline Easement	35	-	0.06%
Total Gas Pipeline Easement		**-**	***0.06%***

Table E-2b: Percentage of Sacramento Orcutt Grass Modeled Habitat in the Permit Area (cont.)

FACILITIES	Percent of Facilities in Modeled Habitat	
	Vernal Pool, Seasonal Wetland, and Swale	**Percentage of Total Facilities in Permit Area**
Transmission		
Lattice Towers	0.18%	0.18%
Wood Poles	-	-
All other Transmission Poles	-	-
Subtotal Transmission Towers and Poles	**0.07%**	**0.07%**
Subtransmission and Distribution		
Wood Poles	0.02%	0.02%
Other Poles	0.07%	0.07%
Subtotal Subtransmission and Distribution Poles	**0.02%**	**0.02%**
Total Towers and Poles	*0.02%*	*0.02%*
Substructures		
Above Ground Pads	0.00%	0.00%
Box-pads	-	-
Manholes	-	-
Subsurface Pads	-	-
Vaults	-	-
Subtotal Substructures	**0.00%**	**0.00%**
Pull Boxes		
Pull Boxes	0.00%	0.00%
Subtotal Pull Boxes	**0.00%**	**0.00%**
Electrical Substations		
Transmission Substations	-	-
Distribution Substations	-	-
Subtotal Electrical Substations	**-**	**-**
Gas Pipeline Valve Stations	-	-
Poles in State Responsibility Area	-	-
Cosumnes Power Plant Cathodic Test Protection Stations	-	-
Total Facilities	***0.02%***	***0.02%***

Table E-2b: Percentage of Sacramento Orcutt Grass Modeled Habitat in the Permit Area (cont.)

OTHER FACILITIES*	Easement Width (feet)	Percentage of Modeled Habitat in Special Areas (acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Percentage of Total Acreage in Permit Area
Cosumnes Power Plant	n/a	-	-
Mitigation Bank - Oak Tree Planting Area	n/a	0.46%	0.46%
Rancho Seco Photovoltaic 5 Removal	n/a	0.01%	0.01%
Cosumnes Power Plant Water Pipeline	25	0.16%	0.16%
Total Other Facilities*		***0.40%***	***100.00%***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-3b: SMUD HCP Total Land Cover Loss by Covered Activity

Covered Activity Number and Title	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
	Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	0.00008	1.09	32.70	-	-	-
E6c. Wood Pole Repair - Trussing	-	-	-	0.000007	0.004	0.12
E8. Pole Replacement	0.002	1.34	40.20	0.009	0.18	5.40
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	0.04	6.00	180.00	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	0.57	171.00	5130.00	0.001	0.60	18.00
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	0.12	19.68	590.40	0.001	0.33	9.84
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	0.0006	0.01	0.30	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	0.01	0.02	0.6	0.0002	0.0004	0.01
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	0.23	n/a	1.84	0.001	n/a	0.008
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	0.25	n/a	0.50	0.002	n/a	0.0004
E11. Overhead Reconstruction and Reconductoring	1.08	6.48	194.40	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	0.460	30.36	910.80	0.00007	0.02	0.60
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	0.09	0.72	21.60	0.001	0.02	0.60
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	1.26	n/a	3.78	0.001	n/a	0.01
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	0.12	0.24	7.20	0.001	0.004	0.12
E15. Existing Distribution Substation Expansion	0.23	n/a	1.38	0.30	n/a	1.80
E16 [1]. New Transmission Substation Construction	0.34	n/a	1.36	11.00	n/a	44.00
E16 [2]. New Distribution Substation Construction	0.23	n/a	0.46	0.50	n/a	1.00
G4. Internal Pipeline Inspection	0.12	n/a	0.72	-	n/a	-
G5a. Aboveground Pipeline Maintenance and Repair	-	-	-	0.00002	0.0005	0.02
G5b. Underground Pipeline Maintenance and Repair	0.07	0.35	10.50	0.003	0.003	0.09

Table E-3b: SMUD HCP Total Land Cover Loss by Covered Activity (cont.)

Covered Activity Number and Title	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
	Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
G6. Pipeline Cathodic Protection Test Station Installation	0.009	n/a	0.09	0.000002	n/a	0.00002
G7. Pipeline Anode Bed Replacement	0.06	n/a	3.18	-	n/a	-
G8. Pipeline Valve Repair or Replacement	0.23	n/a	0.46	-	n/a	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	0.50	n/a	1.50	0.04	n/a	0.12
G10a. New Construction for Realigned Pipelines - Trenching.	7.00	n/a	42.00	0.00008	n/a	0.0005
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	0.46	n/a	1.38	0.000006	n/a	0.00001
G10c. New Construction for Realigned Pipelines - Directional Boring	0.46	n/a	1.38	0.000004	n/a	0.00001
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	0.34	n/a	4.08	-	n/a	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	5.25	-	31.50	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	0.004	n/a	0.04	-	n/a	-
V5c. Elderberry Shrub Trimming and Removal - Removal by Cutting	-	n/a	-	-	n/a	-
V6. Pole Vegetation Clearing	-	-	-	0.009	n/a	8.34
V7. Vegetation Management on Natural Gas Easement	13.33	n/a	79.98	-	n/a	-
T2. New Construction of Telecommunication Tower(s)	0.06	n/a	0.12	-	n/a	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	0.73	1.46	43.80	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	0.50	n/a	0.50	0.28	n/a	0.28
M. Rancho Seco Photovoltaic 5 Removal	-	n/a	-	10.65	n/a	10.65
M2a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	0.05	n/a	0.26	0.00002	n/a	0.0001
M2b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	0.78	n/a	0.78	0.009	n/a	0.009
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	0.23	n/a	0.46	-	-	-
TOTALS	**35.22**	**238.75**	**7,340.25**	**22.81**	**1.16**	**101.02**

Table E-4b: SMUD HCP Total Sacramento Orcutt Grass Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Per Event (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	0.0004
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	0.0004
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	0.0039
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	-
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.01	-
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	-
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	-
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	-
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	-
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	0.0023
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	0.0009
TOTALS	**-**	**-**	**31.92**	**0.0080**

*Total Habitat Loss for activities is based on all activities listed in Table E-3d regardless of whether or not it affects modeled habitat shown for this species.

Table E-5b: SMUD HCP Total Sacramento Orcutt Grass Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Annual (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	1.09	0.0002
E8. Pole Replacement	less than 1 day	671 per year	1.34	0.0003
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	6.00	0.0001
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	171.00	0.0023
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	19.68	0.0003
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.01	0.0000003
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.02	0.00004
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	6.48	0.0042
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	30.36	0.0197
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.72	0.00002
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.24	0.00001
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	1.46	0.0039
TOTALS	**-**	**-**	**238.75**	**0.0311**

*Total Habitat Loss for activities is based on all activities listed in Table E-3d regardless of whether or not it affects modeled habitat shown for this species.

Table E-6b: Sacramento Orcutt Grass Modeled Habitat Loss by Covered Activity, Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (After Reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	32.70	0.0065		0.0065	
E8. Pole Replacement	less than 1 day	671 per year	40.20	0.0097		0.0097	
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	5,130.00	0.0702	-0.0702	-	Trenching would not occur in perennial aquatic habitat. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	590.40	0.0081	-0.0081	-	SMUD would not set up the HDD pad such that it would impact aquatic features
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.30	0.00001	-0.00001	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.60	0.0011		0.0011	

Table E-6b: Sacramento Orcutt Grass Modeled Habitat Loss by Covered Activity, Temporary Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (After Reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	1.84	0.0033	-	0.0033	
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.50	0.0009	-	0.0009	
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	194.40	0.1261	-0.0757	0.0504	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the traveler installation could still affect aquatic habitats. The numbers here equal 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	910.80	0.5909	-0.5909	-	Pull sites would not be placed in perennial aquatic habitat; any impacts in Vernal Pool, Seasonal Wetland and Swale habitat would be considered permanent.
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	21.60	0.0007	-0.0007	-	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.

Table E-6b: Sacramento Orcutt Grass Modeled Habitat Loss by Covered Activity, Temporary Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (After Reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	3.78	0.0001	-0.0001	-	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	7.20	0.0002	-0.0002	-	HDD temporary work sites would be located outside of wetlands
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	1.36	0.0155	-0.0155	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	43.80	0.1163	-0.0698	0.0465	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the traveler installation could still affect aquatic habitats. The numbers here equal 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	0.0023	-0.0023	-	Temporary work areas would avoid aquatic impacts

Table E-6b: Sacramento Orcutt Grass Modeled Habitat Loss by Covered Activity, Temporary Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (After Reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.46	0.0018	-0.0018	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
TOTALS	**-**	**-**	**7,340.25**	**0.9538**	**-0.8354**	**0.1184**	

* Total Habitat Loss for activities is based on all activities listed in Table E-3d regardless of whether or not it affects modeled habitat shown for this species.

Table E-7b: SMUD HCP Total Sacramento Orcutt Grass Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Per Event (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.001	0.000002
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.002	0.000004
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	11.00	0.1250
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	0.0013
TOTALS	**-**	**-**	**22.79**	**0.1263**

* Total Habitat Loss for activities is based on all activities listed in Table E-3d regardless of whether or not it affects modeled habitat shown for this species.

Table E-8b: SMUD HCP Total Sacramento Orcutt Grass Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Annual (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.004	0.000001
E8. Pole Replacement	less than 1 day	671 per year	0.18	0.00004
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.60	0.00001
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.33	0.000004
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.0004	0.000001
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.02	0.00001
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.02	0.000001
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.004	0.0000001
TOTALS	**--**	**--**	**1.16**	**0.0001**

* Total Habitat Loss for activities is based on all activities listed in Table E-3d regardless of whether or not it affects modeled habitat shown for this species.

Table E-9b: Sacramento Orcutt Grass Modeled Habitat Loss by Covered Activity, Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (After Reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.12	0.00002	-	0.00002	
E8. Pole Replacement	less than 1 day	671 per year	5.40	0.0013	-	0.0013	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	18.00	0.0002	-	0.3602	Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	9.84	0.0001	-0.0001	-	SMUD would not set up the HDD pad such that it would impact aquatic features; pull boxes would not be placed in aquatic habitats
E9e.Underground Component Repair and Replacement – Cable Repair (Third Party Damage/Dig In	Less than 1 day	20 per year	-	-	-	0.3602	This would typically be considered a temporary impact, but SMUD recognizes that if it occurs in Vernal Pool, Seasonal Wetland and Swale features, it would result in a permanent impact. One feature assumed to be impacted; average feature size of 0.3602
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.00002	-	0.00002	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.

Table E-9b: Sacramento Orcutt Grass Modeled Habitat Loss by Covered Activity, Permanent Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (After Reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.01	0.00001	-	0.00001	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.0004	0.000001	-	0.000001	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.60	0.0004	-	2.1612	Assumes that when this Covered Activity occurs in Vernal Pool, Seasonal Wetland and Swale features, it would permanently impact the whole feature. 6 features assumed to be impacted; average feature size of 0.3602
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.60	0.00002	-	0.3602	Pull boxes would not be placed in perennial aquatic habitat. Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.01	0.0000003	-	0.3602	Pull boxes would not be placed in perennial aquatic habitat. Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602

Table E-9b: Sacramento Orcutt Grass Modeled Habitat Loss by Covered Activity, Permanent Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (After Reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.000004	-	0.3602	Pull boxes would not be placed in perennial aquatic habitat. Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	44.00	0.5000	-	0.3602	Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	0.0013	-0.0013	-	Trees would not be planted in aquatic habitat
TOTALS	**--**	**--**	**101.02**	**0.503**	**-0.001**	**4.3238**	

* Total Habitat Loss for activities is based on all activities listed in Table E-3d regardless of whether or not it affects modeled habitat shown for this species.

Table E-10b: SMUD HCP Total Sacramento Orcutt Grass Modeled Habitat Loss by Covered Activity Types

SMUD HCP Land Cover Types	Permit Term Covered Activities	
	Temporary Land Cover Loss (acres)	Permanent Land Cover Loss (acres)
Vernal Pool, Seasonal Wetland, and Swale	0.1	4.3
TOTAL	**0.1**	**4.3**

Table E-1c: Vernal Pool Fairy Shrimp Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Total Permit Area
Total Land Cover		**7,784.11**	**577,553.21**
LINES			
Transmission			
Easement OH Transmission	200	233.91	3,806.37
Easement UG Transmission in Conduit	200	-	347.30
Subtotal Transmission		**233.91**	**4,153.66**
Subtransmission and Distribution			
Easement OH Distribution - without 69kV Overbuild	12.5	16.35	4,842.62
Easement OH Subtransmission and Distribution	25	5.48	1,673.59
Easement UG Subtransmission and Distribution in Conduit	25	8.67	10,329.69
Easement UG Subtransmission and Distribution Direct Buried	25	1.11	7,031.11
Total Easement OH Subtransmission and Distribution	-	*21.83*	*6,516.21*
Total Easement UG Subtransmission and Distribution	-	*9.77*	*17,360.80*
Subtotal Subtransmission and Distribution	**-**	**31.60**	**23,877.01**
Total Easement OH Transmission, Subtransmission, Distribution	-	*255.74*	*10,322.58*
Total Easement UG in Conduit	-	*8.67*	*10,676.99*
Total Easement UG Direct Buried	-	*1.11*	*7,031.11*
Total Easement Total UG in Conduit and Direct Buried	-	*9.77*	*17,708.10*
Total Electrical Line Easement	**-**	***265.51***	***28,030.68***
Fiber-optic Line			
OH Fiber-optic Line	25	22.84	422.35
UG Fiber-optic Line	25	0.02	111.65
Total Fiber-optic Line Easement		***22.86***	***534.00***
Gas Pipeline			
Gas Pipeline Easement	35	0.04	321.30
Total Gas Pipeline Easement		***0.04***	***321.30***

Table E-1c: Vernal Pool Fairy Shrimp Modeled Habitat in the Permit Area

FACILITIES	Numbers of Facilities in Modeled Habitat	
	Vernal Pool, Seasonal Wetland, and Swale	**Total Facilities in Permit Area**
Transmission		
Lattice Towers	44	560
Wood Poles	-	144
All other Transmission Poles	5	723
Subtotal Transmission Towers and Poles	**49**	**1,427**
Subtransmission and Distribution		
Wood Poles	286	131,213
Other Poles	29	12,785
Subtotal Subtransmission and Distribution Poles	**315**	**143,998**
Total Towers and Poles	*364*	*145,425*
Substructures		
Above Ground Pads	15	42,776
Box-pads	3	2,584
Manholes	-	1,569
Subsurface Pads	-	208
Vaults	-	215
Subtotal Substructures	**18**	**47,352**
Pull Boxes		
Pull Boxes	25	24,926
Subtotal Pull Boxes	**25**	**24,926**
Electrical Substations		
Transmission Substations	-	18
Distribution Substations	-	211
Subtotal Electrical Substations	**-**	**229**
Gas Pipeline Valve Stations	-	12
Poles in State Responsibility Area	3	927
Cosumnes Power Plant Cathodic Test Protection Stations	-	17
Total Facilities	***410***	***218,888***

Table E-1c: Vernal Pool Fairy Shrimp Modeled Habitat in the Permit Area

OTHER FACILITIES*	Easement Width (feet)	Modeled Habitat in Other Facilities (acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Total Facilities in Permit Area
Cosumnes Power Plant	n/a	-	29.05
Mitigation Bank - Oak Tree Planting Area	n/a	1.31	282.47
Rancho Seco Photovoltaic 5 Removal	n/a	0.001	10.65
Cosumnes Power Plant Water Pipeline	25	0.06	15.49
Total Other Facilities*		***1.37***	***337.66***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-2c: Percentage of Vernal Pool Fairy Shrimp Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (% of total acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Percentage of Total Acreage in Permit Area
Total Land Cover		**1.35%**	**100.00%**
LINES			
Transmission			
Easement OH Transmission	200	6.15%	0.66%
Easement UG Transmission in Conduit	200	-	0.06%
Subtotal Transmission		**5.63%**	**0.72%**
Subtransmission and Distribution			
Easement OH Distribution - without 69kV Overbuild	12.5	0.34%	0.84%
Easement OH Subtransmission and Distribution	25	0.33%	0.29%
Easement UG Subtransmission and Distribution in Conduit	25	0.08%	1.79%
Easement UG Subtransmission and Distribution Direct Buried	25	0.02%	1.22%
Total Easement OH Subtransmission and Distribution	-	*0.34%*	*1.13%*
Total Easement UG Subtransmission and Distribution	-	*0.06%*	*3.01%*
Subtotal Subtransmission and Distribution	**-**	**0.13%**	**4.13%**
Total Easement OH Transmission, Subtransmission, Distribution	-	*2.48%*	*1.79%*
Total Easement UG in Conduit	-	*0.08%*	*1.85%*
Total Easement UG Direct Buried	-	*0.02%*	*1.22%*
Total Easement Total UG in Conduit and Direct Buried	-	*0.06%*	*3.07%*
Total Electrical Line Easement	**-**	***0.95%***	***4.85%***
Fiber-optic Line			
OH Fiber-optic Line	25	5.41%	0.07%
UG Fiber-optic Line	25	0.02%	0.02%
Total Fiber-optic Line Easement		***4.28%***	***0.09%***
Gas Pipeline			
Gas Pipeline Easement	35	0.01%	0.06%
Total Gas Pipeline Easement		***0.01%***	***0.06%***

Table E-2c: Percentage of Vernal Pool Fairy Shrimp Modeled Habitat in the Permit Area

FACILITIES	Percent of Facilities in Modeled Habitat	
	Vernal Pool, Seasonal Wetland, and Swale	**Percentage of Total Facilities in Permit Area**
Transmission		
Lattice Towers	7.86%	7.86%
Wood Poles	-	-
All other Transmission Poles	0.69%	0.69%
Subtotal Transmission Towers and Poles	**3.43%**	**3.43%**
Subtransmission and Distribution		
Wood Poles	0.22%	0.22%
Other Poles	0.23%	0.23%
Subtotal Subtransmission and Distribution Poles	**0.22%**	**0.22%**
Total Towers and Poles	*0.25%*	*0.25%*
Substructures		
Above Ground Pads	0.04%	0.04%
Box-pads	0.12%	0.12%
Manholes	-	-
Subsurface Pads	-	-
Vaults	-	-
Subtotal Substructures	**0.04%**	**0.04%**
Pull Boxes		
Pull Boxes	0.10%	0.10%
Subtotal Pull Boxes	**0.10%**	**0.10%**
Electrical Substations		
Transmission Substations	-	-
Distribution Substations	-	-
Subtotal Electrical Substations	**-**	**-**
Gas Pipeline Valve Stations	-	-
Poles in State Responsibility Area	0.32%	0.32%
Cosumnes Power Plant Cathodic Test Protection Stations	-	-
Total Facilities	***0.19%***	***0.19%***

Table E-2c: Percentage of Vernal Pool Fairy Shrimp Modeled Habitat in the Permit Area

OTHER FACILITIES*	Easement Width (feet)	Percentage of Modeled Habitat in Special Areas	
		Vernal Pool, Seasonal Wetland, and Swale	Percentage of Total Acreage in Permit Area
Cosumnes Power Plant	n/a	-	-
Mitigation Bank - Oak Tree Planting Area	n/a	0.46%	0.46%
Rancho Seco Photovoltaic 5 Removal	n/a	0.01%	0.01%
Cosumnes Power Plant Water Pipeline	25	0.36%	0.36%
Total Other Facilities*		***0.41%***	***100.00%***

Table E-3c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	0.00008	1.09	32.70	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	0.000007	0.004	0.12
E8. Pole Replacement	less than 1 day	671 per year	0.002	1.34	40.20	0.009	0.18	5.40
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	0.04	6.00	180.00	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.57	171.00	5130.00	0.001	0.60	18.00
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.12	19.68	590.40	0.001	0.33	9.84
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.0006	0.01	0.30	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.02	0.6	0.0002	0.0004	0.01
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	n/a	1.84	0.001	n/a	0.008
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	n/a	0.50	0.002	n/a	0.0004
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	1.08	6.48	194.40	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.460	30.36	910.80	0.00007	0.02	0.60
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.09	0.72	21.60	0.001	0.02	0.60
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	1.26	n/a	3.78	0.001	n/a	0.01

Table E-3c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.24	7.20	0.001	0.004	0.12
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.23	n/a	1.38	0.30	n/a	1.80
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	n/a	1.36	11.00	n/a	44.00
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.23	n/a	0.46	0.50	n/a	1.00
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	n/a	0.72	-	n/a	-
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	0.00002	0.0005	0.02
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.07	0.35	10.50	0.003	0.003	0.09
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.009	n/a	0.09	0.000002	n/a	0.00002
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	n/a	3.18	-	n/a	-
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	0.23	n/a	0.46	-	n/a	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	n/a	1.50	0.04	n/a	0.12
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	n/a	42.00	0.00008	n/a	0.0005
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	n/a	1.38	0.000006	n/a	0.00001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	n/a	1.38	0.000004	n/a	0.00001
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	n/a	4.08	-	n/a	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	-	31.50	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	n/a	0.04	-	n/a	-

Table E-3c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
V5c. Elderberry Shrub Trimming and Removal - Removal by Cutting	less than 1 day	10 times over the permit term	-	n/a	-	-	n/a	-
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	0.009	n/a	8.34
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	n/a	79.98	-	n/a	-
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.06	n/a	0.12	-	n/a	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	0.73	1.46	43.80	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	n/a	0.50	0.28	n/a	0.28
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	-	n/a	-	10.65	n/a	10.65
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	0.05	n/a	0.26	0.00002	n/a	0.0001
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	n/a	0.78	0.009	n/a	0.009
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	n/a	0.46	-	-	-
TOTALS	**-**	**-**	**35.22**	**238.75**	**7,340.25**	**22.81**	**1.16**	**101.02**

Table E-4c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Per Event (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	0.0181
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	0.0196
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	0.0039
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	0.00002
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.01	0.000001
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	0.00001
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	0.0001
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	0.0010
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	0.0001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	0.0001
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	0.0000
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	0.0018
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	0.0023
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	0.0009
TOTALS	**-**	**-**	**31.92**	**0.0479**

* Total Habitat Loss for activities is based on all activities listed in Table E-3e regardless of whether or not it affects modeled habitat shown for this species.

Table E-5c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Annual (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	1.09	0.0024
E8. Pole Replacement	less than 1 day	671 per year	1.34	0.0030
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	6.00	0.0021
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	171.00	0.0269
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	19.68	0.0031
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.01	0.00001
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.02	0.0017
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	6.48	0.0217
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	30.36	0.1017
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.72	0.0004
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.24	0.0001
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.35	0.00005
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	1.46	0.0790
TOTALS	**-**	**-**	**238.75**	**0.2421**

* Total Habitat Loss for activities is based on all activities listed in Table E-3e regardless of whether or not it affects modeled habitat shown for this species.

Table E-6c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	32.70	0.0712	-	0.0712	
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	-	
E8. Pole Replacement	less than 1 day	671 per year	40.20	0.0888	-	0.0888	
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	180.00	0.2090	-	0.2090	
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	5,130.00	0.8068	-0.8068	-	Trenching would not occur in perennial aquatic habitat; HDD would be used to avoid impacts. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	590.40	0.0928	-0.0928	-	SMUD would not set up the HDD pad such that it would impact aquatic features

Table E-6c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.30	0.0002	-0.0002	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.60	0.0471	-	0.0471	
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	1.84	0.1446	-	0.1446	
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.50	0.0393		0.0393	
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	194.40	0.6513	-0.3908	0.2605	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the traveler installation could still affect aquatic habitats. The numbers here = 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites

Table E-6c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	910.80	3.0514	-3.0514	-	Pull sites would not be placed in perennial aquatic habitat. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	21.60	0.0122	-.0122	-	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	3.78	0.0021	-.0021	-	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.

Table E-6c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	7.20	0.0041	-0.0041	-	HDD temporary work sites would be located outside of wetlands
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	1.36	0.0155	-0.0155	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.72	0.0001	-0.0001	-	Staging areas would not be sited in aquatic features
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	10.50	0.0015	-0.0015	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.09	0.00001	-0.00001	-	Cathodic protection test stations would not be sited in aquatic features
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	3.18	0.0004	-0.0004	-	Pipeline anode beds would not be installed in aquatic features
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	1.50	0.0002	-0.0002	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.

Table E-6c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	42.00	0.0058	-0.0058	-	SMUD wouldn't trench through aquatic habitats for pipeline relocation
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	1.38	0.0002	-0.0002	-	Temporary work areas for HDD would avoid aquatic habitats
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	1.38	0.0002	-0.0002	-	Temporary work areas for directional boring would avoid aquatic habitats
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	4.08	0.0006	-0.0006	-	Temporary areas for hydrostatic testing would avoid aquatic habitats
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	79.98	0.0111	-	0.0111	
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	43.80	2.3688	-1.4213	0.9475	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the traveler installation could still affect aquatic habitats. The numbers here = 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites

Table E-6c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	0.0023	-0.0023	-	Temporary work areas would avoid aquatic impacts
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.46	0.0018	-0.0018	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
TOTALS	**-**	**-**	**7,340.25**	**7.6293**	**-5.8103**	**1.8191**	

* Total Habitat Loss for activities is based on all activities listed in Table E-3e regardless of whether or not it affects modeled habitat shown for this species.

Table E-7c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Per Event (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.001	0.0001
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.002	0.0002
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	11.00	0.1250
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.000002	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.04	0.00001
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.0001	0.00000001
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	0.01	0.00003
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	0.0013
TOTALS	**-**	**-**	**22.79**	**0.1266**

* Total Habitat Loss for activities is based on all activities listed in Table E-3e regardless of whether or not it affects modeled habitat shown for this species.

Table E-8c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Annual (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.004	0.00001
E8. Pole Replacement	less than 1 day	671 per year	0.18	0.0004
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.60	0.0001
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.33	0.0001
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.0004	0.00003
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.02	0.00007
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.02	0.00001
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.004	0.000002
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.001	0.0000001
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.003	0.0000004
TOTALS	**-**	**-**	**1.16**	**0.0007**

* Total Habitat Loss for activities is based on all activities listed in Table E-3e regardless of whether or not it affects modeled habitat shown for this species.

Table E-9c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after corrections)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.12	0.0003	-	0.0003	
E8. Pole Replacement	less than 1 day	671 per year	5.40	0.0119	-	0.0000	Temporary impacts only
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	18.00	0.0028	-	0.7204	Determined that this Covered Activity could occur in two Vernal Pool, Seasonal Wetland, and Swale features over the Permit Term; assumed an average feature size of 0.3602 acre
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	9.84	0.0015	-0.0015	-	Pull boxes would not be placed in aquatic habitat
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.0001			0.3602	Permanent only; assumed an average pool size of 0.3602 acre
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.0008	-	0.0008	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower	4 weeks	8 over the permit term	0.01	0.0006	-	0.0006	Assumes only the footprint of the new pole would be an impact in Vernal Pool,

Table E-9c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after corrections)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
Replacement with a Tubular Steel Pole							Seasonal Wetland, and Swale features.
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.0004	0.00003	-	0.00003	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.60	0.0020	-	10.4458	Assumes whole pool would be permanently impacted. Assumed 29 features to be impacted; average size of 0.3602
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.60	0.0003	-	0.3602	Pull boxes would not be placed in perennial aquatic habitat
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.01	0.00001	-	0.3602	Determined that this Covered Activity could occur in one Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre

Table E-9c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after corrections)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.0001	-	0.3602	Determined that this Covered Activity could occur in one Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	44.00	0.5000	-	0.3602	Determined that this Covered Activity could occur in one Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.02	0.000003	-	0.000003	
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.09	0.00001	-	0.3602	Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.00002	-	-	-	Cathodic protection test stations would not be sited in aquatic features

Table E-9c: Vernal Pool Fairy Shrimp Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after corrections)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.12	0.00002	-	0.3602	Determined that this Covered Activity could occur in one Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.001	0.0000001	-0.0000001	-	Pipeline markers would not be placed in aquatic habitat
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	-	-	-	Pipeline markers would not be placed in aquatic habitat
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.00001	-	-	-	Pipeline markers would not be placed in aquatic habitat
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	0.0013	-0.0013	-	Trees would not be planted in aquatic habitat
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.0018			0.3602	
TOTALS	**-**	**-**	**101.382**	**0.5218**	**-0.0028**	**14.0495**	

* Total Habitat Loss for activities is based on all activities listed in Table E-3e regardless of whether or not it affects modeled habitat shown for this species.

Table E-10c: Total Vernal Pool Fairy Shrimp Modeled Habitat Loss

SMUD HCP Land Cover Types	Permit Term Covered Activities		Permit Term Covered Activities (Modified)	
	Temporary Land Cover Loss (acres)	Permanent Land Cover Loss (acres)	REVISED Temporary Land Cover Loss (acres)	REVISED Permanent Land Cover Loss (acres)
Vernal Pool, Seasonal Wetland, and Swale	7.6	0.5	1.8	14.1
TOTAL	**7.6**	**0.5**	**1.8**	**14.1**

Table E-1d: Vernal Pool Tadpole Shrimp Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Total Permit Area
Total Land Cover		**7,784.11**	**577,553.21**
LINES			
Transmission			
Easement OH Transmission	200	233.91	3,806.37
Easement UG Transmission in Conduit	200	-	347.30
Subtotal Transmission		**233.91**	**4,153.66**
Subtransmission and Distribution			
Easement OH Distribution - without 69kV Overbuild	12.5	16.35	4,842.62
Easement OH Subtransmission and Distribution	25	5.48	1,673.59
Easement UG Subtransmission and Distribution in Conduit	25	8.67	10,329.69
Easement UG Subtransmission and Distribution Direct Buried	25	1.11	7,031.11
Total Easement OH Subtransmission and Distribution	-	*21.83*	*6,516.21*
Total Easement UG Subtransmission and Distribution	-	*9.77*	*17,360.80*
Subtotal Subtransmission and Distribution	**-**	**31.60**	**23,877.01**
Total Easement OH Transmission, Subtransmission, Distribution	-	*255.74*	*10,322.58*
Total Easement UG in Conduit	-	*8.67*	*10,676.99*
Total Easement UG Direct Buried	-	*1.11*	*7,031.11*
Total Easement Total UG in Conduit and Direct Buried	-	*9.77*	*17,708.10*
Total Electrical Line Easement	**-**	***265.51***	***28,030.68***
Fiber-optic Line			
OH Fiber-optic Line	25	22.84	422.35
UG Fiber-optic Line	25	0.02	111.65
Total Fiber-optic Line Easement		***22.86***	***534.00***
Gas Pipeline			
Gas Pipeline Easement	35	0.04	321.30
Total Gas Pipeline Easement		***0.04***	***321.30***

Table E-1d: Vernal Pool Tadpole Shrimp Modeled Habitat in the Permit Area

FACILITIES	Numbers of Facilities in Modeled Habitat	
	Vernal Pool, Seasonal Wetland, and Swale	**Total Facilities in Permit Area**
Transmission		
Lattice Towers	44	560
Wood Poles	-	144
All other Transmission Poles	5	723
Subtotal Transmission Towers and Poles	**49**	**1,427**
Subtransmission and Distribution		
Wood Poles	286	131,213
Other Poles	29	12,785
Subtotal Subtransmission and Distribution Poles	**315**	**143,998**
Total Towers and Poles	*364*	*145,425*
Substructures		
Above Ground Pads	15	42,776
Box-pads	3	2,584
Manholes	-	1,569
Subsurface Pads	-	208
Vaults	-	215
Subtotal Substructures	**18**	**47,352**
Pull Boxes		
Pull Boxes	25	24,926
Subtotal Pull Boxes	**25**	**24,926**
Electrical Substations		
Transmission Substations	-	18
Distribution Substations	-	211
Subtotal Electrical Substations	**-**	**229**
Gas Pipeline Valve Stations	-	12
Poles in State Responsibility Area	3	927
Cosumnes Power Plant Cathodic Test Protection Stations	-	17
Total Facilities	***410***	***218,888***

Table E-1d: Vernal Pool Tadpole Shrimp Modeled Habitat in the Permit Area

OTHER FACILITIES*	Easement Width (feet)	Modeled Habitat in Other Facilities (acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Total Facilities in Permit Area
Cosumnes Power Plant	n/a	-	29.05
Mitigation Bank - Oak Tree Planting Area	n/a	1.31	282.47
Rancho Seco Photovoltaic 5 Removal	n/a	0.001	10.65
Cosumnes Power Plant Water Pipeline	25	0.06	15.49
Total Other Facilities*		***1.37***	***337.66***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-2d: Percentage of Vernal Pool Tadpole Shrimp Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (% of total acres)	
		Vernal Pool, Seasonal Wetland, and Swale	Percentage of Total Acreage in Permit Area
Total Land Cover		**1.35%**	**100.00%**
LINES			
Transmission			
Easement OH Transmission	200	6.15%	0.66%
Easement UG Transmission in Conduit	200	-	0.06%
Subtotal Transmission		**5.63%**	**0.72%**
Subtransmission and Distribution			
Easement OH Distribution - without 69kV Overbuild	12.5	0.34%	0.84%
Easement OH Subtransmission and Distribution	25	0.33%	0.29%
Easement UG Subtransmission and Distribution in Conduit	25	0.08%	1.79%
Easement UG Subtransmission and Distribution Direct Buried	25	0.02%	1.22%
Total Easement OH Subtransmission and Distribution	-	*0.34%*	*1.13%*
Total Easement UG Subtransmission and Distribution	-	*0.06%*	*3.01%*
Subtotal Subtransmission and Distribution	**-**	**0.13%**	**4.13%**
Total Easement OH Transmission, Subtransmission, Distribution	-	*2.48%*	*1.79%*
Total Easement UG in Conduit	-	*0.08%*	*1.85%*
Total Easement UG Direct Buried	-	*0.02%*	*1.22%*
Total Easement Total UG in Conduit and Direct Buried	-	*0.06%*	*3.07%*
Total Electrical Line Easement	**-**	***0.95%***	***4.85%***
Fiber-optic Line			
OH Fiber-optic Line	25	5.41%	0.07%
UG Fiber-optic Line	25	0.02%	0.02%
Total Fiber-optic Line Easement		***4.28%***	***0.09%***
Gas Pipeline			
Gas Pipeline Easement	35	0.01%	0.06%
Total Gas Pipeline Easement		***0.01%***	***0.06%***

Table E-2d: Percentage of Vernal Pool Tadpole Shrimp Modeled Habitat in the Permit Area

FACILITIES	Percent of Facilities in Modeled Habitat	
	Vernal Pool, Seasonal Wetland, and Swale	**Percentage of Total Facilities in Permit Area**
Transmission		
Lattice Towers	7.86%	7.86%
Wood Poles	-	-
All other Transmission Poles	0.69%	0.69%
Subtotal Transmission Towers and Poles	**3.43%**	**3.43%**
Subtransmission and Distribution		
Wood Poles	0.22%	0.22%
Other Poles	0.23%	0.23%
Subtotal Subtransmission and Distribution Poles	**0.22%**	**0.22%**
Total Towers and Poles	*0.25%*	*0.25%*
Substructures		
Above Ground Pads	0.04%	0.04%
Box-pads	0.12%	0.12%
Manholes	-	-
Subsurface Pads	-	-
Vaults	-	-
Subtotal Substructures	**0.04%**	**0.04%**
Pull Boxes		
Pull Boxes	0.10%	0.10%
Subtotal Pull Boxes	**0.10%**	**0.10%**
Electrical Substations		
Transmission Substations	-	-
Distribution Substations	-	-
Subtotal Electrical Substations	**-**	**-**
Gas Pipeline Valve Stations	-	-
Poles in State Responsibility Area	0.32%	0.32%
Cosumnes Power Plant Cathodic Test Protection Stations	-	-
Total Facilities	***0.19%***	***0.19%***

Table E-2d: Percentage of Vernal Pool Tadpole Shrimp Modeled Habitat in the Permit Area

OTHER FACILITIES*	Easement Width (feet)	Percentage of Modeled Habitat in Special Areas	
		Vernal Pool, Seasonal Wetland, and Swale	Percentage of Total Acreage in Permit Area
Cosumnes Power Plant	n/a	-	-
Mitigation Bank - Oak Tree Planting Area	n/a	0.46%	0.46%
Rancho Seco Photovoltaic 5 Removal	n/a	0.01%	0.01%
Cosumnes Power Plant Water Pipeline	25	0.36%	0.36%
Total Other Facilities*		***0.41%***	***100.00%***

Table E-3d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	0.00008	1.09	32.70	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	0.000007	0.004	0.12
E8. Pole Replacement	less than 1 day	671 per year	0.002	1.34	40.20	0.009	0.18	5.40
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	0.04	6.00	180.00	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.57	171.00	5130.00	0.001	0.60	18.00
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.12	19.68	590.40	0.001	0.33	9.84
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.0006	0.01	0.30	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.02	0.6	0.0002	0.0004	0.01
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	n/a	1.84	0.001	n/a	0.008
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	n/a	0.50	0.002	n/a	0.0004
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	1.08	6.48	194.40	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.460	30.36	910.80	0.00007	0.02	0.60
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.09	0.72	21.60	0.001	0.02	0.60
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	1.26	n/a	3.78	0.001	n/a	0.01

Table E-3d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.24	7.20	0.001	0.004	0.12
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.23	n/a	1.38	0.30	n/a	1.80
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	n/a	1.36	11.00	n/a	44.00
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.23	n/a	0.46	0.50	n/a	1.00
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	n/a	0.72	-	n/a	-
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	0.00002	0.0005	0.02
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.07	0.35	10.50	0.003	0.003	0.09
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.009	n/a	0.09	0.000002	n/a	0.00002
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	n/a	3.18	-	n/a	-
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	0.23	n/a	0.46	-	n/a	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	n/a	1.50	0.04	n/a	0.12
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	n/a	42.00	0.00008	n/a	0.0005
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	n/a	1.38	0.000006	n/a	0.00001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	n/a	1.38	0.000004	n/a	0.00001
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	n/a	4.08	-	n/a	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	-	31.50	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	n/a	0.04	-	n/a	-

Table E-3d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
V5c. Elderberry Shrub Trimming and Removal - Removal by Cutting	less than 1 day	10 times over the permit term	-	n/a	-	-	n/a	-
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	0.009	n/a	8.34
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	n/a	79.98	-	n/a	-
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.06	n/a	0.12	-	n/a	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	0.73	1.46	43.80	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	n/a	0.50	0.28	n/a	0.28
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	-	n/a	-	10.65	n/a	10.65
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	0.05	n/a	0.26	0.00002	n/a	0.0001
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	n/a	0.78	0.009	n/a	0.009
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	n/a	0.46	-	-	-
TOTALS	**-**	**-**	**35.22**	**238.75**	**7,340.25**	**22.81**	**1.16**	**101.02**

Table E-4d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Per Event (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	0.0181
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	0.0196
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	0.0039
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	0.00002
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.01	0.000001
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	0.00001
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	0.0001
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	0.0010
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	0.0001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	0.0001
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	0.0000
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	0.0018
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	0.0023
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	0.0009
TOTALS	**-**	**-**	**31.92**	**0.0479**

* Total Habitat Loss for activities is based on all activities listed in Table E-3e regardless of whether or not it affects modeled habitat shown for this species.

Table E-5d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Annual (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	1.09	0.0024
E8. Pole Replacement	less than 1 day	671 per year	1.34	0.0030
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	6.00	0.0021
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	171.00	0.0269
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	19.68	0.0031
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.01	0.00001
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.02	0.0017
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	6.48	0.0217
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	30.36	0.1017
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.72	0.0004
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.24	0.0001
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.35	0.00005
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	1.46	0.0790
TOTALS	**-**	**-**	**238.75**	**0.2421**

* Total Habitat Loss for activities is based on all activities listed in Table E-3e regardless of whether or not it affects modeled habitat shown for this species.

Table E-6d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	32.70	0.0712	-	0.0712	
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	-	
E8. Pole Replacement	less than 1 day	671 per year	40.20	0.0888	-	0.0888	
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	180.00	0.2090	-	0.2090	
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	5,130.00	0.8068	-0.8068	-	Trenching would not occur in perennial aquatic habitat; HDD would be used to avoid impacts. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	590.40	0.0928	-0.0928	-	SMUD would not set up the HDD pad such that it would impact aquatic features

Table E-6d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.30	0.0002	-0.0002	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.60	0.0471	-	0.0471	
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	1.84	0.1446	-	0.1446	
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.50	0.0393		0.0393	
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	194.40	0.6513	-0.3908	0.2605	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the traveler installation could still affect aquatic habitats. The numbers here = 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites

Table E-6d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	910.80	3.0514	-3.0514	-	Pull sites would not be placed in perennial aquatic habitat. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	21.60	0.0122	-.0122	-	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	3.78	0.0021	-.0021	-	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.

Table E-6d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	7.20	0.0041	-0.0041	-	HDD temporary work sites would be located outside of wetlands
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	1.36	0.0155	-0.0155	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.72	0.0001	-0.0001	-	Staging areas would not be sited in aquatic features
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	10.50	0.0015	-0.0015	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.09	0.00001	-0.00001	-	Cathodic protection test stations would not be sited in aquatic features
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	3.18	0.0004	-0.0004	-	Pipeline anode beds would not be installed in aquatic features
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	1.50	0.0002	-0.0002	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.

Table E-6d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	42.00	0.0058	-0.0058	-	SMUD wouldn't trench through aquatic habitats for pipeline relocation
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	1.38	0.0002	-0.0002	-	Temporary work areas for HDD would avoid aquatic habitats
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	1.38	0.0002	-0.0002	-	Temporary work areas for directional boring would avoid aquatic habitats
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	4.08	0.0006	-0.0006	-	Temporary areas for hydrostatic testing would avoid aquatic habitats
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	79.98	0.0111	-	0.0111	
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	43.80	2.3688	-1.4213	0.9475	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the traveler installation could still affect aquatic habitats. The numbers here = 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites

Table E-6d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after reduction)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	0.0023	-0.0023	-	Temporary work areas would avoid aquatic impacts
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.46	0.0018	-0.0018	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
TOTALS	**-**	**-**	**7,340.25**	**7.6293**	**-5.8103**	**1.8191**	

* Total Habitat Loss for activities is based on all activities listed in Table E-3e regardless of whether or not it affects modeled habitat shown for this species.

Table E-7d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Per Event (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.001	0.0001
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.002	0.0002
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	11.00	0.1250
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.000002	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.04	0.00001
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.0001	0.00000001
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	0.01	0.00003
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	0.0013
TOTALS	**-**	**-**	**22.79**	**0.1266**

* Total Habitat Loss for activities is based on all activities listed in Table E-3e regardless of whether or not it affects modeled habitat shown for this species.

Table E-8d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Annual (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.004	0.00001
E8. Pole Replacement	less than 1 day	671 per year	0.18	0.0004
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.60	0.0001
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.33	0.0001
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.0004	0.00003
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.02	0.00007
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.02	0.00001
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.004	0.000002
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.001	0.0000001
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.003	0.0000004
TOTALS	**-**	**-**	**1.16**	**0.0007**

* Total Habitat Loss for activities is based on all activities listed in Table E-3e regardless of whether or not it affects modeled habitat shown for this species.

Table E-9d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after corrections)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.12	0.0003	-	0.0003	
E8. Pole Replacement	less than 1 day	671 per year	5.40	0.0119	-	0.0000	Temporary impacts only
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	18.00	0.0028	-	0.7204	Determined that this Covered Activity could occur in two Vernal Pool, Seasonal Wetland, and Swale features over the Permit Term; assumed an average feature size of 0.3602 acre
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	9.84	0.0015	-0.0015	-	Pull boxes would not be placed in aquatic habitat
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.0001			0.3602	Permanent only; assumed an average pool size of 0.3602 acre
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.0008	-	0.0008	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.

Table E-9d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after corrections)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.01	0.0006	-	0.0006	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.0004	0.00003	-	0.00003	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.60	0.0020	-	10.4458	Assumes whole pool would be permanently impacted. Assumed 29 features to be impacted; average size of 0.3602
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.60	0.0003	-	0.3602	Pull boxes would not be placed in perennial aquatic habitat
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.01	0.00001	-	0.3602	Determined that this Covered Activity could occur in one Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre

Table E-9d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after corrections)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.0001	-	0.3602	Determined that this Covered Activity could occur in one Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	44.00	0.5000	-	0.3602	Determined that this Covered Activity could occur in one Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.02	0.000003	-	0.000003	
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.09	0.00001	-	0.3602	Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.00002	-	-	-	Cathodic protection test stations would not be sited in aquatic features

Table E-9d: Vernal Pool Tadpole Shrimp Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages	Final Acreages (after corrections)	Justification
					Vernal Pool, Seasonal Wetland, and Swale (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.12	0.00002	-	0.3602	Determined that this Covered Activity could occur in one Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.001	0.0000001	-0.0000001	-	Pipeline markers would not be placed in aquatic habitat
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	-	-	-	Pipeline markers would not be placed in aquatic habitat
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.00001	-	-	-	Pipeline markers would not be placed in aquatic habitat
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	0.0013	-0.0013	-	Trees would not be planted in aquatic habitat
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.0018			0.3602	
TOTALS	**-**	**-**	**101.382**	**0.5218**	**-0.0028**	**14.0495**	

* Total Habitat Loss for activities is based on all activities listed in Table E-3e regardless of whether or not it affects modeled habitat shown for this species.

Table E-10d: Total Vernal Pool Tadpole Shrimp Modeled Habitat Loss

SMUD HCP Land Cover Types	Permit Term Covered Activities		Permit Term Covered Activities (Modified)	
	Temporary Land Cover Loss (acres)	Permanent Land Cover Loss (acres)	REVISED Temporary Land Cover Loss (acres)	REVISED Permanent Land Cover Loss (acres)
Vernal Pool, Seasonal Wetland, and Swale	7.6	0.5	1.8	14.1
TOTAL	**7.6**	**0.5**	**1.8**	**14.1**

Table E-1e: Valley Elderberry Longhorn Beetle Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (acres)		
		Valley Foothill Riparian	Mine Tailing Riparian Woodland	Total Permit Area
Total Land Cover		**10,356.62**	**3,186.39**	**577,553.21**
LINES		**Modeled Habitat in Easement (acres)**		
Transmission				
Easement OH Transmission	200	90.56	-	3,806.37
Easement UG Transmission in Conduit	200	-	-	347.30
Subtotal Transmission		**90.56**	**-**	**4,153.66**
Subtransmission and Distribution				
Easement OH Distribution - without 69kV Overbuild	12.5	39.48	1.67	4,842.62
Easement OH Subtransmission and Distribution	25	10.80	5.89	1,673.59
Easement UG Subtransmission and Distribution in Conduit	25	14.95	0.20	10,329.69
Easement UG Subtransmission and Distribution Direct Buried	25	12.69	0.07	7,031.11
Total Easement OH Subtransmission and Distribution	-	*50.28*	*7.57*	*6,516.21*
Total Easement UG Subtransmission and Distribution	-	*27.64*	*0.27*	*17,360.80*
Subtotal Subtransmission and Distribution	**-**	**77.92**	**7.84**	**23,877.01**
Total Easement OH Transmission, Subtransmission, Distribution	-	*140.84*	*7.57*	*10,322.58*
Total Easement UG in Conduit	-	*14.95*	*0.20*	*10,676.99*
Total Easement UG Direct Buried	-	*12.69*	*0.07*	*7,031.11*
Total Easement Total UG in Conduit and Direct Buried	-	*27.64*	*0.27*	*17,708.10*
Total Electrical Line Easement	**-**	***168.48***	***7.84***	***28,030.68***
Fiber-optic Line				
OH Fiber-optic Line	25	7.20	-	422.35
UG Fiber-optic Line	25	0.37	-	111.65
Total Fiber-optic Line Easement		***7.57***	**-**	***534.00***
Gas Pipeline				
Gas Pipeline Easement	35	1.78	-	321.30
Total Gas Pipeline Easement	**-**	***1.78***	**-**	***321.30***

Table E-1e: Valley Elderberry Longhorn Beetle Modeled Habitat in the Permit Area

FACILITIES	Number of Facilities in Modeled Habitat		
	Valley Foothill Riparian	**Mine Tailing Riparian Woodland**	**Total Facilities in Permit Area**
Transmission			
Lattice Towers	22	-	560
Wood Poles	12	-	144
All other Transmission Poles	5	-	723
Subtotal Transmission Towers and Poles	**39**	**-**	**1,427**
Subtransmission and Distribution			
Wood Poles	738	65	131,213
Other Poles	105	4	12,785
Subtotal Subtransmission and Distribution Poles	**843**	**69**	**143,998**
Total Towers and Poles	*882*	*69*	*145,425*
Substructures			
Above Ground Pads	52	1	42,776
Box-pads	4	-	2,584
Manholes	3	-	1,569
Subsurface Pads	1	-	208
Vaults	-	-	215
Subtotal Substructures	**60**	**1**	**47,352**
Pull Boxes			
Pull Boxes	51	1	24,926
Subtotal Pull Boxes	**51**	**1**	**24,926**
Electrical Substations			
Transmission Substations	-	-	18
Distribution Substations	-	-	211
Subtotal Electrical Substations	**-**	**-**	**229**
Gas Pipeline Valve Stations	-	-	12
Poles in State Responsibility Area	13	-	927
Cosumnes Power Plant Cathodic Test Protection Stations	-	-	17
Total Facilities	***1,006***	***71***	***218,888***

Table E-1e: Valley Elderberry Longhorn Beetle Modeled Habitat in the Permit Area

OTHER FACILITIES*	Easement Width (feet)	Modeled Habitat in Other Facilities (acres)		
		Valley Foothill Riparian	Mine Tailing Riparian Woodland	Total Facilities in Permit Area
Cosumnes Power Plant	n/a	-	-	29.05
Mitigation Bank - Oak Tree Planting Area	n/a	-	-	282.47
Rancho Seco Photovoltaic 5 Removal	n/a	-	-	10.65
Cosumnes Power Plant Water Pipeline	25	-	-	15.49
Total Other Facilities*		-	-	***337.66***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-2e: Percentage of Valley Elderberry Longhorn Beetle Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (% of total acres)		
		Valley Foothill Riparian	Mine Tailing Riparian Woodland	Percentage of Total Acreage in Permit Area
Total Land Cover		**1.79%**	**0.55%**	**100.00%**
LINES				
Transmission				
Easement OH Transmission	200	2.38%	-	0.66%
Easement UG Transmission in Conduit	200	-	-	0.06%
Subtotal Transmission		**2.18%**	**-**	**0.72%**
Subtransmission and Distribution				
Easement OH Distribution - without 69kV Overbuild	12.5	0.82%	0.03%	0.84%
Easement OH Subtransmission and Distribution	25	0.65%	0.35%	0.29%
Easement UG Subtransmission and Distribution in Conduit	25	0.14%	0.002%	1.79%
Easement UG Subtransmission and Distribution Direct Buried	25	0.18%	0.001%	1.22%
Total Easement OH Subtransmission and Distribution	-	*0.77%*	*0.12%*	*1.13%*
Total Easement UG Subtransmission and Distribution	-	*0.16%*	*0.00%*	*3.01%*
Subtotal Subtransmission and Distribution	**-**	**0.33%**	**0.03%**	**4.13%**
Total Easement OH Transmission, Subtransmission, Distribution	-	*1.36%*	*0.07%*	*1.79%*
Total Easement UG in Conduit	-	*0.14%*	*0.00%*	*1.85%*
Total Easement UG Direct Buried	-	*0.18%*	*0.00%*	*1.22%*
Total Easement Total UG in Conduit and Direct Buried	-	*0.16%*	*0.00%*	*3.07%*
Total Electrical Line Easement	**-**	***0.60%***	***0.03%***	***4.85%***
Fiber-optic Line				
OH Fiber-optic Line	25	1.70%	-	0.07%
UG Fiber-optic Line	25	0.33%	-	0.02%
Total Fiber-optic Line Easement		***1.42%***	**-**	***0.09%***
Gas Pipeline				
Gas Pipeline Easement	35	0.55%	-	0.06%
Total Gas Pipeline Easement		***0.55%***	**-**	***0.06%***

Table E-2e: Percentage of Valley Elderberry Longhorn Beetle Modeled Habitat in the Permit Area

FACILITIES	Percent of Facilities in Land Cover		
	Valley Foothill Riparian	**Mine Tailing Riparian Woodland**	**Percentage of Total Facilities in Permit Area**
Transmission			
Lattice Towers	3.93%	-	3.93%
Wood Poles	8.33%	-	8.33%
All other Transmission Poles	0.69%	-	0.69%
Subtotal Transmission Towers and Poles	**2.73%**	**-**	**2.73%**
Subtransmission and Distribution			
Wood Poles	0.56%	0.05%	0.61%
Other Poles	0.82%	0.03%	0.85%
Subtotal Subtransmission and Distribution Poles	**0.59%**	**0.05%**	**0.63%**
Total Towers and Poles	*0.61%*	*0.05%*	*0.65%*
Substructures			
Above Ground Pads	0.12%	0.002%	0.12%
Box-pads	0.15%	-	0.15%
Manholes	0.19%	-	0.19%
Subsurface Pads	0.48%	-	0.48%
Vaults	-	-	-
Subtotal Substructures	**0.13%**	**0.00%**	**0.13%**
Pull Boxes			
Pull Boxes	0.20%	0.004%	0.21%
Subtotal Pull Boxes	**0.20%**	**0.004%**	**0.21%**
Electrical Substations			
Transmission Substations	-	-	-
Distribution Substations	-	-	-
Subtotal Electrical Substations	**-**	**-**	**-**
Gas Pipeline Valve Stations	-	-	-
Poles in State Responsibility Area	1.40%	-	1.40%
Cosumnes Power Plant Cathodic Test Protection Stations	-	-	-
Total Facilities	***0.46%***	***0.03%***	***0.49%***

Table E-2e: Percentage of Valley Elderberry Longhorn Beetle Modeled Habitat in the Permit Area

OTHER FACILITIES*	Easement Width (feet)	Percentage of Land Cover in Special Areas		
		Valley Foothill Riparian	Mine Tailing Riparian Woodland	Percentage of Total Acreage in Permit Area
Cosumnes Power Plant	n/a	-	-	-
Mitigation Bank - Oak Tree Planting Area	n/a	-	-	-
Rancho Seco Photovoltaic 5 Removal	n/a	-	-	-
Cosumnes Power Plant Water Pipeline	25	-	-	-
Total Other Facilities*		-	-	***100.00%***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-3e: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	0.00008	1.09	32.70	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	0.000007	0.004	0.12
E8. Pole Replacement	less than 1 day	671 per year	0.002	1.34	40.20	0.009	0.18	5.40
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	0.04	6.00	180.00	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.57	171.00	5130.00	0.001	0.60	18.00
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.12	19.68	590.40	0.001	0.33	9.84
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.0006	0.01	0.30	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.02	0.6	0.0002	0.0004	0.01
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	n/a	1.84	0.001	n/a	0.008
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	n/a	0.50	0.002	n/a	0.0004
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	1.08	6.48	194.40	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.460	30.36	910.80	0.00007	0.02	0.60
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.09	0.72	21.60	0.001	0.02	0.60

Table E-3e: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	1.26	n/a	3.78	0.001	n/a	0.01
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.24	7.20	0.001	0.004	0.12
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.23	n/a	1.38	0.30	n/a	1.80
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	n/a	1.36	11.00	n/a	44.00
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.23	n/a	0.46	0.50	n/a	1.00
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	n/a	0.72	-	n/a	-
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	0.00002	0.0005	0.02
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.07	0.35	10.50	0.003	0.003	0.09
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.009	n/a	0.09	0.000002	n/a	0.00002
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	n/a	3.18	-	n/a	-
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	0.23	n/a	0.46	-	n/a	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	n/a	1.50	0.04	n/a	0.12
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	n/a	42.00	0.00008	n/a	0.0005
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	n/a	1.38	0.000006	n/a	0.00001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	n/a	1.38	0.000004	n/a	0.00001
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	n/a	4.08	-	n/a	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	-	31.50	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	n/a	0.04	-	n/a	-

Table E-3e: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	0.009	n/a	8.34
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	n/a	79.98	-	n/a	-
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.06	n/a	0.12	-	n/a	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	0.73	1.46	43.80	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	n/a	0.50	0.28	n/a	0.28
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	-	n/a	-	10.65	n/a	10.65
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	0.05	n/a	0.26	0.00002	n/a	0.0001
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	n/a	0.78	0.009	n/a	0.009
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	n/a	0.46	-	-	-
TOTALS	**-**	**-**	**35.22**	**238.75**	**7,340.25**	**22.81**	**1.16**	**101.02**

Table E-4e: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Per Event (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	0.0090	-	0.0090
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	0.0098	-	0.0098
E14a [1] [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	1.26	0.1050	-	0.1050
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	0.0007	-	0.0007
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.01	0.00005	-	0.00005
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	0.0003	-	0.0003
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	0.0028	-	0.0028
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	0.0388	-	0.0388
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	0.0025	-	0.0025
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	0.0025	-	0.0025
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	0.0019	-	0.0019
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	5.2500	-	5.2500
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	0.0002	-	0.0002
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	0.0738	-	0.0738
TOTALS	**-**	**-**	**31.92**	**5.4974**	**-**	**5.4974**

* Total Habitat Loss for activities is based on all activities listed in Table Y-1 regardless of whether or not it affects modeled habitat shown for this species.

Table E-5e: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Annual (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	1.09	0.0062	0.0005	0.0068
E8. Pole Replacement	less than 1 day	671 per year	1.34	0.0080	0.0006	0.0086
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	6.00	0.0073	0.0001	0.0074
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	171.00	0.3086	0.0018	0.3103
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	19.68	0.0355	0.0002	0.0357
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.01	0.00002	0.0000002	0.00002
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.02	0.0009	-	0.0009
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	6.48	0.0500	0.0075	0.0575
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	30.36	0.2343	0.0353	0.2695
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.72	0.0011	0.00001	0.0012
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.24	0.0004	0.000004	0.0004
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.35	0.0019	-	0.0019
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	1.46	0.0249	-	0.0249
TOTALS	**-**	**-**	**238.75**	**0.6791**	**0.0461**	**0.7251**

* Total Habitat Loss for activities is based on all activities listed in Table Y-1 regardless of whether or not it affects modeled habitat shown for this species.

Table E-6e: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	32.70	0.1867	0.0162	0.2029
E8. Pole Replacement	less than 1 day	671 per year	40.20	0.2386	0.0191	0.2578
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	180.00	0.2786	-	0.2786
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	5,130.00	9.2567	0.0527	9.3094
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	590.40	1.0653	0.0061	1.0714
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.30	0.0005	0.000005	0.0005
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.60	0.0236	-	0.0236
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	1.84	0.0723	-	0.0723
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.50	0.0196	-	0.0196
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	194.40	1.5001	0.2258	1.7259
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	910.80	7.0283	1.0579	8.0862
E14a. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	21.60	0.0344	0.0003	0.0347
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	3.78	0.0060	0.0001	0.0061

Table E-6e: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	7.20	0.0115	0.0001	0.0116
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.72	0.0040	-	0.0040
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	10.50	0.0581	-	0.0581
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.09	0.0005	-	0.0005
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	3.18	0.0176	-	0.0176
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	1.50	0.0083	-	0.0083
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	42.00	0.2325	-	0.2325
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	1.38	0.0076	-	0.0076
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	1.38	0.0076	-	0.0076
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	4.08	0.0226	-	0.0226
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	31.50	31.5000	-	31.5000
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.04	0.0016	-	0.0016
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	79.98	0.4428	-	0.4428
M3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	43.80	0.7467	-	0.7467
TOTALS	**-**	**-**	**7,340.25**	**52.7723**	**1.3783**	**54.1506**

* Total Habitat Loss for activities is based on all activities listed in Table Y-1 regardless of whether or not it affects modeled habitat shown for this species.

Table E-7e: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Per Event (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.001	0.00004	-	0.00004
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.002	0.0001	-	0.0001
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.001	0.0001	-	0.0001
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.000002	0.00000001	-	0.00000001
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.04	0.0002	-	0.0002
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.0001	0.0000004	-	0.0000004
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	0.00000003	-	0.00000003
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.000004	0.00000002	-	0.00000002
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	0.01	0.0001	-	0.0001
TOTALS	-	-	**22.79**	**0.0005**	-	**0.0005**

* Total Habitat Loss for activities is based on all activities listed in Table Y-1 regardless of whether or not it affects modeled habitat shown for this species.

Table E-8e: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Annual (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.004	0.00002	0.000002	0.00002
E8. Pole Replacement	less than 1 day	671 per year	0.18	0.0011	0.0001	0.0012
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.60	0.0011	0.00001	0.0011
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.33	0.0006	0.000003	0.0006
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.0004	0.00002	-	0.00002
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.02	0.0002	0.00002	0.0002
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.02	0.00003	0.0000003	0.00003
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.004	0.00001	0.0000001	0.00001
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.001	0.000003	-	0.000003
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.003	0.00002	-	0.00002
TOTALS	**-**	**-**	**1.16**	**0.0030**	**0.0001**	**0.0031**

* Total Habitat Loss for activities is based on all activities listed in Table E-3f regardless of whether or not it affects modeled habitat shown for this species.

Table E-9e: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.12	0.0007	0.0001	0.0007
E8. Pole Replacement	less than 1 day	671 per year	5.40	0.0321	0.0026	0.0346
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	18.00	0.0325	0.0002	0.0327
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	9.84	0.0178	0.0001	0.0179
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.0004	-	0.0004
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.01	0.0003	-	0.0003
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.0004	0.00002	-	0.00002
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.60	0.0046	0.0007	0.0053
E14a. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.60	0.0010	0.00001	0.0010
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.01	0.00002	0.0000002	0.00002
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.0002	0.000002	0.0002
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.02	0.0001	-	0.0001
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.09	0.0005	-	0.0005
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.00002	0.0000001	-	0.0000001

Table E-9e: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.12	0.0007	-	0.0007
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.001	0.000003	-	0.000003
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	0.0000001	-	0.0000001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.00001	0.0000001	-	0.0000001
TOTALS	**-**	**-**	**34.9414**	**0.0908**	**0.0036**	**0.0944**

* Total Habitat Loss for activities is based on all activities listed in Table E-3f regardless of whether or not it affects modeled habitat shown for this species.

Table E-10e: Total Valley Elderberry Longhorn Beetle Modeled Habitat Loss

SMUD HCP Land Cover Types	Permit Term Covered Activities	
	Temporary Land Cover Loss (acres)	Permanent Land Cover Loss (acres)
Valley Foothill Riparian	52.8	0.1
Mine Tailing Riparian Woodland	1.4	0.004
TOTAL	**54.2**	**0.1**

Table E-1f: California Tiger Salamander Aquatic and Upland Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (acres)							
		Blue Oak Woodland	Valley Oak Woodland	Pasture	Grasses and Forbs	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Total Permit Area
Total Land Cover		**17,715.10**	**1,089.22**	**21,239.58**	**168,230.12**	**6,502.02**	**9,437.22**	**7,784.11**	**577,553.21**
LINES		**Modeled Habitat in Easement (acres)**							
Transmission									
Easement OH Transmission	200	-	-	67.01	248.25	1.74	7.92	10.23	3,806.37
Easement UG Transmission in Conduit	200	-	-	-	-	-	-	-	347.30
Subtotal Transmission		**-**	**-**	**67.01**	**248.25**	**1.74**	**7.92**	**10.23**	**4,153.66**
Subtransmission and Distribution									
Easement OH Distribution - without 69kV Overbuild	12.5	4.21	0.38	52.72	260.47	1.44	6.46	3.53	4,842.62
Easement OH Subtransmission and Distribution	25	-	-	5.50	55.31	0.12	0.42	0.09	1,673.59
Easement UG Subtransmission and Distribution in Conduit	25	1.94	-	1.81	58.57	0.20	0.11	0.31	10,329.69
Easement UG Subtransmission and Distribution Direct Buried	25	0.24	-	1.56	12.42	0.31	0.06	0.14	7,031.11
Total Easement OH Subtransmission and Distribution	-	*4.21*	*0.38*	*58.22*	*315.78*	*1.56*	*6.88*	*3.62*	*6,516.21*
Total Easement UG Subtransmission and Distribution	-	*2.18*	-	*3.37*	*70.99*	*0.51*	*0.17*	*0.44*	*17,360.80*
Subtotal Subtransmission and Distribution	-	**6.39**	**0.38**	**61.58**	**386.77**	**2.07**	**7.05**	**4.06**	**23,877.01**
	-								
Total Easement OH Transmission, Subtransmission, Distribution	-	*4.21*	*0.38*	*125.23*	*564.03*	*3.30*	*14.80*	*13.84*	*10,322.58*
Total Easement UG in Conduit	-	*1.94*	-	*1.81*	*58.57*	*0.20*	*0.11*	*0.31*	*10,676.99*
Total Easement UG Direct Buried	-	*0.24*	-	*1.56*	*12.42*	*0.31*	*0.06*	*0.14*	*7,031.11*
Total Easement Total UG in Conduit and Direct Buried	-	*2.18*	-	*3.37*	*70.99*	*0.51*	*0.17*	*0.44*	*17,708.10*
Total Electrical Line Easement	-	***6.39***	***0.38***	***128.59***	***635.02***	***3.80***	***14.97***	***14.29***	***28,030.68***
Fiber-optic Line									
OH Fiber-optic Line	25	-	-	5.46	20.30	0.14	0.67	0.89	422.35
UG Fiber-optic Line	25	-	-	2.02	11.62	0.10	0.09	0.02	111.65
Total Fiber-optic Line Easement		**-**	**-**	***7.48***	***31.93***	***0.24***	***0.76***	***0.91***	***534.00***
Gas Pipeline									
Gas Pipeline Easement	35	-	-	30.96	18.04	0.24	0.16	0.02	321.30
Total Gas Pipeline Easement		**-**	**-**	***30.96***	***18.04***	***0.24***	***0.16***	***0.02***	***321.30***

Table E-1f: California Tiger Salamander Aquatic and Upland Modeled Habitat in the Permit Area (cont.)

FACILITIES	Numbers of Facilities in Modeled Habitat							
	Blue Oak Woodland	Valley Oak Woodland	Pasture	Grasses and Forbs	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Total Facilities in Permit Area
Transmission								
Lattice Towers	-	-	14	52	-	1	-	560
Wood Poles	-	-	-	-	-	-	-	144
All other Transmission Poles	-	-	4	18	-	-	-	723
Subtotal Transmission Towers and Poles	**-**	**-**	**18**	**70**	**-**	**1**	**-**	**1,427**
Subtransmission and Distribution								
Wood Poles	46	6	789	4,698	13	66	48	131,213
Other Poles	3	-	33	252	-	1	1	12,785
Subtotal Subtransmission and Distribution Poles	**49**	**6**	**822**	**4,950**	**13**	**67**	**49**	**143,998**
Total Towers and Poles	*49*	*6*	*840*	*5,020*	*13*	*68*	*49*	*145,425*
Substructures								
Above Ground Pads	5	-	7	92	2	-	-	42,776
Box-pads	-	-	-	4	-	-	1	2,584
Manholes	-	-	-	-	-	-	-	1,569
Subsurface Pads	-	-	-	2	-	-	-	208
Vaults	-	-	-	-	-	-	-	215
Subtotal Substructures	**5**	**-**	**7**	**98**	**2**	**-**	**1**	**47,352**
Pull Boxes								
Pull Boxes	5	-	4	136	-	1	1	24,926
Subtotal Pull Boxes	**5**	**-**	**4**	**136**	**-**	**1**	**1**	**24,926**
Electrical Substations								
Transmission Substations	-	-	-	-	-	-	-	18
Distribution Substations	-	-	-	1	-	-	-	211
Subtotal Electrical Substations	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**229**
Gas Pipeline Valve Station	-	-	-	-	-	-	-	12
Poles in State Responsibility Area	7	-	15	285	-	-	2	927
Cosumnes Power Plant Cathodic Test Protection Stations	-	-	4	9	-	1	-	17
Total Facilities	***66***	***6***	***870***	***5,551***	***15***	***70***	***53***	***218,888***

Table E-1f: California Tiger Salamander Aquatic and Upland Modeled Habitat in the Permit Area (cont.)

OTHER FACILITIES*	Easement Width (feet)	Modeled Habitat in Other Facilities (acres)							
		Blue Oak Woodland	Valley Oak Woodland	Pasture	Grasses and Forbs	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Total Facilities in Permit Area
Cosumnes Power Plant	n/a	-	-	-	1.70	-	-	-	29.05
Mitigation Bank - Oak Tree Planting Area	n/a	-	-	-	278.20	0.76	0.34	1.31	282.47
Rancho Seco Photovoltaic 5 Removal	n/a	-	-	-	0.05	-	-	0.00	10.65
Cosumnes Power Plant Water Pipeline	25	-	-	4.82	7.82	0.01	0.20	0.06	15.49
Total Other Facilities*		**-**	**-**	***4.82***	***287.77***	***0.77***	***0.53***	***1.37***	***337.66***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-2f: Percentage of California Tiger Salamander Aquatic and Upland Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (% of total acres)							
		Blue Oak Woodland	Valley Oak Woodland	Pasture	Grasses and Forbs	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Percent-age of Total Acreage in Permit Area
Total Land Cover		**3.07%**	**0.19%**	**3.68%**	**29.13%**	**1.13%**	**1.63%**	**1.35%**	**100.00%**
LINES		**Percent of Modeled Habitat in Easement**							
Transmission									
Easement OH Transmission	200	-	-	1.76%	6.52%	0.05%	0.21%	0.27%	0.66%
Easement UG Transmission in Conduit	200	-	-	-	-	-	-	-	0.06%
Subtotal Transmission		**-**	**-**	**1.61%**	**5.98%**	**0.04%**	**0.19%**	**0.25%**	**0.72%**
Subtransmission and Distribution									
Easement OH Distribution - without 69kV Overbuild	12.5	0.09%	0.01%	1.09%	5.38%	0.03%	0.13%	0.07%	0.84%
Easement OH Subtransmission and Distribution	25	-	-	0.33%	3.30%	0.01%	0.03%	0.01%	0.29%
Easement UG Subtransmission and Distribution in Conduit	25	0.02%	-	0.02%	0.57%	0.00%	0.00%	0.00%	1.79%
Easement UG Subtransmission and Distribution Direct Buried	25	0.00%	-	0.02%	0.18%	0.00%	0.00%	0.00%	1.22%
Total Easement OH Subtransmission and Distribution	-	*0.06%*	*0.01%*	*0.89%*	*4.85%*	*0.02%*	*0.11%*	*0.06%*	*1.13%*
Total Easement UG Subtransmission and Distribution	-	*0.01%*	-	*0.02%*	*0.41%*	*0.00%*	*0.00%*	*0.00%*	*3.01%*
Subtotal Subtransmission and Distribution	-	**0.03%**	**0.00%**	**0.26%**	**1.62%**	**0.01%**	**0.03%**	**0.02%**	**4.13%**
Total Easement OH Transmission, Subtransmission, Distribution	-	*0.04%*	*0.00%*	*1.21%*	*5.46%*	*0.03%*	*0.14%*	*0.13%*	*1.79%*
Total Easement UG in Conduit	-	*0.02%*	-	*0.02%*	*0.55%*	*0.00%*	*0.00%*	*0.00%*	*1.85%*
Total Easement UG Direct Buried	-	*0.00%*	-	*0.02%*	*0.18%*	*0.00%*	*0.00%*	*0.00%*	*1.22%*
Total Easement Total UG in Conduit and Direct Buried	-	*0.01%*	-	*0.02%*	*0.40%*	*0.00%*	*0.00%*	*0.00%*	*3.07%*
Total Electrical Line Easement	**-**	***0.02%***	***0.00%***	***0.46%***	***2.27%***	***0.01%***	***0.05%***	***0.05%***	***4.85%***
Fiber-optic Line									
OH Fiber-optic Line	25	-	-	1.29%	4.81%	0.03%	0.16%	0.21%	0.07%
UG Fiber-optic Line	25	-	-	1.81%	10.41%	0.09%	0.08%	0.02%	0.02%
Total Fiber-optic Line Easement		**-**	**-**	***1.40%***	***5.98%***	***0.05%***	***0.14%***	***0.17%***	***0.09%***
Gas Pipeline									
Gas Pipeline Easement	35	-	-	9.63%	5.61%	0.08%	0.05%	0.01%	0.06%
Total Gas Pipeline Easement		**-**	**-**	***9.63%***	***5.61%***	***0.08%***	***0.05%***	***0.01%***	***0.06%***

Table E-2f: Percentage of California Tiger Salamander Aquatic and Upland Modeled Habitat in the Permit Area (cont.)

FACILITIES	Percent of Facilities on Modeled Habitat							
	Blue Oak Woodland	Valley Oak Woodland	Pasture	Grasses and Forbs	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Percent-age of Total Facilities in Permit Area
Transmission								
Lattice Towers	-	-	2.50%	9.29%	-	0.18%	-	11.96%
Wood Poles	-	-	-	-	-	-	-	-
All other Transmission Poles	-	-	0.55%	2.49%	-	-	-	3.04%
Subtotal Transmission Towers and Poles	**-**	**-**	**1.26%**	**4.91%**	**-**	**0.07%**	**-**	**6.24%**
Subtransmission and Distribution								
Wood Poles	0.04%	0.00%	0.60%	3.58%	0.01%	0.05%	0.04%	4.32%
Other Poles	0.02%	-	0.26%	1.97%	-	0.01%	0.01%	2.27%
Subtotal Subtransmission and Distribution Poles	**0.03%**	**0.00%**	**0.57%**	**3.44%**	**0.01%**	**0.05%**	**0.03%**	**4.14%**
Total Towers and Poles	*0.03%*	*0.00%*	*0.58%*	*3.45%*	*0.01%*	*0.05%*	*0.03%*	*4.16%*
Substructures								
Above Ground Pads	0.01%	-	0.02%	0.22%	0.00%	-	-	0.25%
Box-pads	-	-	-	0.15%	-	-	0.04%	0.19%
Manholes	-	-	-	-	-	-	-	-
Subsurface Pads	-	-	-	0.96%	-	-	-	0.96%
Vaults	-	-	-	-	-	-	-	-
Subtotal Substructures	**0.01%**	**-**	**0.01%**	**0.21%**	**0.00%**	**-**	**0.00%**	**0.24%**
Pull Boxes								
Pull Boxes	0.02%	-	0.02%	0.55%	-	0.00%	0.00%	0.59%
Subtotal Pull Boxes	**0.02%**	**-**	**0.02%**	**0.55%**	**-**	**0.00%**	**0.00%**	**0.59%**
Electrical Substations								
Transmission Substations	-	-	-	-	-	-	-	-
Distribution Substations	-	-	-	0.47%	-	-	-	0.47%
Subtotal Electrical Substations	**-**	**-**	**-**	**0.44%**	**-**	**-**	**-**	**0.44%**
Gas Pipeline Valve Stations	-	-	-	-	-	-	-	-
Poles in State Responsibility Area	0.76%	-	1.62%	30.74%	-	-	0.22%	33.33%
Cosumnes Power Plant Cathodic Test Protection Stations	-	-	23.53%	52.94%	-	5.88%	-	82.35%
Total Facilities	***0.03%***	***0.00%***	***0.40%***	***2.54%***	***0.01%***	***0.03%***	***0.02%***	***3.03%***

Table E-2f: Percentage of California Tiger Salamander Aquatic and Upland Modeled Habitat in the Permit Area (cont.)

OTHER FACILITIES*	Easement Width (feet)	Percentage of Modeled Habitat in Special Areas							
		Blue Oak Woodland	Valley Oak Woodland	Pasture	Grasses and Forbs	Open Water/Fringe	Other Depressional Wetland	Vernal Pool, Seasonal Wetland, and Swale	Percent-age of Total Acreage in Permit Area
Cosumnes Power Plant	n/a	-	-	-	5.84%	-	-	-	5.84%
Mitigation Bank - Oak Tree Planting Area	n/a	-	-	-	98.49%	0.27%	0.12%	0.46%	99.34%
Rancho Seco Photovoltaic 5 Removal	n/a	-	-	-	0.52%	-	-	0.01%	0.53%
Cosumnes Power Plant Water Pipeline	25	-	-	31.13%	50.48%	0.06%	1.28%	0.36%	83.32%
Total Other Facilities*		**-**	**-**	***1.43%***	***85.22%***	***0.23%***	***0.16%***	***0.41%***	***100.00%***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-3f: SMUD HCP Total Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	0.00008	1.09	32.70	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	0.000007	0.004	0.12
E8. Pole Replacement	less than 1 day	671 per year	0.002	1.34	40.20	0.009	0.18	5.40
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	0.04	6.00	180.00	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.57	171.00	5130.00	0.001	0.60	18.00
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.12	19.68	590.40	0.001	0.33	9.84
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.0006	0.01	0.30	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.02	0.6	0.0002	0.0004	0.01
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	n/a	1.84	0.001	n/a	0.008
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	n/a	0.50	0.002	n/a	0.0004
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	1.08	6.48	194.40	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.460	30.36	910.80	0.00007	0.02	0.60
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.09	0.72	21.60	0.001	0.02	0.60
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	1.26	n/a	3.78	0.001	n/a	0.01

Table E-3f: SMUD HCP Total Modeled Habitat Loss by Covered Activity (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.24	7.20	0.001	0.004	0.12
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.23	n/a	1.38	0.30	n/a	1.80
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	n/a	1.36	11.00	n/a	44.00
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.23	n/a	0.46	0.50	n/a	1.00
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	n/a	0.72	-	n/a	-
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	0.00002	0.0005	0.02
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.07	0.35	10.50	0.003	0.003	0.09
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.009	n/a	0.09	0.000002	n/a	0.00002
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	n/a	3.18	-	n/a	-
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	0.23	n/a	0.46	-	n/a	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	n/a	1.50	0.04	n/a	0.12
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	n/a	42.00	0.00008	n/a	0.0005
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	n/a	1.38	0.000006	n/a	0.00001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	n/a	1.38	0.000004	n/a	0.00001
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	n/a	4.08	-	n/a	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	-	31.50	-	-	-

Table E-3f: SMUD HCP Total Modeled Habitat Loss by Covered Activity (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	n/a	0.04	-	n/a	-
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	0.009	n/a	8.34
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	n/a	79.98	-	n/a	-
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.06	n/a	0.12	-	n/a	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	0.73	1.46	43.80	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	n/a	0.50	0.28	n/a	0.28
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	-	n/a	-	10.65	n/a	10.65
M2a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	0.05	n/a	0.26	0.00002	n/a	0.0001
M2b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	n/a	0.78	0.009	n/a	0.009
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	n/a	0.46	-	-	-
TOTALS	-	-	**35.22**	**238.75**	**7,340.25**	**22.81**	**1.16**	**101.02**

Table E-4f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Per Event (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	-	-	0.0058	0.0214	-	0.0004	-	0.0271	0.0004
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	-	-	0.0063	0.0232	-	0.0004	-	0.0295	0.0004
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.23	-	-	-	0.0011	-	-	-	0.0011	-
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	-	-	-	0.3361	-	-	0.0039	0.3361	0.0039
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.23	-	-	-	0.2300	-	-	-	0.2300	-
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	-	-	0.0116	0.0067	0.0001	0.0001	0.00001	0.0183	0.0002
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.01	-	-	0.0009	0.0005	0.00001	0.000004	0.000001	0.0014	0.00001
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	-	-	0.0058	0.0034	0.00005	0.00003	0.000004	0.0091	0.0001
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	-	-	0.0482	0.0281	0.0004	0.0002	0.00004	0.0762	0.0007
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	-	-	0.6744	0.3930	0.0053	0.0035	0.0005	1.0674	0.0093
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	-	-	0.0443	0.0258	0.0003	0.0002	0.00003	0.0701	0.0006

Table E-4f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Per Event (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	-	-	0.0443	0.0258	0.0003	0.0002	0.00003	0.0701	0.0006
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	-	-	0.0328	0.0191	0.0003	0.0002	0.00002	0.0519	0.0004
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	-	0.0002	0.0001	0.0003	-	-	-	0.0006	-
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	-	-	1.2843	0.7484	0.0101	0.0066	0.0010	2.0327	0.0177
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.06	-	-	-	0.0600	-	-	-	0.0600	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	-	-	-	0.4924	0.0013	0.0006	0.0023	0.4924	0.0043
M2a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	17 times over the permit term	0.05	-	-	0.049	0.0004	-	-	-	0.0494	-
M2b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	-	-	-	0.7699	-	-	-	0.7699	-
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	-	-	0.0713	0.1150	0.0002	0.0023	0.00092	0.1863	0.0035
TOTALS	**-**	**-**	**31.92**	**-**	**0.0002**	**2.2788**	**3.3006**	**0.0184**	**0.0148**	**0.0087**	**5.5797**	**0.0420**

* Total Habitat Loss for activities is based on all activities listed in Table E-3h regardless of whether or not it affects modeled habitat shown for this species.

Table E-5f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Annual (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	1.09	0.0004	0.00005	0.0065	0.0390	0.0001	0.0005	0.0004	0.0460	0.0011
E8. Pole Replacement	less than 1 day	671 per year	1.34	0.0005	0.0001	0.0076	0.0460	0.0001	0.0006	0.0005	0.0081	0.0012
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	6.00	0.0007	-	0.0010	0.0129	0.0003	-	-	0.0017	0.0003
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	171.00	0.0059	-	0.0378	0.3021	0.0075	0.0014	0.0033	0.0438	0.0122
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	19.68	0.0007	-	0.0044	0.0348	0.0009	0.0002	0.0004	0.0050	0.0014

Table E-5f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Annual (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.01	0.000001	-	0.000002	0.00004	0.0000003	0.0000001	0.0000003	0.000003	0.000001
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.02	-	-	0.0006	0.0020	-	0.00004	-	0.0006	0.00004
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	6.48	0.0042	0.0004	0.0579	0.3140	0.0016	0.0068	0.0036	0.0625	0.0120
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	30.36	0.0196	0.0018	0.2712	1.4713	0.0073	0.0321	0.0168	0.2927	0.0562
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.72	0.0001	-	0.0001	0.0029	0.00002	0.00001	0.00002	0.0002	0.00005

Table E-5f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Annual (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.24	0.00003	-	0.00005	0.0010	0.00001	0.000002	0.00001	0.0001	0.00002
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.35	-	-	0.0337	0.0197	0.0003	0.0002	0.00003	0.0337	0.0005
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	1.46	-	-	0.0189	0.0702	0.0005	0.0023	0.0031	0.0189	0.0059
TOTALS	**--**	**--**	**238.75**	**0.0321**	**0.0023**	**0.4398**	**2.3158**	**0.0185**	**0.0442**	**0.0281**	**2.7902**	**0.0909**

* Total Habitat Loss for activities is based on all activities listed in Table E-3h regardless of whether or not it affects modeled habitat shown for this species.

Table E-6f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages			Final Acreages			Total Upland Modeled Habitat	Total Aquatic Modeled Habitat	Justification
											Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)			
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 min-utes	13,600 times per year	32.70	0.0115	0.0015	0.1964	1.1695	0.0032	0.0164	0.0119	-	-	-	0.0032	0.0164	0.0119	1.3789	0.0316	
E8. Pole Replacement	less than 1 day	671 per year	40.20	0.0136	0.0017	0.2292	1.3786	0.0036	0.0186	0.0136	-	-	-	0.0036	0.0186	0.0136	1.6231	0.0358	
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	180.00	-	-	-	0.2786	-	-	0.0697	-	-	-	-	-	0.0697	0.2786	0.0697	
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	5,130.00	0.1776	-	1.1352	9.0625	0.2244	0.0425	0.0991	-0.2244	-0.0425	-0.0991	-	-	-	10.3754	-	Trenching would not occur in perennial aquatic habitat; HDD would be used to avoid impacts. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	590.40	0.0204	-	0.1306	1.0430	0.0258	0.0049	0.0114	-0.0258	-0.0049	-0.0114	-	-	-	1.1941	-	SMUD would not set up the HDD pad such that it would impact aquatic features
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.30	0.00004	-	0.00006	0.00123	0.00001	0.000003	0.00001	-	-	-0.00001	0.00001	0.000003	-	0.00132	0.00001	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.60	-	-	0.0150	0.0557	-	0.0011	-	-	-	-	-	0.0011	-	0.0707	0.0011	
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	1.84	-	-	0.0460	0.1709	-	0.0033	-	-	-	-	-	0.0033	-	0.2169	0.0033	
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.50	-	-	0.0125	0.0464	-	0.0009	-	-	-	-	-	0.0009	-	0.0589	0.0009	
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	194.40	0.1257	0.0115	1.7368	9.4208	0.0465	0.2052	0.1079	-0.0279	-0.1231	-0.0647	0.0186	0.0821	0.0431	11.2948	0.1439	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the travelers installation could still affect aquatic habitats. The numbers here equal 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites

Table E-6f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages			Final Acreages			Total Upland Modeled Habitat	Total Aquatic Modeled Habitat	Justification
											Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)			
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	910.80	0.5890	0.0537	8.1370	44.1384	0.2181	0.9616	0.5054	-0.2181	-0.9616	-0.5054	-	-	-	52.9181	-	Pull sites would not be placed in perennial aquatic habitat; any impacts in Vernal Pool, Seasonal Wetland and Swale habitat would be considered permanent.
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	21.60	0.0027	-	0.0042	0.0883	0.0006	0.0002	0.0006	-0.0006	-0.0002	-0.0006	-	-	-	0.0952	-	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	3.78	0.0005	-	0.0007	0.0155	0.0001	0.0000	0.0001	-0.0001	-0.00004	-0.0001	-	-	-	0.0167	-	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used. Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	7.20	0.0009	-	0.0014	0.0294	0.0002	0.0001	0.0002	-0.0002	-0.0001	-0.0002	-	-	-	0.0317	-	HDD temporary work sites would be located outside of wetlands
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	1.38	-	-	-	1.3800	-	-	-	-	-	-	-	-	-	1.3800	-	
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	1.36	-	-	-	1.3415	-	-	0.0155	-	-	-0.0155	-	-	-	1.3415	-	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.46	-	-	-	0.4600	-	-	-	-	-	-	-	-	-	0.4600	-	
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.72	-	-	0.0694	0.0404	0.0005	0.0004	0.0001	-0.0005	-0.0004	-0.0001	-	-	-	0.1098	-	Staging areas would not be sited in aquatic features
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	10.50	-	-	1.0116	0.5895	0.0080	0.0052	0.0008	-	-	-0.0008	0.0080	0.0052	-	1.6011	0.0132	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.09	-	-	0.0087	0.0051	0.0001	0.00004	0.00001	-0.0001	-0.00004	-0.00001	-	-	-	0.0137	-	Cathodic protection test stations would not be sited in aquatic features
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	3.18	-	-	0.3064	0.1785	0.0024	0.0016	0.0002	-0.0024	-0.0016	-0.0002	-	-	-	0.4849	-	Pipeline anode beds would not be installed in aquatic features
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	1.50	-	-	0.1445	0.0842	0.0011	0.0007	0.0001	-	-	-0.0001	0.0011	0.0007	-	0.2287	0.0019	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.

Table E-6f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages			Final Acreages			Total Upland Modeled Habitat	Total Aquatic Modeled Habitat	Justification
											Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)			
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	42.00	-	-	4.0465	2.3581	0.0318	0.0209	0.0031	-0.0318	-0.0209	-0.0031	-	-	-	6.4046	-	SMUD wouldn't trench through aquatic habitats for pipeline relocation
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	1.38	-	-	0.1330	0.0775	0.0010	0.0007	0.0001	-0.0010	-0.0007	-0.0001	-	-	-	0.2104	-	Temporary work areas for HDD would avoid aquatic habitats
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	1.38	-	-	0.1330	0.0775	0.0010	0.0007	0.0001	-0.0010	-0.0007	-0.0001	-	-	-	0.2104	-	Temporary work areas for directional boring would avoid aquatic habitats
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	4.08	-	-	0.3931	0.2291	0.0031	0.0020	0.0003	-0.0031	-0.0020	-0.0003	-	-	-	0.6222	-	Temporary areas for hydrostatic testing would avoid aquatic habitats
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.04	-	0.0016	0.0008	0.0032	-	-	-	-	-	-	-	-	-	0.0056	-	
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	79.98	-	-	7.7057	4.4905	0.0606	0.0397	0.0059	-	-	-	0.0606	0.0397	0.0059	12.1961	0.1062	
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.12	-	-	-	0.1200	-	-	-	-	-	-	-	-	-	0.1200	-	
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	43.80	-	-	0.5665	2.1057	0.0150	0.0691	0.0926	-0.0090	-0.0414	-0.0555	0.0060	0.0276	0.0370	2.6722	0.0707	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the travelers installation could still affect aquatic habitats. The numbers here equal 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	-	-	-	0.4924	0.0013	0.0006	0.0023	-0.0013	-0.0006	-0.0023	-	-	-	0.4924	-	Temporary work areas would avoid aquatic impacts
M2a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	17 times over the permit term	0.26	-	-	0.2548	0.0020	-	-	-	-	-	-	-	-	-	0.2568	-	
M2b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	-	-	-	0.7699	-	-	-	-	-	-	-	-	-	0.7699	-	
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.46	-	-	0.1426	0.2300	0.0005	0.0046	0.0018	-	-	-0.0018	0.0005	0.0046	-	0.3726	0.0051	Any impacts in Vernal Pool, Seasonal Wetland, and Swale habitat would be considered permanent.
TOTALS	**--**	**--**	**7,340.25**	**0.9420**	**0.0699**	**26.5615**	**81.9339**	**0.6492**	**1.4009**	**0.9426**	**-0.5476**	**-1.2007**	**-0.7613**	**0.1016**	**0.2003**	**0.1812**	**109.5073**	**0.4832**	

* Total Habitat Loss for activities is based on all activities listed in Table E-3h regardless of whether or not it affects modeled habitat shown for this species.

Table E-7f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Per Event (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.001	-	-	0.00003	0.0001	-	0.000002	-	0.0001	0.000002
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.002	-	-	0.0001	0.0002	-	0.000004	-	0.0002	0.000004
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.30	-	-	-	0.3000	-	-	-	0.3000	-
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	11.00	-	-	-	10.8750	-	-	0.1250	10.8750	0.1250
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.50	-	-	-	0.5000	-	-	-	0.5000	-
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.000002	-	-	0.0000002	0.0000001	-	-	-	0.0000003	-

Table E-7f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Per Event (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.04	-	-	0.0039	0.0022	0.00003	0.00002	0.000003	0.0061	0.0001
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.0001	-	-	0.00001	0.000004	0.0000001	0.00000004	0.00000001	0.00001	0.0000001
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	-	-	0.000001	0.0000003	-	-	-	0.000001	-
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.000004	-	-	0.0000004	0.0000002	-	-	-	0.000001	-
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	0.01	0.00007	-	0.0001	0.0028	-	-	0.00002	0.0030	0.00002
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	-	-	-	0.2758	0.0007	0.0003	0.0013	0.2765	0.0024
M. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	10.65	-	-	-	0.0550	-	-	-	0.0550	-

Table E-7f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Per Event (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
M2a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	17 times over the permit term	0.00002	-	-	0.00001	0.000004	-	-	-	0.0000	-
M2b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.01	-	-	-	0.0090	-	-	-	0.0090	-
TOTALS	**--**	**--**	**22.79**	**0.0001**	**-**	**0.0041**	**12.0201**	**0.0008**	**0.0004**	**0.1263**	12.0250	**-**

* Total Habitat Loss for activities is based on all activities listed in Table E-3h regardless of whether or not it affects modeled habitat shown for this species.

Table E-8f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Annual (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.004	0.000001	0.0000002	0.00002	0.0001	0.0000004	0.000002	0.000001	0.0002	0.000004
E8. Pole Replacement	less than 1 day	671 per year	0.18	0.0001	0.00001	0.0010	0.0062	0.00002	0.0001	0.0001	0.0073	0.0002
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.60	0.00002	-	0.0001	0.0011	0.00003	0.000005	0.00001	0.0012	0.00004
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.33	0.00001	-	0.0001	0.0006	0.00001	0.000003	0.00001	0.0007	0.00002
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.0004	-	-	0.00001	0.00004	-	0.000001	-	0.00005	0.000001
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.02	0.00001	0.000001	0.0002	0.0010	0.000005	0.00002	0.00001	0.0012	0.00004

Table E-8f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Annual (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Annual (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.02	0.000003	-	0.000004	0.0001	0.000001	0.0000002	0.000001	0.0001	0.000001
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.004	0.000001	-	0.000001	0.00002	0.0000001	0.00000004	0.0000001	0.00002	0.0000003
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.001	-	-	0.00005	0.00003	0.0000004	0.0000003	0.00000004	0.0001	0.000001
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.003	-	-	0.0003	0.0002	0.000002	0.000001	0.0000002	0.0005	0.000004
TOTALS	**-**	**-**	**1.16**	**0.0001**	**0.0000**	**0.0018**	**0.0093**	**0.0001**	**0.0001**	**0.0001**	**0.0112**	**0.0003**

* Total Habitat Loss for activities is based on all activities listed in Table E-3h regardless of whether or not it affects modeled habitat shown for this species.

Table E-9f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss- Entire Permit Term (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages			Final Acreages (after reduction)			Final Total Upland Modeled Habitat	Final Total Aquatic Modeled Habitat	Justification
											Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)			
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.12	0.0000	0.0000	0.0007	0.0043	0.0000	0.0001	0.0000	-	-	-	0.0000	0.0001	0.0000	0.0051	0.0001	
E8. Pole Replacement	less than 1 day	671 per year	5.40	0.0018	0.0002	0.0308	0.1852	0.0005	0.0025	0.0018	-	-	-	0.0005	0.0025	0.0018	0.2180	0.0048	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	18.00	0.0006	-	0.0040	0.0318	0.0008	0.0001	0.0003	-0.0008	-0.0001	-	-	-	0.3602	0.0364	0.3620	Pull boxes would not be placed in perennial aquatic habitat. Determined that this Covered Activity could occur in1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	9.84	0.0003	-	0.0022	0.0174	0.0004	0.0001	0.0002	-0.0004	-0.0001	-0.0002	-	-	-	0.0199	-	Pull boxes would not be placed in aquatic habitat
E9e.Underground Component Repair and Replacement – Cable Repair (Third Party Damage/Dig In	Less than 1 day	20 per year	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3602	-	0.3602	This would typically be considered a temporary impact, but SMUD recognizes that if it occurs in Vernal Pool, Seasonal Wetland and Swale features, it would result in a permanent impact. One feature assumed to be impacted; average feature size of 0.3602
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	-	-	0.0003	0.0009	-	0.00002	-	-	-	-	-	0.00002	-	0.0012	0.00002	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.01	-	-	0.0002	0.0007	-	0.00001	-	-	-	-	-	0.00001	-	0.0009	0.00001	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.0004	-	-	0.00001	0.00004	-	0.000001	-	-	-	-	-	0.000001	-	0.00005	0.000001	Assumes only the footprint of the new pole would be an impact in Vernal Pool, Seasonal Wetland, and Swale features.
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.60	0.0004	0.00004	0.0054	0.0291	0.0001	0.0006	0.0003	-0.0001	-0.0006	-	-	-	1.8010	0.0349	1.8010	Determined that this Covered Activity could occur in 5 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre

Table E-9f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss- Entire Permit Term (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages			Final Acreages (after reduction)			Final Total Upland Modeled Habitat	Final Total Aquatic Modeled Habitat	Justification
											Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)			
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.60	0.0001	-	0.0001	0.0025	0.00002	0.00001	0.00002	-0.00002	-0.00001	-	-	-	0.3602	0.0026	0.3602	Pull boxes would not be placed in perennial aquatic habitat. Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.01	0.000001	-	0.000002	0.00004	0.0000003	0.0000001	0.0000003	-0.0000003	-0.0000001	-	-	-	0.3602	0.00004	0.3602	Pull boxes would not be placed in perennial aquatic habitat. Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.00002	-	0.00002	0.0005	0.000003	0.000001	0.000003	-0.000003	-0.000001	-	-	-	0.3602	0.0005	0.3620	Pull boxes would not be placed in perennial aquatic habitat. Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	1.80	-	-	-	1.8000	-	-	-	-	-	-	-	-	-	1.8000	-	
E16 [1]. New Transmission Substation Construction	18 months	1 transmission substations over the permit term	11.00	-	-	-	10.5000	-	-	0.5000	-	-	-	-	-	0.5000	10.5000	0.5000	
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	1.00	-	-	-	1.0000	-	-	-	-	-	-	-	-	-	1.0000	-	
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.02	-	-	0.0019	0.0011	0.00002	0.00001	0.000001	-	-	-	0.00002	0.00001	0.000001	0.0030	0.00003	
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.09	-	-	0.0087	0.0051	0.0001	0.00004	0.00001	-	-	-	0.0001	0.0000	0.3602	0.0137	0.3603	Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.00002	-	-	0.000002	0.000001	0.00000002	0.00000001	-	-0.00000002	-0.00000001	-	-	-	-	0.000003	-	Cathodic protection test stations would not be sited in aquatic features

Table E-9f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss- Entire Permit Term (acres)	Blue Oak Woodland (acres)	Valley Oak Woodland (acres)	Pasture (acres)	Grasses and Forbs (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Reduced Acreages			Final Acreages (after reduction)			Final Total Upland Modeled Habitat	Final Total Aquatic Modeled Habitat	Justification
											Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Vernal Pool, Seasonal Wetland, and Swale (acres)			
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.12	-	-	0.0116	0.0067	0.0001	0.0001	0.00001	-	-	-	0.0001	0.0001	0.3602	0.0183	0.3604	Determined that this Covered Activity could occur in 1 Vernal Pool, Seasonal Wetland, and Swale feature over the Permit Term; assumed an average feature size of 0.3602 acre
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.001	-	-	0.00005	0.00003	0.0000004	0.0000003	0.00000004	-0.0000004	-0.0000003	-0.00000004	-	-	-	0.0001	-	Pipeline markers would not be placed in aquatic habitat
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	-	-	0.000001	0.000001	0.00000001	-	-	-0.00000001	-	-	-	-	-	0.000002	-	Pipeline markers would not be placed in aquatic habitat
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.00001	-	-	0.000001	0.000001	0.00000001	-	-	-0.00000001	-	-	-	-	-	0.000002	-	Pipeline markers would not be placed in aquatic habitat
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.28	-	-	-	0.2758	0.0007	0.0003	0.0013	-0.0007	-0.0003	-0.0013	-	-	-	0.2758	-	Trees would not be planted in aquatic habitat
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	10.65	-	-	-	10.6500	-	-	-	-	-	-	-	-	-	10.6500	-	
M2a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	17 times over the permit term	0.0001	-	-	0.0001	0.00002	-	-	-	-	-	-	-	-	-	0.0001	-	
M2b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.01	-	-	-	0.0090	-	-	-	-	-	-	-	-	-	0.0090	-	
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	Up to 5 days	2 times over the permit term		-	-	-	-	-	-	-	-	-	-	-	-	0.3602	-	0.3602	This would typically be considered a temporary impact, but SMUD recognizes that if it occurs in Vernal Pool, Seasonal Wetland and Swale features, it would result in a permanent impact. One feature assumed to be impacted;
TOTALS	**--**	**--**	**68.02**	**0.0033**	**0.0003**	**0.0659**	**24.5202**	**0.0028**	**0.0039**	**0.5041**	**-0.0021**	**-0.0012**	**-0.0015**	**0.0007**	**0.0027**	**5.0447**	**24.5896**	**5.0480**	

Table E-10f: SMUD HCP Total California Tiger Salamander Aquatic and Upland Modeled Habitat Loss

SMUD HCP Land Cover Types	Permit Term Covered Activities	
	Temporary Land Cover Loss (acres)	Permanent Land Cover Loss (acres)
Blue Oak Woodland	0.9	0.003
Valley Oak Woodland	0.1	0.0003
Pasture	26.6	0.1
Grasses and Forbs	82.0	24.5
Open Water/Fringe	0.1	0.0007
Other Depressional Wetland	0.2	0.003
Vernal Pool, Seasonal Wetland, and Swale	0.2	5.0
Subtotal Aquatic	*0.5*	*5.0*
Subtotal Upland	*109.5*	*24.6*
TOTAL	**110.0**	**29.6**

Table E-1g: Valley Elderberry Longhorn Beetle Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (acres)		
		Valley Foothill Riparian	Mine Tailing Riparian Woodland	Total Permit Area
Total Land Cover		**10,356.62**	**3,186.39**	**577,553.21**
LINES		**Modeled Habitat in Easement (acres)**		
Transmission				
Easement OH Transmission	200	90.56	-	3,806.37
Easement UG Transmission in Conduit	200	-	-	347.30
Subtotal Transmission		**90.56**	**-**	**4,153.66**
Subtransmission and Distribution				
Easement OH Distribution - without 69kV Overbuild	12.5	39.48	1.67	4,842.62
Easement OH Subtransmission and Distribution	25	10.80	5.89	1,673.59
Easement UG Subtransmission and Distribution in Conduit	25	14.95	0.20	10,329.69
Easement UG Subtransmission and Distribution Direct Buried	25	12.69	0.07	7,031.11
Total Easement OH Subtransmission and Distribution	-	*50.28*	*7.57*	*6,516.21*
Total Easement UG Subtransmission and Distribution	-	*27.64*	*0.27*	*17,360.80*
Subtotal Subtransmission and Distribution	**-**	**77.92**	**7.84**	**23,877.01**
Total Easement OH Transmission, Subtransmission, Distribution	-	*140.84*	*7.57*	*10,322.58*
Total Easement UG in Conduit	-	*14.95*	*0.20*	*10,676.99*
Total Easement UG Direct Buried	-	*12.69*	*0.07*	*7,031.11*
Total Easement Total UG in Conduit and Direct Buried	-	*27.64*	*0.27*	*17,708.10*
Total Electrical Line Easement	**-**	***168.48***	***7.84***	***28,030.68***
Fiber-optic Line				
OH Fiber-optic Line	25	7.20	-	422.35
UG Fiber-optic Line	25	0.37	-	111.65
Total Fiber-optic Line Easement		***7.57***	**-**	***534.00***
Gas Pipeline				
Gas Pipeline Easement	35	1.78	-	321.30
Total Gas Pipeline Easement	**-**	***1.78***	**-**	***321.30***

Table E-1g: Valley Elderberry Longhorn Beetle Modeled Habitat in the Permit Area

FACILITIES	Number of Facilities in Modeled Habitat		
	Valley Foothill Riparian	**Mine Tailing Riparian Woodland**	**Total Facilities in Permit Area**
Transmission			
Lattice Towers	22	-	560
Wood Poles	12	-	144
All other Transmission Poles	5	-	723
Subtotal Transmission Towers and Poles	**39**	**-**	**1,427**
Subtransmission and Distribution			
Wood Poles	738	65	131,213
Other Poles	105	4	12,785
Subtotal Subtransmission and Distribution Poles	**843**	**69**	**143,998**
Total Towers and Poles	*882*	*69*	*145,425*
Substructures			
Above Ground Pads	52	1	42,776
Box-pads	4	-	2,584
Manholes	3	-	1,569
Subsurface Pads	1	-	208
Vaults	-	-	215
Subtotal Substructures	**60**	**1**	**47,352**
Pull Boxes			
Pull Boxes	51	1	24,926
Subtotal Pull Boxes	**51**	**1**	**24,926**
Electrical Substations			
Transmission Substations	-	-	18
Distribution Substations	-	-	211
Subtotal Electrical Substations	**-**	**-**	**229**
Gas Pipeline Valve Stations	-	-	12
Poles in State Responsibility Area	13	-	927
Cosumnes Power Plant Cathodic Test Protection Stations	-	-	17
Total Facilities	***1,006***	***71***	***218,888***

Table E-1g: Valley Elderberry Longhorn Beetle Modeled Habitat in the Permit Area

OTHER FACILITIES*	Easement Width (feet)	Modeled Habitat in Other Facilities (acres)		
		Valley Foothill Riparian	Mine Tailing Riparian Woodland	Total Facilities in Permit Area
Cosumnes Power Plant	n/a	-	-	29.05
Mitigation Bank - Oak Tree Planting Area	n/a	-	-	282.47
Rancho Seco Photovoltaic 5 Removal	n/a	-	-	10.65
Cosumnes Power Plant Water Pipeline	25	-	-	15.49
Total Other Facilities*		-	-	***337.66***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-2g: Percentage of Valley Elderberry Longhorn Beetle Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (% of total acres)		
		Valley Foothill Riparian	Mine Tailing Riparian Woodland	Percentage of Total Acreage in Permit Area
Total Land Cover		**1.79%**	**0.55%**	**100.00%**
LINES				
Transmission				
Easement OH Transmission	200	2.38%	-	0.66%
Easement UG Transmission in Conduit	200	-	-	0.06%
Subtotal Transmission		**2.18%**	**-**	**0.72%**
Subtransmission and Distribution				
Easement OH Distribution - without 69kV Overbuild	12.5	0.82%	0.03%	0.84%
Easement OH Subtransmission and Distribution	25	0.65%	0.35%	0.29%
Easement UG Subtransmission and Distribution in Conduit	25	0.14%	0.002%	1.79%
Easement UG Subtransmission and Distribution Direct Buried	25	0.18%	0.001%	1.22%
Total Easement OH Subtransmission and Distribution	-	*0.77%*	*0.12%*	*1.13%*
Total Easement UG Subtransmission and Distribution	-	*0.16%*	*0.00%*	*3.01%*
Subtotal Subtransmission and Distribution	-	**0.33%**	**0.03%**	**4.13%**
Total Easement OH Transmission, Subtransmission, Distribution	-	*1.36%*	*0.07%*	*1.79%*
Total Easement UG in Conduit	-	*0.14%*	*0.00%*	*1.85%*
Total Easement UG Direct Buried	-	*0.18%*	*0.00%*	*1.22%*
Total Easement Total UG in Conduit and Direct Buried	-	*0.16%*	*0.00%*	*3.07%*
Total Electrical Line Easement	-	***0.60%***	***0.03%***	***4.85%***
Fiber-optic Line				
OH Fiber-optic Line	25	1.70%	-	0.07%
UG Fiber-optic Line	25	0.33%	-	0.02%
Total Fiber-optic Line Easement		***1.42%***	-	***0.09%***
Gas Pipeline				
Gas Pipeline Easement	35	0.55%	-	0.06%
Total Gas Pipeline Easement		***0.55%***	-	***0.06%***

Table E-2g: Percentage of Valley Elderberry Longhorn Beetle Modeled Habitat in the Permit Area

FACILITIES	Percent of Facilities in Land Cover		
	Valley Foothill Riparian	**Mine Tailing Riparian Woodland**	**Percentage of Total Facilities in Permit Area**
Transmission			
Lattice Towers	3.93%	-	3.93%
Wood Poles	8.33%	-	8.33%
All other Transmission Poles	0.69%	-	0.69%
Subtotal Transmission Towers and Poles	**2.73%**	**-**	**2.73%**
Subtransmission and Distribution			
Wood Poles	0.56%	0.05%	0.61%
Other Poles	0.82%	0.03%	0.85%
Subtotal Subtransmission and Distribution Poles	**0.59%**	**0.05%**	**0.63%**
Total Towers and Poles	*0.61%*	*0.05%*	*0.65%*
Substructures			
Above Ground Pads	0.12%	0.002%	0.12%
Box-pads	0.15%	-	0.15%
Manholes	0.19%	-	0.19%
Subsurface Pads	0.48%	-	0.48%
Vaults	-	-	-
Subtotal Substructures	**0.13%**	**0.00%**	**0.13%**
Pull Boxes			
Pull Boxes	0.20%	0.004%	0.21%
Subtotal Pull Boxes	**0.20%**	**0.004%**	**0.21%**
Electrical Substations			
Transmission Substations	-	-	-
Distribution Substations	-	-	-
Subtotal Electrical Substations	**-**	**-**	**-**
Gas Pipeline Valve Stations	-	-	-
Poles in State Responsibility Area	1.40%	-	1.40%
Cosumnes Power Plant Cathodic Test Protection Stations	-	-	-
Total Facilities	***0.46%***	***0.03%***	***0.49%***

Table E-2g: Percentage of Valley Elderberry Longhorn Beetle Modeled Habitat in the Permit Area

OTHER FACILITIES*	Easement Width (feet)	Percentage of Land Cover in Special Areas		
		Valley Foothill Riparian	Mine Tailing Riparian Woodland	Percentage of Total Acreage in Permit Area
Cosumnes Power Plant	n/a	-	-	-
Mitigation Bank - Oak Tree Planting Area	n/a	-	-	-
Rancho Seco Photovoltaic 5 Removal	n/a	-	-	-
Cosumnes Power Plant Water Pipeline	25	-	-	-
Total Other Facilities*		-	-	***100.00%***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-3g: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	0.00008	1.09	32.70	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	0.000007	0.004	0.12
E8. Pole Replacement	less than 1 day	671 per year	0.002	1.34	40.20	0.009	0.18	5.40
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	0.04	6.00	180.00	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.57	171.00	5130.00	0.001	0.60	18.00
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.12	19.68	590.40	0.001	0.33	9.84
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.0006	0.01	0.30	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.02	0.6	0.0002	0.0004	0.01
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	n/a	1.84	0.001	n/a	0.008
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	n/a	0.50	0.002	n/a	0.0004
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	1.08	6.48	194.40	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.460	30.36	910.80	0.00007	0.02	0.60
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.09	0.72	21.60	0.001	0.02	0.60

Table E-3g: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	1.26	n/a	3.78	0.001	n/a	0.01
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.24	7.20	0.001	0.004	0.12
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.23	n/a	1.38	0.30	n/a	1.80
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	n/a	1.36	11.00	n/a	44.00
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.23	n/a	0.46	0.50	n/a	1.00
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	n/a	0.72	-	n/a	-
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	0.00002	0.0005	0.02
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.07	0.35	10.50	0.003	0.003	0.09
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.009	n/a	0.09	0.000002	n/a	0.00002
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	n/a	3.18	-	n/a	-
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	0.23	n/a	0.46	-	n/a	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	n/a	1.50	0.04	n/a	0.12
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	n/a	42.00	0.00008	n/a	0.0005
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	n/a	1.38	0.000006	n/a	0.00001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	n/a	1.38	0.000004	n/a	0.00001
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	n/a	4.08	-	n/a	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	-	31.50	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	n/a	0.04	-	n/a	-

Table E-3g: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	0.009	n/a	8.34
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	n/a	79.98	-	n/a	-
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.06	n/a	0.12	-	n/a	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	0.73	1.46	43.80	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	n/a	0.50	0.28	n/a	0.28
M2. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	-	n/a	-	10.65	n/a	10.65
M3a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	0.05	n/a	0.26	0.00002	n/a	0.0001
M3b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	n/a	0.78	0.009	n/a	0.009
M3c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	n/a	0.46	-	-	-
TOTALS	**-**	**-**	**35.22**	**238.75**	**7,340.25**	**22.81**	**1.16**	**101.02**

Table E-4g Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity – Temporary Habitat Loss – Per Event

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Per Event (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	0.0090	-	0.0090
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	0.0098	-	0.0098
E14a [1] [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	1.26	0.1050	-	0.1050
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	0.0007	-	0.0007
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.01	0.00005	-	0.00005
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	0.0003	-	0.0003
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	0.0028	-	0.0028
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	0.0388	-	0.0388
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	0.0025	-	0.0025
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	0.0025	-	0.0025
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	0.0019	-	0.0019
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	5.2500	-	5.2500
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	0.0002	-	0.0002
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	0.0738	-	0.0738
TOTALS	**-**	**-**	**31.92**	**5.4974**	**-**	**5.4974**

* Total Habitat Loss for activities is based on all activities listed in Table Y-1 regardless of whether or not it affects modeled habitat shown for this species.

Table E-5g: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Annual (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	1.09	0.0062	0.0005	0.0068
E8. Pole Replacement	less than 1 day	671 per year	1.34	0.0080	0.0006	0.0086
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	6.00	0.0073	0.0001	0.0074
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	171.00	0.3086	0.0018	0.3103
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	19.68	0.0355	0.0002	0.0357
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.01	0.00002	0.0000002	0.00002
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.02	0.0009	-	0.0009
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	6.48	0.0500	0.0075	0.0575
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	30.36	0.2343	0.0353	0.2695
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.72	0.0011	0.00001	0.0012
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.24	0.0004	0.000004	0.0004
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.35	0.0019	-	0.0019
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	1.46	0.0249	-	0.0249
TOTALS	**-**	**-**	**238.75**	**0.6791**	**0.0461**	**0.7251**

* Total Habitat Loss for activities is based on all activities listed in Table Y-1 regardless of whether or not it affects modeled habitat shown for this species.

Table E-6g: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	32.70	0.1867	0.0162	0.2029
E8. Pole Replacement	less than 1 day	671 per year	40.20	0.2386	0.0191	0.2578
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	180.00	0.2786	-	0.2786
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	5,130.00	9.2567	0.0527	9.3094
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	590.40	1.0653	0.0061	1.0714
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.30	0.0005	0.000005	0.0005
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.60	0.0236	-	0.0236
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	1.84	0.0723	-	0.0723
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.50	0.0196	-	0.0196
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	194.40	1.5001	0.2258	1.7259
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	910.80	7.0283	1.0579	8.0862
E14a. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	21.60	0.0344	0.0003	0.0347
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	3.78	0.0060	0.0001	0.0061

Table E-6g: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	7.20	0.0115	0.0001	0.0116
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.72	0.0040	-	0.0040
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	10.50	0.0581	-	0.0581
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.09	0.0005	-	0.0005
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	3.18	0.0176	-	0.0176
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	1.50	0.0083	-	0.0083
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	42.00	0.2325	-	0.2325
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	1.38	0.0076	-	0.0076
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	1.38	0.0076	-	0.0076
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	4.08	0.0226	-	0.0226
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	31.50	31.5000	-	31.5000
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.04	0.0016	-	0.0016
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	79.98	0.4428	-	0.4428
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	43.80	0.7467	-	0.7467
TOTALS	**-**	**-**	**7,340.25**	**52.7723**	**1.3783**	**54.1506**

* Total Habitat Loss for activities is based on all activities listed in Table Y-1 regardless of whether or not it affects modeled habitat shown for this species.

Table E-7g: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Per Event (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.001	0.00004	-	0.00004
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.002	0.0001	-	0.0001
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.001	0.0001	-	0.0001
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.000002	0.00000001	-	0.00000001
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.04	0.0002	-	0.0002
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.0001	0.0000004	-	0.0000004
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	0.00000003	-	0.00000003
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.000004	0.00000002	-	0.00000002
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	0.01	0.0001	-	0.0001
TOTALS	**-**	**-**	**22.79**	**0.0005**	**-**	**0.0005**

* Total Habitat Loss for activities is based on all activities listed in Table Y-1 regardless of whether or not it affects modeled habitat shown for this species.

Table E-8g: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss – Annual

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Annual (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.004	0.00002	0.000002	0.00002
E8. Pole Replacement	less than 1 day	671 per year	0.18	0.0011	0.0001	0.0012
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.60	0.0011	0.00001	0.0011
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.33	0.0006	0.000003	0.0006
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.0004	0.00002	-	0.00002
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.02	0.0002	0.00002	0.0002
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.02	0.00003	0.0000003	0.00003
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.004	0.00001	0.0000001	0.00001
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.001	0.000003	-	0.000003
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.003	0.00002	-	0.00002
TOTALS	**-**	**-**	**1.16**	**0.0030**	**0.0001**	**0.0031**

* Total Habitat Loss for activities is based on all activities listed in Table E-3f regardless of whether or not it affects modeled habitat shown for this species.

Table E-9g: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.12	0.0007	0.0001	0.0007
E8. Pole Replacement	less than 1 day	671 per year	5.40	0.0321	0.0026	0.0346
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	18.00	0.0325	0.0002	0.0327
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	9.84	0.0178	0.0001	0.0179
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.0004	-	0.0004
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.01	0.0003	-	0.0003
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.0004	0.00002	-	0.00002
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.60	0.0046	0.0007	0.0053
E14a. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.60	0.0010	0.00001	0.0010
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.01	0.00002	0.0000002	0.00002
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.0002	0.000002	0.0002
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.02	0.0001	-	0.0001
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.09	0.0005	-	0.0005
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.00002	0.0000001	-	0.0000001

Table E-9g: Valley Elderberry Longhorn Beetle Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Mine Tailing Riparian Woodland (acres)	Total Modeled Habitat (acres)
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.12	0.0007	-	0.0007
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.001	0.000003	-	0.000003
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	0.0000001	-	0.0000001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.00001	0.0000001	-	0.0000001
TOTALS	**-**	**-**	**101.02**	**0.0908**	**0.0036**	**0.0944**

* Total Habitat Loss for activities is based on all activities listed in Table E-3f regardless of whether or not it affects modeled habitat shown for this species.

Table E-10g: Total Valley Elderberry Longhorn Beetle Modeled Habitat Loss

SMUD HCP Land Cover Types	Permit Term Covered Activities	
	Temporary Land Cover Loss (acres)	Permanent Land Cover Loss (acres)
Valley Foothill Riparian	52.8	0.1
Mine Tailing Riparian Woodland	1.4	0.004
TOTAL	**54.2**	**0.01**

Table E-1h: Giant Garter Snake Aquatic and Upland Modeled Habitat in the Permit Area

	Easement Width (feet)	Land Cover (acres)								
		Valley Foothill Riparian	Valley Oak Woodland	Rice	Pasture	Grasses and Forbs	Riverine	Open Water/Fringe	Other Depressional Wetland	Total Permit Area
Total Land Cover		**10,356.62**	**1,089.22**	**5,312.61**	**21,239.58**	**168,230.12**	**10,793.52**	**6,502.02**	**9,437.22**	**577,553.21**
LINES										
Transmission										
Easement OH Transmission	200	11.43	0.02	-	9.83	114.00	14.04	3.75	13.84	3,806.37
Easement UG Transmission in Conduit	200	-	-	-	-	-	-	-	-	347.30
Subtotal Transmission		**11.43**	**0.02**	**-**	**9.83**	**114.00**	**14.04**	**3.75**	**13.84**	**4,153.66**
Subtransmission and Distribution										
Easement OH Distribution - without 69kV Overbuild	12.5	24.92	3.72	6.89	20.92	75.25	37.89	3.82	12.99	4,842.62
Easement OH Subtransmission and Distribution	25	4.17	0.21	8.91	3.43	53.30	8.64	0.92	1.05	1,673.59
Easement UG Subtransmission and Distribution in Conduit	25	3.69	0.52	2.14	1.71	34.32	24.95	1.61	4.41	10,329.69
Easement UG Subtransmission and Distribution Direct Buried	25	1.98	0.04	0.04	0.44	3.87	3.59	0.23	0.85	7,031.11
Total Easement OH Subtransmission and Distribution	-	*29.09*	*3.93*	*15.81*	*24.35*	*128.55*	*46.54*	*4.74*	*14.04*	*6,516.21*
Total Easement UG Subtransmission and Distribution	-	*5.67*	*0.56*	*2.18*	*2.15*	*38.19*	*28.54*	*1.84*	*5.26*	*17,360.80*
Subtotal Subtransmission and Distribution	**-**	**34.76**	**4.48**	**17.99**	**26.50**	**166.73**	**75.08**	**6.58**	**19.31**	**23,877.01**
Total Easement OH Transmission, Subtransmission, Distribution	-	*40.52*	*3.95*	*15.81*	*34.18*	*242.54*	*60.58*	*8.49*	*27.88*	*10,322.58*
Total Easement UG in Conduit	-	*3.69*	*0.52*	*2.14*	*1.71*	*34.32*	*24.95*	*1.61*	*4.41*	*10,676.99*
Total Easement UG Direct Buried	-	*1.98*	*0.04*	*0.04*	*0.44*	*3.87*	*3.59*	*0.23*	*0.85*	*7,031.11*
Total Easement Total UG in Conduit and Direct Buried	-	*5.67*	*0.56*	*2.18*	*2.15*	*38.19*	*28.54*	*1.84*	*5.26*	*17,708.10*
Total Electrical Line Easement	**-**	***46.19***	***4.51***	***17.99***	***36.34***	***280.73***	***89.12***	***10.34***	***33.15***	***28,030.68***
Fiber-optic Line										
OH Fiber-optic Line	25	-	1.31	-	0.46	10.96	0.38	0.22	1.08	422.35
UG Fiber-optic Line	25	0.31	-	-	2.73	3.47	1.06	0.21	0.26	111.65
Total Fiber-optic Line Easement		***0.31***	***1.31***	***-***	***3.18***	***14.43***	***1.44***	***0.43***	***1.34***	***534.00***
Gas Pipeline										
Gas Pipeline Easement	35	-	-	13.29	28.43	8.97	6.93	5.38	17.60	321.30
Total Gas Pipeline Easement		***-***	***-***	***13.29***	***28.43***	***8.97***	***6.93***	***5.38***	***17.60***	***321.30***

Table E-1h: Giant Garter Snake Aquatic and Upland Modeled Habitat in the Permit Area (cont.)

FACILITIES	Numbers of Facilities in Modeled Habitat								
	Valley Foothill Riparian	Valley Oak Woodland	Rice	Pasture	Grasses and Forbs	Riverine	Open Water/Fringe	Other Depressional Wetland	Total Facilities in Permit Area
Transmission									
Lattice Towers	-	-	-	-	15	-	-	1	560
Wood Poles	-	-	-	-	-	-	-	-	144
All other Transmission Poles	4	-	-	2	31	6	-	-	723
Subtotal Transmission Towers and Poles	**4**	**-**	**-**	**2**	**46**	**6**	**-**	**1**	**1,427**
Subtransmission and Distribution									
Wood Poles	436	76	156	323	1,644	617	37	165	131,213
Other Poles	25	2	11	5	85	14	6	9	12,785
Subtotal Subtransmission and Distribution Poles	**461**	**78**	**167**	**328**	**1,729**	**631**	**43**	**174**	**143,998**
Total Towers and Poles	*465*	*78*	*167*	*330*	*1,775*	*637*	*43*	*175*	*145,425*
Substructures									
Above Ground Pads	2	2	4	3	49	41	10	9	42,776
Box-pads	-	-	-	-	12	6	-	1	2,584
Manholes	-	-	-	-	-	2	-	-	1,569
Subsurface Pads	-	-	-	-	1	-	-	-	208
Vaults	-	-	-	-	-	-	-	-	215
Subtotal Substructures	**2**	**2**	**4**	**3**	**62**	**49**	**10**	**10**	**47,352**
Pull Boxes									
Pull Boxes	7	1	2	7	137	90	3	17	24,926
Subtotal Pull Boxes	**7**	**1**	**2**	**7**	**137**	**90**	**3**	**17**	**24,926**
Electrical Substations									
Transmission Substations	-	-	-	-	-	-	-	-	18
Distribution Substations	-	-	-	-	1	2	-	-	211
Subtotal Electrical Substations	**-**	**-**	**-**	**-**	**1**	**2**	**-**	**-**	**229**
Gas Pipeline Valve Stations	-	-	-	-	-	-	-	-	12
Poles in State Responsibility Area	-	-	-	-	-	-	-	-	927
Cosumnes Power Plant Cathodic Test Protection Stations	-	-	-	-	2	-	-	-	17
Total Facilities	***474***	***81***	***173***	***340***	***1,979***	***782***	***56***	***202***	***218,888***

Table E-1h: Giant Garter Snake Aquatic and Upland Modeled Habitat in the Permit Area (cont.)

OTHER FACILITIES*	Easement Width (feet)	Modeled Habitat on Other Facilities (acres)								
		Valley Foothill Riparian	Valley Oak Woodland	Rice	Pasture	Grasses and Forbs	Riverine	Open Water/Fringe	Other Depressional Wetland	Total Facilities in Permit Area
Cosumnes Power Plant	n/a	1.35	-	-	-	-	-	-	-	29.05
Mitigation Bank - Oak Tree Planting Area	n/a	-	-	-	-	-	-	-	-	282.47
Rancho Seco Photovoltaic 5 Removal	n/a	-	-	-	-	-	-	-	-	10.65
Cosumnes Power Plant Water Pipeline	25	-	-	-	0.58	0.21	0.06	-	-	15.49
Total Other Facilities*		***1.35***	***-***	***-***	***0.58***	***0.21***	***0.06***	***-***	***-***	***337.66***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-2h: Percentage of Giant Garter Snake Aquatic and Upland Modeled Habitat in the Permit Area

	Ease-ment Width (feet)	Land Cover (% of total acres)								
		Valley Foothill Riparian	Valley Oak Woodland	Rice	Pasture	Grasses and Forbs	Riverine	Open Water/Fringe	Other Depressional Wetland	Percentage of Total Acreage in Permit Area
Total Land Cover		**1.79%**	**0.19%**	**0.92%**	**3.68%**	**29.13%**	**1.87%**	**1.13%**	**1.63%**	**100.00%**
LINES										
Transmission										
Easement OH Transmission	200	0.30%	0.00%	-	0.26%	2.99%	0.37%	0.10%	0.36%	0.66%
Easement UG Transmission in Conduit	200	-	-	-	-	-	-	-	-	0.06%
Subtotal Transmission		**0.28%**	**0.00%**	**-**	**0.24%**	**2.74%**	**0.34%**	**0.09%**	**0.33%**	**0.72%**
Subtransmission and Distribution										
Easement OH Distribution - without 69kV Overbuild	12.5	0.51%	0.08%	0.14%	0.43%	1.55%	0.78%	0.08%	0.27%	0.84%
Easement OH Subtransmission and Distribution	25	0.25%	0.01%	0.53%	0.20%	3.18%	0.52%	0.06%	0.06%	0.29%
Easement UG Subtransmission and Distribution in Conduit	25	0.00	0.00	0.02%	0.02%	0.33%	0.24%	0.02%	0.04%	1.79%
Easement UG Subtransmission and Distribution Direct Buried	25	0.00	0.00	0.0006 %	0.01%	0.06%	0.05%	0.00%	0.01%	1.22%
Total Easement OH Subtransmission and Distribution	-	*0.00*	*0.00*	*0.24%*	*0.37%*	*1.97%*	*0.71%*	*0.07%*	*0.22%*	*1.13%*
Total Easement UG Subtransmission and Distribution	-	*0.03%*	*0.00%*	*0.01%*	*0.01%*	*0.22%*	*0.16%*	*0.01%*	*0.03%*	*3.01%*
Subtotal Subtransmission and Distribution	**-**	**0.15%**	**0.02%**	**0.08%**	**0.11%**	**0.70%**	**0.31%**	**0.03%**	**0.08%**	**4.13%**
Total Easement OH Transmission, Subtransmission, Distribution	-	*0.39%*	*0.04%*	*0.15%*	*0.33%*	*2.35%*	*0.59%*	*0.08%*	*0.27%*	*1.79%*
Total Easement UG in Conduit	-	*0.03%*	*0.00%*	*0.02%*	*0.02%*	*0.32%*	*0.23%*	*0.02%*	*0.04%*	*1.85%*
Total Easement UG Direct Buried	-	*0.03%*	*0.00%*	*0.0006 %*	*0.01%*	*0.06%*	*0.05%*	*0.00%*	*0.01%*	*1.22%*
Total Easement Total UG in Conduit and Direct Buried	-	*0.03%*	*0.00%*	*0.01%*	*0.01%*	*0.22%*	*0.16%*	*0.01%*	*0.03%*	*3.07%*
Total Electrical Line Easement	**-**	***0.16%***	***0.02%***	***0.06%***	***0.13%***	***1.00%***	***0.32%***	***0.04%***	***0.12%***	***4.85%***
Fiber-optic Line										
OH Fiber-optic Line	25	-	0.31%	-	0.11%	2.60%	0.09%	0.05%	0.26%	0.07%
UG Fiber-optic Line	25	0.27%	-	-	2.44%	3.11%	0.95%	0.18%	0.23%	0.02%
Total Fiber-optic Line Easement		***0.06%***	***0.25%***	***-***	***0.60%***	***2.70%***	***0.27%***	***0.08%***	***0.25%***	***0.09%***
Gas Pipeline										
Gas Pipeline Easement	35	-	-	4.14%	8.85%	2.79%	2.16%	1.67%	5.48%	0.06%
Total Gas Pipeline Easement		***-***	***-***	***4.14%***	***8.85%***	***2.79%***	***2.16%***	***1.67%***	***5.48%***	***0.06%***

Table E-2h: Percentage of Giant Garter Snake Aquatic and Upland Modeled Habitat in the Permit Area (cont.)

FACILITIES	Percent of Facilities in Modeled Habitat								
	Valley Foothill Riparian	Valley Oak Woodland	Rice	Pasture	Grasses and Forbs	Riverine	Open Water/Fringe	Other Depressional Wetland	Percentage of Total Facilities in Permit Area
Transmission									
Lattice Towers	-	-	-	-	2.68%	-	-	0.18%	2.86%
Wood Poles	-	-	-	-	-	-	-	-	-
All other Transmission Poles	0.55%	-	-	0.28%	4.29%	0.83%	-	-	5.95%
Subtotal Transmission Towers and Poles	**0.28%**	**-**	**-**	**0.14%**	**3.22%**	**0.42%**	**-**	**0.07%**	**4.13%**
Subtransmission and Distribution									
Wood Poles	0.33%	0.06%	0.12%	0.25%	1.25%	0.47%	0.03%	0.13%	2.63%
Other Poles	0.20%	0.02%	0.09%	0.04%	0.66%	0.11%	0.05%	0.07%	1.23%
Subtotal Subtransmission and Distribution Poles	**0.32%**	**0.05%**	**0.12%**	**0.23%**	**1.20%**	**0.44%**	**0.03%**	**0.12%**	**2.51%**
Total Towers and Poles	*0.32%*	*0.05%*	*0.11%*	*0.23%*	*1.22%*	*0.44%*	*0.03%*	*0.12%*	*2.52%*
Substructures									
Above Ground Pads	0.00%	0.00%	0.01%	0.01%	0.11%	0.10%	0.02%	0.02%	0.28%
Box-pads	-	-	-	-	0.46%	0.23%	-	0.04%	0.74%
Manholes	-	-	-	-	-	0.13%	-	-	0.13%
Subsurface Pads	-	-	-	-	0.48%	-	-	-	0.48%
Vaults	-	-	-	-	-	-	-	-	-
Subtotal Substructures	**0.00%**	**0.00%**	**0.01%**	**0.01%**	**0.13%**	**0.10%**	**0.02%**	**0.02%**	**0.30%**
Pull Boxes									
Pull Boxes	0.03%	0.00	0.01%	0.03%	0.55%	0.36%	0.01%	0.07%	1.06%
Subtotal Pull Boxes	**0.03%**	**0.00**	**0.01%**	**0.03%**	**0.55%**	**0.36%**	**0.01%**	**0.07%**	**1.06%**
Electrical Substations									
Transmission Substations	-	-	-	-	-	-	-	-	-
Distribution Substations	-	-	-	-	0.47%	0.95%	-	-	1.42%
Subtotal Electrical Substations	**-**	**-**	**-**	**-**	**0.44%**	**0.87%**	**-**	**-**	**1.31%**
Gas Pipeline Valve Stations	-	-	-	-	-	-	-	-	-
Poles in State Responsibility Area	-	-	-	-	-	-	-	-	-
Cosumnes Power Plant Cathodic Test Protection Stations	-	-	-	-	11.76%	-	-	-	11.76%
Total Facilities	***0.22%***	***0.04%***	***0.08%***	***0.16%***	***0.90%***	***0.36%***	***0.03%***	***0.09%***	***1.87%***

Table E-2h: Percentage of Giant Garter Snake Aquatic and Upland Modeled Habitat in the Permit Area (cont.)

OTHER FACILITIES*	Easement Width (feet)	Percentage of Modeled Habitat in Special Areas								
		Valley Foothill Riparian	Valley Oak Woodland	Rice	Pasture	Grasses and Forbs	Riverine	Open Water/Fringe	Other Depressional Wetland	Percentage of Total Acreage in Permit Area
Cosumnes Power Plant	n/a	4.65%	-	-	-	-	-	-	-	4.65%
Mitigation Bank - Oak Tree Planting Area	n/a	-	-	-	-	-	-	-	-	-
Rancho Seco Photovoltaic 5 Removal	n/a	-	-	-	-	-	-	-	-	-
Cosumnes Power Plant Water Pipeline	25	-	-	-	3.74%	1.36%	0.39%	-	-	5.49%
Total Other Facilities*		***0.40%***	***-***	***-***	***0.17%***	***0.06%***	***0.02%***	***-***	***-***	***100.00%***

* This refers to acreages of special areas that SMUD manages including; Cosumnes Power Plant, Mitigation Bank - Oak Tree Planting Area, Rancho Seco Photovoltaic 5 Removal Site, Cosumnes Power Plant Water Pipeline.

Table E-3h: Giant Garter Snake Modeled Habitat Loss by Covered Activity

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	0.00008	1.09	32.70	-	-	-
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	-	-	-	0.000007	0.004	0.12
E8. Pole Replacement	less than 1 day	671 per year	0.002	1.34	40.20	0.009	0.18	5.40
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	0.04	6.00	180.00	-	-	-
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.57	171.00	5130.00	0.001	0.60	18.00
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.12	19.68	590.40	0.001	0.33	9.84
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.0006	0.01	0.30	-	-	-
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	0.02	0.6	0.0002	0.0004	0.01
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	n/a	1.84	0.001	n/a	0.008
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	n/a	0.50	0.002	n/a	0.0004
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	1.08	6.48	194.40	-	-	-
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.460	30.36	910.80	0.00007	0.02	0.60

Table E-3h: Giant Garter Snake Modeled Habitat Loss by Covered Activity (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.09	0.72	21.60	0.001	0.02	0.60
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	1.26	n/a	3.78	0.001	n/a	0.01
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.24	7.20	0.001	0.004	0.12
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.23	n/a	1.38	0.30	n/a	1.80
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	n/a	1.36	11.00	n/a	44.00
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.23	n/a	0.46	0.50	n/a	1.00
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	n/a	0.72	-	n/a	-
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	-	-	-	0.00002	0.0005	0.02
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.07	0.35	10.50	0.003	0.003	0.09
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.009	n/a	0.09	0.000002	n/a	0.00002
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	n/a	3.18	-	n/a	-
G8. Pipeline Valve Repair or Replacement	4 weeks	2 over the permit term	0.23	n/a	0.46	-	n/a	-
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	n/a	1.50	0.04	n/a	0.12
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	n/a	42.00	0.00008	n/a	0.0005
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	n/a	1.38	0.000006	n/a	0.00001

Table E-3h: Giant Garter Snake Modeled Habitat Loss by Covered Activity (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss (acres)			Permanent Habitat Loss (acres)		
			Per Event	Annual	Permit Term	Per Event	Annual	Permit Term
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	n/a	1.38	0.000004	n/a	0.00001
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	n/a	4.08	-	n/a	-
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	-	31.50	-	-	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	n/a	0.04	-	n/a	-
V6. Pole Vegetation Clearing	less than 1 day	927 times per year	-	-	-	0.009	n/a	8.34
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	n/a	79.98	-	n/a	-
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.06	n/a	0.12	-	n/a	-
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	0.73	1.46	43.80	-	-	-
C1. SMUD Nature Preserve Mitigation Bank Oak Tree Planting	10-year period	1 time over the permit term	0.50	n/a	0.50	0.28	n/a	0.28
M. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	-	n/a	-	10.65	n/a	10.65
M2a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	0.05	n/a	0.26	0.00002	n/a	0.0001
M2b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	n/a	0.78	0.009	n/a	0.009
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	n/a	0.46	-	-	-
TOTALS	**-**	**-**	**35.22**	**238.75**	**7,340.25**	**22.81**	**1.16**	**101.02**

Table E-4h: Giant Garter Snake Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Per Event (acres)	Valley Foothill Riparian (acres)	Valley Oak Woodland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.23	-	-	-	-	0.0062	-	-	0.0004	0.0062	0.0004
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.25	-	-	-	-	0.0067	-	-	0.0004	0.0067	0.0004
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.23	-	-	-	-	0.0011	0.0022	-	-	0.0011	0.0022
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	0.34	-	-	-	-	0.3361	-	-	-	0.3361	-
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.23	-	-	-	-	0.2300	-	-	-	0.2300	-
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.12	-	-	0.0050	0.0106	0.0034	0.0026	0.0020	0.0066	0.0189	0.0112
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.01	-	-	0.0004	0.0008	0.0003	0.0002	0.0002	0.0005	0.0014	0.0008
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	0.06	-	-	0.0025	0.0053	0.0017	0.0013	0.0010	0.0033	0.0095	0.0056
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.50	-	-	0.0207	0.0442	0.0140	0.0108	0.0084	0.0274	0.0789	0.0465
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	7.00	-	-	0.2896	0.6195	0.1955	0.1511	0.1171	0.3833	1.1046	0.6515
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.46	-	-	0.0190	0.0407	0.0128	0.0099	0.0077	0.0252	0.0726	0.0428
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.46	-	-	0.0190	0.0407	0.0128	0.0099	0.0077	0.0252	0.0726	0.0428
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	0.34	-	-	0.0141	0.0301	0.0095	0.0073	0.0057	0.0186	0.0536	0.0316
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	5.25	5.2500	-	-	-		-	-	-	5.25	-
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.004	0.0002	0.0002	-	0.0001	0.0003	0.0001	-	-	0.0007	0.0001
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	13.33	-	-	0.5514	1.1797	0.3723	0.2877	0.2230	0.7300	2.1034	1.2407
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.06		-	-	-	0.0600	-	-	-	0.0600	-
M2a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	0.05	-	-	-	0.0490	0.0004	-	-	-	0.0494	-
M2b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	-	-	-	-	0.7699	0.0101	-	-	0.7699	0.0101

Table E-4h: Giant Garter Snake Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Per Event (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Per Event (acres)	Valley Foothill Riparian (acres)	Valley Oak Woodland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.23	-	-	-	0.0713	0.1150	0.0046	0.0002	0.0023	0.1863	0.0071
TOTALS	**-**	**-**	**31.92**	**5.2502**	**0.0002**	**0.9216**	**2.0920**	**2.1479**	**0.4978**	**0.3730**	**1.2232**	**10.4118**	**2.0940**

* Total Habitat Loss for activities is based on all activities listed in Table E-3k regardless of whether or not it affects modeled habitat shown for this species.

Table E-5h: Giant Garter Snake Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Annual (acres)	Valley Foothill Riparian (acres)	Valley Oak Woodland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	1.09	0.0036	0.0006	0.0013	0.0027	0.0136	0.0051	0.0003	0.0014	0.0219	0.0068
E8. Pole Replacement	less than 1 day	671 per year	1.34	0.0043	0.0007	0.0015	0.0031	0.0163	0.0059	0.0004	0.0016	0.0259	0.0079
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	6.00	0.0003	0.0003	0.0006	0.0004	0.0069	0.0058	0.0014	0.0013	0.0084	0.0084
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	171.00	0.0482	0.0010	0.0010	0.0108	0.0941	0.0874	0.0056	0.0207	0.1550	0.1137
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	19.68	0.0055	0.0001	0.0001	0.0012	0.0108	0.0101	0.0006	0.0024	0.0178	0.0131
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.01	0.000003	0.0000003	0.000001	0.000001	0.00002	0.00002	0.000001	0.000003	0.00003	0.00002
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.02	-	-	-	-	0.0006	-	-	0.00004	0.0006	0.00004
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	6.48	0.0289	0.0039	0.0157	0.0242	0.1278	0.0463	0.0047	0.0140	0.2006	0.0650
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	30.36	0.1355	0.0183	0.0737	0.1134	0.5989	0.2168	0.0221	0.0654	0.9398	0.3043
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.72	0.0002	0.0000	0.0001	0.0001	0.0016	0.0012	0.0001	0.0002	0.0020	0.0015
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.24	0.0001	0.0000	0.0000	0.0000	0.0005	0.0004	0.00003	0.0001	0.0007	0.0005
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.35	-	-	0.0145	0.0310	0.0098	0.0076	0.0059	0.0192	0.0552	0.0326
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	1.46	-	0.0045	-	0.0016	0.0379	0.0013	0.0008	0.0037	0.0440	0.0058
TOTALS	**-**	**-**	**238.75**	**0.2267**	**0.0295**	**0.1085**	**0.1885**	**0.9189**	**0.3878**	**0.0419**	**0.1300**	**1.4720**	**0.5596**

* Total Habitat Loss for activities is based on all activities listed in Table Y-1 regardless of whether or not it affects modeled habitat shown for this species.

Table E-6h: Giant Garter Snake Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Valley Oak Woodland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Reduced Acreages			Final Acreages (After Reduction)			Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)	Justification
												Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)			
E6a. Wood Pole Testing and Treatment - Wood Pole Testing	20 minutes	13,600 times per year	32.70	0.1085	0.0189	0.0388	0.0804	0.4093	0.1536	0.0092	0.0411	-	-	-	0.1536	0.0092	0.0411	0.6560	0.2039	
E8. Pole Replacement	less than 1 day	671 per year	40.20	0.1290	0.0216	0.0463	0.0916	0.4884	0.1768	0.0119	0.0483	-	-	-	0.1768	0.0119	0.0483	0.7770	0.2370	
E9b. Underground Component Repair and Replacement - Pad-Mounted Transformer Repair and Replacement	less than 1 day	150 per year	180.00	-	-	-	-	0.8359	0.4180	-	0.0697	-	-	-	0.4180	-	0.0697	0.8359	0.4876	
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	5,130.00	1.4445	0.0305	0.0291	0.3230	2.8231	2.6216	0.1679	0.6220	-2.6216	-0.1679	-0.6220	-	-	-	4.6502	-	Trenching would not occur in perennial aquatic habitat; HDD would be used to avoid impacts.
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	590.40	0.1662	0.0035	0.0033	0.0372	0.3249	0.3017	0.0193	0.0716	-0.3017	-0.0193	-0.0716	-	-	-	0.5352	-	SMUD would not set up the HDD pad such that it would impact aquatic features
E9e. Underground Component Repair and Replacement - Cable Repair (Third Party Damage/Dig In)	less than 1 day	20 per year	0.30	0.0001	0.00001	0.00004	0.00004	0.0007	0.0005	0.00003	0.0001	-	-	-	0.0005	0.0000	0.0001	0.0008	0.0006	
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.60	-	-	-	-	0.0161	-	-	0.0011	-	-	-		-	0.0011	0.0161	0.0011	
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	1.84	-	-	-	-	0.0493	-	-	0.0033	-	-	-		-	0.0033	0.0493	0.0033	
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.50	-	-	-	-	0.0134	-	-	0.0009	-	-	-		-	0.0009	0.0134	0.0009	

Table E-6h: Giant Garter Snake Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Valley Oak Woodland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Reduced Acreages			Final Acreages (After Reduction)			Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)	Justification
												Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)			
E11. Overhead Reconstruction and Reconductoring	2 weeks	6 per year	194.40	0.8679	0.1171	0.4716	0.7264	3.8350	1.3883	0.1414	0.4190	-0.8330	-0.0849	-0.2514	0.5553	0.0566	0.1676	6.0180	0.7795	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the travelers installation could still affect aquatic habitats. The numbers here = 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	910.80	4.0662	0.5486	2.2095	3.4034	17.9675	6.5044	0.6626	1.9630	-6.5044	-0.6626	-1.9630	-	-	-	28.1953	-	Pull sites would not be placed in perennial aquatic habitat
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	21.60	0.0071	0.0007	0.0027	0.0027	0.0475	0.0355	0.0023	0.0065	-0.0355	-0.0023	-0.0065	-	-	-	0.0607	-	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	3.78	0.0012	0.0001	0.0005	0.0005	0.0083	0.0062	0.0004	0.0011	-0.0062	-0.0004	-0.0011	-	-	-	0.0106	-	Trenching would not be used to install underground lines in aquatic features; either the features would be avoided, or HDD would be used
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	7.20	0.0024	0.0002	0.0009	0.0009	0.0158	0.0118	0.0008	0.0022	-0.0118	-0.0008	-0.0022	-	-	-	0.0202	-	HDD temporary work sites would be located outside of wetlands
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	1.38	-	-	-	-	1.3800	-	-	-	-	-	-	-	-	-	1.3800	-	
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	1.36	-	-	-	-	1.3415	-	-	-	-	-	-	-	-	-	1.3415	-	

Table E-6h: Giant Garter Snake Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Valley Oak Woodland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Reduced Acreages			Final Acreages (After Reduction)			Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)	Justification
												Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)			
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.46	-	-	-	-	0.4600	-	-	-	-	-	-	-	-	-	0.4600	-	
G4. Internal Pipeline Inspection	3.5 days	6 over the permit term	0.72	-	-	0.0298	0.0637	0.0201	0.0155	0.0120	0.0394	-0.0155	-0.0120	-0.0394	-	-	-	0.1136	-	Staging areas would not be sited in aquatic features
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	10.50	-	-	0.4344	0.9292	0.2932	0.2266	0.1757	0.5750	-	-	-	0.2266	0.1757	0.5750	1.6568	0.9773	
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.09	-	-	0.0037	0.0080	0.0025	0.0019	0.0015	0.0049	-0.0019	-0.0015	-0.0049	-	-	-	0.0142	-	Cathodic protection test stations would not be sited in aquatic features
G7. Pipeline Anode Bed Replacement	less than 2 days	53 over the permit term	3.18	-	-	0.1315	0.2814	0.0888	0.0686	0.0532	0.1741	-0.0686	-0.0532	-0.1741	-	-	-	0.5018	-	Pipeline anode beds would not be installed in aquatic features
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	1.50	-	-	0.0621	0.1327	0.0419	0.0324	0.0251	0.0821	-	-	-	0.0324	0.0251	0.0821	0.2367	0.1396	
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	42.00	-	-	1.7374	3.7169	1.1730	0.9063	0.7027	2.3001	-0.9063	-0.7027	-2.3001	-	-	-	6.6273	-	We wouldn't trench through aquatic habitats for pipeline relocation
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	1.38	-	-	0.0571	0.1221	0.0385	0.0298	0.0231	0.0756	-0.0298	-0.0231	-0.0756	-	-	-	0.2178	-	Temporary work areas for HDD would avoid aquatic habitats
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	1.38	-	-	0.0571	0.1221	0.0385	0.0298	0.0231	0.0756	-0.0298	-0.0231	-0.0756	-	-	-	0.2178	-	Temporary work areas for directional boring would avoid aquatic habitats
G10d. New Construction for Realigned Pipelines - Hydrostatic Testing	3 days	12 times over the permit term	4.08	-	-	0.1688	0.3611	0.1139	0.0880	0.0683	0.2234	-0.0880	-0.0683	-0.2234	-	-	-	0.6438	-	Temporary areas for hydrostatic testing would avoid aquatic habitats
V3c. Transmission Easement Vegetation Management - Brushy Vegetation	2 weeks	6 times over the permit term	31.50	31.5000	-	-	-	-	-	-	-	-	-	-	-	-	-	31.5000	-	
V5b. Elderberry Shrub Trimming and Removal - Removal by Transplantation	less than 1 day	10 times over the permit term	0.04	0.0016	0.0016	-	-	0.0032	0.0008	-	-				0.0008	-	-	0.0064	0.0008	
V7. Vegetation Management on Natural Gas Easement	3 weeks	6 times over the permit term	79.98	-	-	3.3085	7.0781	2.2337	1.7259	1.3381	4.3800	-	-	-	1.7259	1.3381	4.3800	12.6203	7.4440	

Table E-6h: Giant Garter Snake Aquatic and Upland Modeled Habitat Loss by Covered Activity - Temporary Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Temporary Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Valley Oak Woodland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Reduced Acreages			Final Acreages (After Reduction)			Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)	Justification
												Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)			
T2. New Construction of Telecommunication Tower(s)	30-45 days	2 times over the permit term	0.12	-	-	-	-	0.1200	-	-	-	-	-	-	-	-	-	0.1200	-	
T3. Electrical Telecommunications Overhead Fiber-optic Replacement and New Installation	1-2 days	2 times per year	43.80	-	0.1358	-	0.0472	1.1369	0.0391	0.0232	0.1123	-0.0235	-0.0139	-0.0674	0.0156	0.0093	0.0449	1.3200	0.0698	Pull sites would be sited to avoid aquatic habitats (but the shoo fly and impacts from the travelers installation could still affect aquatic habitats. The numbers here = 60% of the GIS numbers as about 60% of the impact footprint was from the pull sites
M2a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	0.26	-	-	-	0.2548	0.0020	-	-	-	-	-	-	-	-	-	0.2568	-	
M2b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.78	-	-	-	-	0.7699	0.0101	-	-	-	-	-	0.0101	-	-	0.7699	0.0101	
M2c. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Segment Replacement	up to 5 days	2 times over the permit term	0.46	-	-	-	0.1426	0.2300	0.0092	0.0005	0.0046	-	-	-	0.0092	0.0005	0.0046	0.3726	0.0143	
TOTALS	**-**	**-**	**7,340.25**	**38.2947**	**0.8788**	**8.7932**	**17.9262**	**36.3229**	**14.8026**	**3.4623**	**11.2970**	**-11.4778**	**-1.8360**	**-5.8784**	**3.3248**	**1.6263**	**5.4186**	**102.2158**	**10.3698**	

* Total Habitat Loss for activities is based on all activities listed in Table Y-1 regardless of whether or not it affects modeled habitat shown for this species.

Table E-7h: Giant Garter Snake Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Per Event

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Per Event (acres)	Valley Foothill Riparian (acres)	Valley Oak Woodland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.001	-	-	-	-	0.00003	-	-	0.000002	0.00003	0.000002
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.002	-	-	-	-	0.0001	-	-	0.000004	0.00005	0.000004
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	0.300	-	-	-	-	0.3000	-	-	-	0.300	-
E16 [1]. New Transmission Substation Construction	18 months	4 transmission substations over the permit term	11.000	-	-	-	-	10.8750	-	-	-	10.875	-
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	0.500	-	-	-	-	0.5000	-	-	-	0.500	-
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.000002	-	-	0.0000001	0.0000002	0.0000001	0.00000004	0.00000003	0.0000001	0.0000003	0.0000002
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.04	-	-	0.0017	0.0035	0.0011	0.0009	0.0007	0.0022	0.0063	0.0037
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.0001	-	-	0.000003	0.00001	0.000002	0.000002	0.000001	0.000004	0.00001	0.00001
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	-	-	0.0000003	0.0000005	0.0000002	0.0000001	0.0000001	0.0000003	0.000001	0.000001
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.000004	-	-	0.0000002	0.0000004	0.0000001	0.0000001	0.0000001	0.0000002	0.000001	0.0000004
M2a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	0.000020	-	-	-	0.00001	0.000004	-	-	-	0.00002	-
M2b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.009000	-	-	-	-	0.0090	-	-	-	0.0090	-
TOTALS	**-**	**-**	**22.79**	**-**	**-**	**0.00166**	**0.00356**	**11.68520**	**0.00087**	**0.00067**	**0.00220**	**11.69042**	**0.00374**

* Total Habitat Loss for activities is based on all activities listed in Table E-3k regardless of whether or not it affects modeled habitat shown for this species.

Table E-8h: Giant Garter Snake Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Annual

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Annual (acres)	Valley Foothill Riparian (acres)	Valley Oak Woodland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.004	0.00001	0.000002	0.000005	0.00001	0.0001	0.00002	0.000001	0.00001	0.0001	0.00002
E8. Pole Replacement	less than 1 day	671 per year	0.18	0.00058	0.00010	0.00021	0.0004	0.0022	0.0008	0.0001	0.0002	0.0035	0.0011
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	0.60	0.00017	0.000004	0.000003	0.00004	0.0003	0.0003	0.00002	0.0001	0.0005	0.0004
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	0.33	0.00009	0.000002	0.000002	0.00002	0.0002	0.0002	0.00001	0.00004	0.0003	0.0002
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.0004	-	-	-	-	0.00001	-	-	0.000001	0.00001	0.000001
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.02	0.00009	0.00001	0.00005	0.0001	0.0004	0.0001	0.00001	0.00004	0.0006	0.0002
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.02	0.00001	0.000001	0.000003	0.000002	0.00004	0.00003	0.000002	0.00001	0.0001	0.00004
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.004	0.000001	0.0000001	0.000001	0.000001	0.00001	0.00001	0.0000004	0.000001	0.00001	0.00001
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.001	-	-	0.00002	0.00004	0.00001	0.00001	0.000008	0.00003	0.0001	0.00005
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.003	-	-	0.0001	0.0003	0.0001	0.0001	0.00005	0.0002	0.0005	0.0003
TOTALS	**-**	**-**	**1.16**	**0.0009**	**0.0001**	**0.0004**	**0.0009**	**0.0033**	**0.0015**	**0.0002**	**0.0006**	**0.0057**	**0.0023**

* Total Habitat Loss for activities is based on all activities listed in Table Y-1 regardless of whether or not it affects modeled habitat shown for this species

Table E-9h: Giant Garter Snake Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Valley Oak Woodland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Reduced Acreages			Final Acreages (after reductions)			Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)	Justification
												Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)			
E6c. Wood Pole Repair - Trussing	2 hours	512 per year	0.12	0.0004	0.0001	0.0001	0.0003	0.0015	0.0006	0.00003	0.0002				0.0006	0.00003	0.0002	0.0024	0.0007	
E8. Pole Replacement	less than 1 day	671 per year	5.40	0.0173	0.0029	0.0062	0.0123	0.0656	0.0237	0.0016	0.0065				0.0237	0.0016	0.0065	0.1044	0.0318	
E9c. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Trenching	1-3 days	300 per year	18.00	0.0051	0.0001	0.0001	0.0011	0.0099	0.0092	0.0006	0.0022	-0.0092	-0.0006	-0.0022	-	-	-	0.0163	-	Pull boxes would not be placed in perennial aquatic habitat
E9d. Underground Component Repair and Replacement - Direct-Buried Cable Replacement - Horizontal Directional Drilling (HDD)	4 days	164 per year	9.84	0.0028	0.0001	0.0001	0.0006	0.0054	0.0050	0.0003	0.0012	-0.0050	-0.0003	-0.0012	-	-	-	0.0089	-	Pull boxes would not be placed in aquatic habitat
E10b. Steel Lattice Tower Repair and Replacement - Lattice Tower Foundation Repair	4 days	2 per year	0.01	-	-	-	-	0.0003	-	-	0.00002	-	-	-	-	-	0.00002	0.0003	0.00002	
E10c. Steel Lattice Tower Repair and Replacement - Steel Lattice Tower Replacement with a Tubular Steel Pole	4 weeks	8 over the permit term	0.01	-	-	-	-	0.0002	-	-	0.00001	-	-	-	-	-	0.00001	0.0002	0.00001	
E10d. Steel Lattice Tower Repair and Replacement - Lattice Tower Replacement - with a new Lattice Tower	4 weeks	2 over the permit term	0.0004	-	-	-	-	0.00001	-	-	0.000001	-	-	-	-	-	0.000001	0.00001	0.000001	
E13. New and Relocated Overhead Subtransmission and Distribution Line Construction	3 days or less	66 per year	0.60	0.0027	0.0004	0.0015	0.0022	0.0118	0.0043	0.0004	0.0013	-0.0043	-0.0004	-0.0013	-	-	-	0.0186	-	
E14a [1]. New Underground Distribution and Subtransmission Line Construction - Trenching	1-3 days	8 (100 ft. long lines) per year	0.60	0.0002	0.00002	0.0001	0.0001	0.0013	0.0010	0.0001	0.0002	-0.0010	-0.0001	-0.0002	-	-	-	0.0017	-	Pull boxes would not be placed in perennial aquatic habitat
E14a [2]. New Underground Distribution and Subtransmission Line Construction - Trenching	7 days	3 (2,000 ft. long lines) per permit term	0.01	0.000003	0.0000003	0.000001	0.000001	0.00002	0.00002	0.000001	0.000003	-0.00002	-0.000001	-0.000003	-	-	-	0.00005	-	Pull boxes would not be placed in perennial aquatic habitat

Table E-9h: Giant Garter Snake Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Valley Oak Woodland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Reduced Acreages			Final Acreages (after reductions)			Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)	Justification
												Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)			
E14b. New Underground Distribution and Subtransmission Line Construction - Horizontal Directional Drilling (HDD)	3 days	2 per year	0.12	0.00004	0.000004	0.00002	0.00001	0.0003	0.0002	0.00001	0.00004	-0.0002	-0.00001	-0.00004	-	-	-	0.0003	-	Pull boxes would not be placed in perennial aquatic habitat
E15. Existing Distribution Substation Expansion	4 months	6 over the permit term	1.80	-	-	-	-	1.8000	-	-	-	-	-	-	-	-	-	1.8000	-	
E16 [1]. New Transmission Substation Construction	18 months	1 transmission substations over the permit term	11.00	-	-	-	-	10.5000	-	-	-	-	-	-	-	-	-	10.5000	-	
E16 [2]. New Distribution Substation Construction	5 months	2 distribution substations over the permit term	1.00	-	-	-	-	1.0000	-	-	-	-	-	-	-	-	-	1.0000	-	
G5a. Aboveground Pipeline Maintenance and Repair	less than 1 day	25 per year	0.02	-	-	0.0008	0.0018	0.0006	0.0004	0.0003	0.0011	-	-	-	0.0004	0.0003	0.0011	0.0032	0.0019	
G5b. Underground Pipeline Maintenance and Repair	1.5 days	5 per year	0.09	-	-	0.0037	0.0080	0.0025	0.0019	0.0015	0.0049	-	-	-	0.0019	0.0015	0.0049	0.0142	0.0084	
G6. Pipeline Cathodic Protection Test Station Installation	less than 2 days	10 over the permit term	0.00002	-	-	0.000001	0.000002	0.000001	0.0000004	0.0000003	0.000001	-0.00000043	-0.00000033	-0.0000011	-	-	-	0.000003	-	Cathodic protection test stations would not be sited in aquatic features
G9. New Construction for Valve Stations and Pressure-Limiting Stations	1-2 months	3 over the permit term	0.12	-	-	0.0050	0.0106	0.0034	0.0026	0.0020	0.0066	-	-	-	0.0026	0.0020	0.0066	0.0189	0.0112	
G10a. New Construction for Realigned Pipelines - Trenching.	2 months	6 over the permit term	0.001	-	-	0.00002	0.00004	0.00001	0.00001	0.00001	0.00003	-0.00001	-0.00001	-0.00003	-	-	-	0.0001	-	Pipeline markers would not be placed in aquatic habitat
G10b. New Construction for Realigned Pipelines - Horizontal Directional Drilling	3 weeks	3 over the permit term	0.00001	-	-	0.0000004	0.000001	0.0000003	0.0000002	0.0000002	0.000001	-0.0000002	-0.0000002	-0.000001	-	-	-	0.000002	-	Pipeline markers would not be placed in aquatic habitat
G10c. New Construction for Realigned Pipelines - Directional Boring	up to 5 days	3 over the permit term	0.00001	-	-	0.0000004	0.000001	0.0000003	0.0000002	0.0000002	0.000001	-0.0000002	-0.0000002	-0.000001	-	-	-	0.000002	-	Pipeline markers would not be placed in aquatic habitat
M. Rancho Seco Photovoltaic 5 Removal	4 weeks	1 time over the permit term	10.65000	-	-	-	-	10.6500	-	-	-	-	-	-	-	-	-	10.6500	-	
M2a. Cosumnes Power Plant Water Pipeline Management - Cathodic Protection Installation	less than 2 days	5 times over the permit term	0.00010	-	-	-	-	0.00002	-	-	-	-	-	-	-	-	-	0.00002	-	

Table E-9h: Giant Garter Snake Aquatic and Upland Modeled Habitat Loss by Covered Activity - Permanent Habitat Loss - Entire Permit Term (cont.)

Covered Activity Number and Title	Duration	Frequency	Permanent Habitat Loss - Entire Permit Term (acres)	Valley Foothill Riparian (acres)	Valley Oak Woodland (acres)	Rice (acres)	Pasture (acres)	Grasses and Forbs (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Reduced Acreages			Final Acreages (after reductions)			Total Upland Modeled Habitat (acres)	Total Aquatic Modeled Habitat (acres)	Justification
												Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)	Riverine (acres)	Open Water/Fringe (acres)	Other Depressional Wetland (acres)			
M2b. Cosumnes Power Plant Water Pipeline Management - Water Pipeline Valve Installation	1-2 months	1 time over the permit term	0.00900	-	-	-	-	0.0090	-	-	-	-	-	-	-	-	-	0.0090	-	
TOTALS	**-**	**-**	**68.02**	**0.0285**	**0.0035**	**0.0176**	**0.0371**	**24.0618**	**0.0490**	**0.0069**	**0.0242**	**-0.0197**	**-0.0014**	**-0.0049**	**0.0293**	**0.0055**	**0.0193**	**24.1485**	**0.0540**	

* Total Habitat Loss for activities is based on all activities listed in Table Y-1 regardless of whether or not it affects modeled habitat shown for this species.

Table E-10h: Total Giant Garter Snake Aquatic and Upland Modeled Habitat Loss

SMUD HCP Land Cover Types	Permit Term Covered Activities	
	Temporary Land Cover Loss (acres)	Permanent Land Cover Loss (acres)
Valley Foothill Riparian	38.3	0.03
Valley Oak Woodland	0.9	0.004
Rice	8.8	0.02
Pasture	18.0	0.04
Grasses and Forbs	36.3	57.1
Riverine	3.3	0.03
Open Water/Fringe	1.6	0.006
Other Depressional Wetland	5.4	0.02
Subtotal Upland	*102.2*	*24.1*
Subtotal Aquatic	*10.4*	*0.05*
TOTAL	**112.6**	**24.2**

APPENDIX F SMUD NATURE PRESERVE LONG TERM MANAGEMENT PLAN

Long-Term Management Plan
for the
SMUD Nature Preserve Mitigation Bank
Sacramento County, California

Prepared for:

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
The Power To Do More.®

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Appendix A. Figures 1 through 11

LIST OF ABBREVIATED TERMS

AU	animal unit
AWE	Area West Environmental, Inc.
Bank	SMUD Nature Preserve Mitigation Bank
BEI	Bank Enabling Instrument
Bti	*Bacillus thuringiensis* var. *israelensis*
Cal-IPC	California Invasive Plant Council
CESA	California Endangered Species Act
CDFW	California Department of Fish and Wildlife
CNPS	California Native Plant Society
Corps	U.S. Army Corps of Engineers
County	County of Sacramento
CPP	Cosumnes Power Plant
ESA	Federal Endangered Species Act
FR	Federal Register
GPS	Global Positioning System
HCP	Habitat Conservation Plan
HUC	Hydrologic Unit Code
IRT	Interagency Review Team
PAWS	Performing Animal Welfare Society
RDM	residual dry matter
SMUD	Sacramento Municipal Utility District
SVC	Sacramento Valley Conservancy
TNC	The Nature Conservancy
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 Introduction

The following Long-Term Management Plan was developed for the Sacramento Municipal Utility District's (SMUD's) Nature Preserve Mitigation Bank (Bank) located in southern Sacramento County (Figure 1; all figures are located in Appendix A).

This document is consistent with the Long-Term Management Plan template (revised May 2008) developed by the U.S. Army Corps of Engineers (Corps), the U.S. Fish and Wildlife Service (USFWS), and the California Department of Fish and Wildlife (CDFW), among others. The Bank Enabling Instrument (BEI) signatory agencies are the Sacramento District of the Corps, Region 9 of the U.S. Environmental Protection Agency (USEPA), the Sacramento Office of USFWS, and the North Central Region of CDFW. These agencies comprise and are referred to jointly as the Interagency Review Team (IRT). Terms used in this management plan have the same meaning as defined in the Bank Enabling Instrument (BEI).

Establishment of the Bank will result in preservation of 52.57 acres of existing wetland habitats and associated plant and wildlife species, preservation of 2.98 acres of previously restored wetlands and up to 25 acres of restoration/establishment of vernal pools, vernal swales, seasonal wetlands, and seasonal swales (Table 1).

Establishment of the Bank will also result in preservation of approximately 1,034 acres of annual grasslands that provide upland habitat for California tiger salamanders (Table 2). Additionally, Bank establishment will result in the preservation of 0.801 acre of previously documented nesting habitat for tricolored blackbird within uplands associated with riparian scrub vegetation (Table 2).

In addition to the habitats and species listed in the Tables 1 and 2, SMUD—working with the IRT—will request additional credit releases under the following circumstances:

- If additional locations of special-status species or habitat are identified at the Bank;
- If new resources are identified at the Bank;
- If additional areas with restoration potential are identified; or
- If resources that occur at the Bank are provided additional federal, state, or local protections.

Table 1. Existing and Proposed Wetlands and Special-Status Species Habitats at the SMUD Nature Preserve Mitigation Bank

Wetland Type	Special-Status Species Habitat[a]	Acres of Habitat for Each Species or Group of Species within a Wetland Type	Total Acreage for Each Wetland Type
Preserved Existing Wetlands			
Intermittent drainage	No special-status species habitat	3.336	3.336
Juncus wetland	No special-status species habitat	0.335	0.335
Open water	VPFS, VPTS, CTS	0.253	4.888
	TCBB[b]	0.407	
	No special-status species habitat	4.228	
Seasonal swale	No special-status species habitat	0.307	0.307
Seasonal wetland	VPFS, VPTS, LELI	2.497	7.614
	VPFS, VPTS	3.361	
	VPFS, VPTS, LELI, TCBB [b]	1.756	
Vernal pool	VPFS, VPTS, CTS	0.587	28.822
	VPFS, VPTS, LELI, TCBB [b]	0.405	
	VPFS, VPTS, DOPU	0.174	
	VPFS, VPTS, LELI	0.423	
	VPFS, VPTS, LELI, GRHE, ORVI, CTS	1.705	
	VPFS, VPTS, LELI, ORVI, CTS	1.274	
	VPFS, VPTS, RALO	0.049	
	VPFS, VPTS	24.205	
Vernal swale	VPFS, VPTS	7.266	7.266
		Total preserved wetland acreage	***52.57***
Previously Restored Wetlands			
Vernal pool	VPFS, VPTS	1.208	2.924
	VPFS, VPTS, CTS	1.716	
Vernal swale	VPFS, VPTS	0.053	0.053
		Total previously restored wetland acreage	***2.98***
Proposed Restored/Established Wetlands			
Vernal pool and/or seasonal wetlands	VPFS, VPTS	23.5	23.5
Vernal swale/or seasonal swale	VPFS, VPTS	1.5	1.5
		Total proposed restored/established wetland acrege	***Up to 25.00***

[a] Species abbreviations:
CTS California tiger salamander (*Ambystoma californiense*)
VPFS Vernal pool fairy shrimp (*Branchinecta lynchi*)
VPTS Vernal pool tadpole shrimp (*Lepidurus packardi*)
TCBB Tricolored blackbird (*Agelaius tricolor*)
DOPU Dwarf downingia (*Downingia pusilla*)
GRHE Boggs Lake hedge-hyssop (*Gratiola heterosepala*).
LELI Legenere (*Legenere limosa*).
ORVI Sacramento Orcutt grass (*Orcuttia viscida*).
RALO Lobb's aquatic buttercup (*Ranunculus lobbii*).

[b] Tricolored blackbird nesting habitat:

The 2.57 acres of nesting habitat for tricolored blackbird is based on acreage of the vegetated portions (i.e., willows) of open water, seasonal wetland, and vernal pool habitats where breeding activity has been documented.

Table 2. Existing and Proposed Upland Habitats and Special-Status Species at the SMUD Nature Preserve Mitigation Bank

Upland Habitat Type	Special-Status Species	Total Preserved Upland Habitat (Acres or # of tress)
Existing Upland Habitat		
Annual Grassland	California tiger salamander (upland)[a]	1,034
	Tricolored blackbird (nesting)[b]	0.801
	Total preserved upland acreage	***1,035***

Notes:

[a] Acreage of existing California tiger salamander upland habitat on the Bank was determined by calculating non-aquatic habitat (annual grassland) within 0.7 mile of a known breeding site on the Bank (1,059 acres) and subtracting 25 acres of proposed wetlands to be restored on the Bank.

[b] Tricolored blackbird nesting habitat occurs within 0.801 acre of uplands, consisting of riparian scrub vegetation within a grassland area where breeding activity has been previously documented.

1.1 Purpose of Bank Establishment

The purpose of Bank establishment is to provide preserved, enhanced, restored, and established mitigation habitats that can be used to compensate for habitat impacts associated with future public or private agency-approved projects.

1.2 Purpose of This Long-Term Management Plan

The purpose of this Long-Term Management Plan is to ensure that the Bank is managed, monitored, and maintained in perpetuity. This management plan establishes objectives and tasks to monitor, manage, maintain, and report on the status of waters of the U.S., including wetlands; covered species; and covered habitats at the Bank. This management plan is a binding and enforceable instrument, implemented by a permanent conservation easement (Exhibit E-4 of the BEI) covering the Bank.

1.3 Land Manager and Responsibilities

SMUD is the property owner. The land manager for the Bank will either be the property owner or the conservation easement holder. The land manager, and subsequent land managers upon transfer, shall implement this Long-Term Management Plan, managing and monitoring the Bank property in perpetuity to preserve its habitat and conservation values in accordance with the Bank's BEI, including the permanent conservation easement and the Long-Term Management Plan. Long-term management tasks shall be funded through an endowment fund provided by SMUD. The land manager shall be responsible for providing an annual report to the Corps detailing the time period covered, an itemized account of the management tasks, recommendations for remedial actions, and total amount expended. Any subsequent grading, or alteration of the site's hydrology or topography by the land manager or its representatives, must

be approved by the IRT; and the necessary permits, such as a Clean Water Act Section 404 permit, must be obtained if required.

2.0 Property Description

2.1 Location and Setting

The Bank encompasses approximately 1,132 acres owned by SMUD and is located in southeastern Sacramento County, approximately 12 miles east of State Route 99, south of State Route 104, and east of the decommissioned Rancho Seco Nuclear Generating Station (shut down in 1989) towers in Sacramento County, California (Figures 1 and 2, all figures located within Appendix A). The Bank occurs mostly within Township 6 North, Range 8 East, Sections 27, 28, 29, 32, 33, and 34 of the Goose Creek U.S. Geological Survey (USGS) 7.5-minute quadrangle, with a small portion along the western boundary of the Bank occurring in Section 29 of the Clay USGS 7.5-minute quadrangle (Figure 2). The Bank is in size.

The Bank is characterized by rolling hills covered with native and naturalized non-native annual grasses typical of the Sacramento County region. Wetlands and other waters of the U.S. are present throughout much of the Bank and include vernal pools, vernal swales, seasonal wetlands, seasonal swales, Juncus wetlands, intermittent drainages, open water, and an agricultural return ditch (Figure 3). Clay Creek runs through the northeastern corner of the Bank (Figure 2) and is dammed to create Rancho Seco Lake (outside of the Bank). SMUD maintains the water level of Rancho Seco Lake at an elevation of approximately 237 feet above mean sea level throughout the year. The lake level is maintained by natural flow into the lake and from water pumped into the lake from the Folsom South Canal (Figure 1).

2.2 History and Land Use

In 1966, SMUD purchased 2,100 acres (including the Bank) in southeast Sacramento County for construction of a nuclear power plant. Construction of the Rancho Seco Nuclear Generating Station began in 1969. Commercial operation started in 1975, in Clay Station, approximately 0.5 mile west and north of the Bank. The power plant was operated until 1989, when it was closed by public vote.

As part of the development agreement to construct and operate the power plant, SMUD contracted with the State of California to operate part of the power plant site as a public park for 50 years. SMUD entered into the contract with the State of California that granted SMUD funding for the construction of the Rancho Seco dam and reservoir, recreational facilities, and water and sanitary facilities. This contract requires SMUD to maintain these facilities in a manner that supports public recreational use and fisheries. The reservoir may not be drawn down below an elevation of 237 feet without the prior written consent of the state. The contract remains in effect until December 31, 2022.

In accordance with the state contract, SMUD entered into a contract with the County of Sacramento (County) for the management of public recreational uses. Under the terms of the contract with the County, SMUD agreed to construct water, sanitary, and recreation facilities and to operate the reservoir and the County would manage the public recreational uses. However, a budget shortfall in 1992 resulted in the County discontinuing management of the park facilities in September 1992 and SMUD assuming those responsibilities.

In October 2006, SMUD teamed up with SVC and The Nature Conservancy (TNC) to set aside approximately 1,200 acres of land on the SMUD-owned Rancho Seco property as a temporary nature preserve. SMUD granted SVC a 30-month temporary easement for the protection of critical ecological and agricultural resources, including wetlands that support species that are state and federally listed as threatened and endangered. SVC assumed management of grazing on the land, which is leased to a cattle rancher. The temporary conservation easement was extended to December 31, 2011, and the grazing lease is still active. As long as the Bank Enabling Instrument (BEI) is progressing toward approval, SMUD anticipates extending the temporary conservation easement annually, to be terminated upon Bank establishment.

2.3 Cultural Resources

Existing infrastructure within the Bank includes several well-maintained interior dirt access roads. These interior roads allow access through locked gates from the paved road to Rancho Seco Lake and associated recreation facilities, and from Clay East Road. There are no buildings on the Bank. There are no levees on the Bank; however, existing berms surround several of the reservoirs (open water) located on the Bank, which were constructed for livestock drinking water. The majority of the Bank boundary is fenced, with occasional locked gates for access onto the site. Several interior fences are present on the Bank to restrict cattle movement during grazing. In addition, no State-owned historic properties are located on the Bank.

The majority of the Bank has been previously surveyed for cultural resources. The entire Bank was surveyed in 2007 by Golden Hills Consulting. Previous surveys include:

- *Cultural Resource Assessment of the Proposed SMUD Photovoltaic Project, Sacramento County, California* (Peak & Associates 1984);
- *Cultural Resources Report for Rancho Seco Park, Sacramento County, California* (Costello et al., Foothill Resources 1993);
- *Documentation and National Register of Historic Places, Evaluation of Historic Resources for the Rancho Seco Park Project, Sacramento County, California* (Marvin and Fryman, Foothills Resources 1994); and
- *Cultural Resource Survey of Selected Locations for the Cosumnes Power Plant Project Rancho Seco, California* (Sharpe and Bard, CH2M HILL 2002).

Potential impacts to recorded prehistoric or historic cultural resource locations are not anticipated from monitoring and management of the Bank. High and moderate sensitivity areas occur on the Bank; however, no ground disturbance will occur within high sensitivity (areas where cultural resources have been previously recorded) areas. Any future ground disturbance during the Long-Term Management Period that occurs within culturally sensitive areas will be monitored by a cultural resources specialist.

2.4 Hydrology and Topography

The Bank occurs within the Laguna and Dry Creek subwatersheds, in the USGS 10 digit Hydrologic Unit Codes (HUCs) 1804001307 and 1804001209, respectively.

The terrain of the Bank consists of rolling gentle slopes with many small collection tributaries that drain runoff from incidental rainfall (Figure 4). The Bank ranges in elevation from 130 to 280 feet above mean sea level. Most land on the Bank drains, eventually, to Hadselville Creek (Figure 2); either through small intermittent tributaries to Hadselville Creek or to Clay Creek, which is also a tributary to Hadselville Creek. Hadselville Creek drains into Laguna Creek, which conveys flow westerly to the Cosumnes River and then into the Mokelumne River. The Bank and vicinity have not historically been prone to flooding and are not likely to flood even under heavy rainfall (SMUD 1991).

Rancho Seco Lake, which is surrounded by the Bank but not included in the Bank, has a tributary area of approximately 1,000 acres in the upper reaches of Clay Creek. The lake covers an area of approximately 160 acres and has an approximate storage capacity of 2,850 acre-feet (Jones & Stokes Associates 1993).

The flow in Clay Creek, which was an intermittent stream before construction of Rancho Seco Lake, is dominated downstream of the Bank by water discharge from the Rancho Seco site. Water transfers from the Folsom South Canal to a seasonal unnamed creek that is a tributary of Clay Creek from the decommissioned Rancho Seco Nuclear Generating Station on a continual basis at an average flow of 6,000 gallons per minute. Water can be transferred either through the power plant to the unnamed creek or to Rancho Seco Lake. (Scott pers. comm.)

2.4.1 Vernal Pool Hydrology

The Bank contains a significant number of vernal pools. Vernal pools provide important hydrologic functions, in addition to sustaining biological resources, by linking the flow of precipitation, surface water, and groundwater between the upstream and downstream portions of a watershed. Vernal pools may retard the flow of surface runoff, reduce flow velocities, and reduce erosion potential. Vernal pools can also contribute to groundwater recharge and discharge as surface water.

Within the Bank, vernal pools are underlain by an impermeable duripan and/or clay layers (claypan). In general, direct inception of precipitation is the main source of water filling vernal pools and evaporation/transpiration are the main causes of water loss. Overland and subsurface flow can also contribute to filling vernal pools. Water may also be lost by subsurface flow. This is especially true for vernal pools not connected to an upstream channel or swale. Overland flow between vernal pools on the Bank is probably not a major hydrologic pathway; soils have a low infiltration rate, but the gentle slopes allow water to be retained in the soil. This condition can result in the presence of perched groundwater.

2.5 Soils

The Bank is located on two distinct landforms: Laguna Formation and Mehrten Formation. Based on the Sacramento County Soil Survey (U.S. Department of Agriculture Natural

Resources Conservation Service 1993), these geologic formations support five soil map units (Table 3 and Figure 5).

Table 3. Geologic Formations and Associated Soil Map Units at the SMUD Nature Preserve Mitigation Bank

Soil Map Unit	Geologic Formation
125 – Corning complex, 0–8% slopes	Laguna
126 – Corning-Redding complex, 8–30% slopes	Laguna
156 – Hadselville-Pentz complex, 2–30% slopes	Mehrten
198 – Redding gravelly loam, 0–8% slopes	Laguna
247 – Open water	Not applicable

2.6 Existing Utilities, Easements, and Leases

Existing utility infrastructure on the Bank includes an active pole line, owned by SMUD, which is located along the southwest side of the Rancho Seco Lake dam and extends westward along a dirt access road (Figure 6). The portion of this pole line that occurs on the Bank consists of approximately 16 poles situated along the northern extent of the pole line. These 16 poles and overhead wires are located on the Bank boundary and along a disturbed corridor (i.e., dirt road and/or fire break). Additionally, Pacific Gas & Electric (PG&E) maintains four lattice towers and associated 230 kV overhead transmission lines located along the Bank boundary in the southwest corner of the Bank (Figure 6). An underground telephone cable owned and maintained by AT&T (formerly Pacific Bell) is also present within the Bank to service existing SMUD facilities adjacent to the Bank. This cable line extends from the north end of the Performing Animal Welfare Society (PAWS) area within a dirt access road/firebreak along the Bank Boundary and continues westward along Clay East Road (Figure 6).

The majority of existing utility infrastructure on the Bank occurs within an existing disturbed corridor (i.e., dirt access road/firebreak or adjacent to a paved roadway) and any necessary maintenance activities associated with these facilities will be conducted in a manner that would avoid and/or minimize effects to nearby waters of the U.S., including wetlands, and associated special-status species. Any maintenance activities occurring on the Bank would likely trigger the need for additional permitting and consultation with the IRT would be required.

The Proforma Title Report for the Bank is provided as Exhibit E-2 (Attachment 1) of BEI.

2.7 Surrounding Land Uses and Zoning

Surrounding lands consist mostly of grazed annual grasslands with large vernal pool complexes. Adjacent developed areas include the decommissioned Rancho Seco Nuclear Generating Station (shut down in 1989), the Cosumnes Power Plant (CPP), Rancho Seco Lake and associated recreational facilities, and the Amanda Blake Memorial Wildlife Refuge (Figure 7). Lands surrounding the Bank are zoned Permanent Agriculture, 80 acre minimum (Figure 8) (County of Sacramento 2010a). No known development is planned on private lands adjacent to the Bank (County of Sacramento 2010b). SMUD has the option to construct a 500-megawatt natural gas power plant associated with the CPP (within the existing CPP footprint shown on Figure 7), and

SMUD may consider installation of solar power-generation facilities on SMUD-owned lands west of the Bank.

There are existing preserves and conservation easements adjacent to the Bank. Developed or preserve facilities/areas surrounding the Bank are briefly described below.

2.7.1 Rancho Seco Nuclear Generating Station (Decommissioned)

SMUD's decommissioned Rancho Seco Nuclear Generating Station facility is approximately 160 acres and is located 0.5 mile north and west of the Bank. SMUD permanently terminated nuclear power operations at these facilities on June 7, 1989, and began decommissioning activities in February 1997. On June 30, 2000, the Nuclear Regulatory Commission (NRC) issued Materials License SNM-2510 for the Rancho Seco Independent Spent Fuel Storage Installation (ISFSI), which authorizes SMUD to store spent fuel in the ISFSI. SMUD completed transferring all of the spent fuel on August 21, 2002. On June 8, 2009, SMUD requested the release of a portion of the Rancho Seco Nuclear Generating Station from NRC 10 Code of Federal Regulations (CFR) Part 50 license DPR-54. The area requested for release included the entire licensed site, except for a 1-acre area associated with the Interim Onsite Storage Building (IOSB) and the ISFSI. The request stated that the area to be released was "not impacted" by the reactor operation as detailed in the License Termination Plan which was approved by NRC. The NRC granted this request on September 25, 2009, and released the area for unrestricted public use (Nuclear Regulatory Commission 2009).

Because the Bank is located in close proximity to the closed Rancho Seco Nuclear Generating Station, information regarding historical radiological site characterization and the decommissioning process is provided in the Phase I Environmental Site Assessment (Exhibit G of the BEI) to demonstrate that the Bank property was not impacted by operation and decommissioning of the nuclear generating station. The Phase I Environmental Site Assessment (Exhibit G of the BEI) also includes a summary of previous environmental reports, which were developed in support of the license termination plan for Rancho Seco Nuclear Generating Station.

2.7.2 Cosumnes Power Plant

The SMUD CPP is located on a 30-acre site approximately 0.5 mile south of the decommissioned Rancho Seco Nuclear Generating Station and north of the Bank (Figure 3). The first phase of the CPP (500 megawatts) went on-line on February 24, 2006. The CPP is considered a state-of-the-art facility that uses combined-cycle technology to capture heat normally lost in the production of electricity, making it highly fuel efficient and clean. The 500-megawatt CPP, the largest power plant in Sacramento County, can provide enough power to meet the annual energy needs of approximately 450,000 single-family homes. A potential second phase of the CPP could add an additional 500 megawatts. The second phase would be constructed within the existing CPP footprint and would utilize the existing graveled laydown area (Figure 3). No additional ground disturbance would be required to construct the second phase. To date, no plans have been developed for a second phase.

2.7.3 Rancho Seco Lake

In the early 1970s, a small pond located on the Rancho Seco Nuclear Generating Station site was expanded into a 160-acre lake (Ranch Seco Lake) and used as an emergency backup water supply in case water delivery from the Folsom South Canal was temporarily halted. The current lake and surrounding park facilities (developed area) are located in the central portion of the Bank but outside the Bank boundaries (Figure 3). Riparian vegetation, including many large trees, is present around the lake and provides potential nesting habitat for special-status and non-special-status raptors that forage at the Bank.

2.7.4 Amanda Blake Memorial Wildlife Refuge

In 1995, SMUD entered into a lease agreement with the PAWS to establish the Amanda Blake Memorial Wildlife Refuge. The refuge is a 75-acre sanctuary located just west of Rancho Seco Lake that houses rescued animals including oryx, eland, fallow deer, giraffe, zebra, ostrich, and emu. The refuge occurs adjacent to the southern boundary of the Bank (Figure 7). The southern undeveloped portion of the refuge contains five vernal pools that provide habitat for federally listed large branchiopod species.

2.7.5 Howard Ranch

Adjacent to the Bank, to the east, is Howard Ranch (Figure 7). In 1999, TNC purchased 12,000 acres of the Howard Ranch from the heirs of Charles Howard, owner of the famed racehorse Seabiscuit. TNC placed permanent protective restrictions on the property and resold the land to a local cattleman. This area will remain in its present state (grazed vernal pool grassland) in perpetuity.

2.7.6 Howard Ranch Nature Trail

On October 1, 2002, a Memorandum of Agreement (MOA) (not an easement) was recorded between SMUD and TNC for construction and maintenance of a foot trail that would extend through a portion of the Bank. A copy of the MOA is provided in Attachment 1 of Exhibit E-1 of the BEI. In June 2006, SMUD—working cooperatively with TNC—dedicated the Howard Ranch Nature Trail, a 7-mile long trail through the Bank and the adjoining Howard Ranch. Within the Bank, the Howard Ranch Nature Trail extends for approximately 0.62 mile from the eastern boundary of the Bank, through a vernal pool and grassland landscape until it reaches the Bank boundary at the westernmost finger of Rancho Seco Lake (Figure 3 and photograph 5 in Appendix C). The trail continues along the northern edge of Rancho Seco Lake outside the Bank.

3.0 Habitat and Species Descriptions

3.1 Biological Resources Surveys

Numerous biological resources surveys have been conducted throughout the Bank from 1993 to 2011. Field surveys performed at the Bank included a wetland delineation, special-status plant surveys, and targeted special-status wildlife surveys (large branchiopods, California tiger salamander, and nesting birds). Specific survey dates, personnel, methods, and results are provided in Exhibit H of the BEI.

3.2 Summary of Bank Development Plan

The focus of the Bank is preservation of sensitive habitats, including wetlands. In addition to preservation, development includes additional wetland restoration/ establishment, wildlife habitat enhancement, and native oak tree plantings.

The primary emphasis of the Development Plan is restoration of vernal pools, vernal swales, and seasonal wetlands eliminated during land leveling in the 1960s. Restoration and establishment of wetland habitats and construction of interspersed mima mounds will focus on using existing site materials and hydrology to create vernal pools, vernal swales, and seasonal wetlands in areas that do not currently support Corps-jurisdictional wetlands. Restoration of wetland habitat will occur in areas where historical locations of vernal pools and swales were leveled during creation of the onsite irrigated pasture habitat (Figure 3). A very limited amount of establishment will occur within the irrigated pasture habitat and will focus on creating a connection between existing vernal pool/swales and restored vernal pool/swales. The proposed wetland restoration and establishment at the Bank were designed to ensure that no adverse effects occurred on surrounding natural wetlands (e.g., a reduction of a contributory watershed or adverse changes in hydrologic connectivity). Vegetation (i.e., seeds and roots, and bulbs) and invertebrate materials will be collected primarily by mowing or vacuum method from existing vernal pools and swales at the Bank and distributed into constructed wetlands as inoculum. Onsite collection will be conducted to ensure that quantities of vegetation materials harvested at individual collection sites do not exhaust the natural functions of the existing habitat (i.e., no more than 10 percent of dry vegetation and no more than 5 percent of live vegetation materials [plugs] will be harvested at any one site). Due to the numerous vernal pools and swales onsite, ample collection materials are available. In subsequent years, inoculum will be re-collected from preserved wetlands and distributed into constructed wetlands if the constructed wetlands are found to have less than 50 percent vegetation cover.

Enhancement of burrowing owl habitat on the Bank involves installation of nest boxes. Enhancement of California tiger salamander habitat on the Bank involves removal of non-native fish and bullfrogs (*Rana catesbeiana*) from onsite wetlands identified as potential breeding habitat (ponds) that do not currently support tiger salamanders. Maintenance of enhanced California tiger salamander breeding ponds or ponds known to support breeding California tiger salamanders may include vegetation management (grazing program) to reduce thatch accumulation, which increases the ability of California tiger salamanders to move into and out of breeding ponds and potentially increases the hydroperiod of breeding pools/ponds.

To further enhance native habitat on the Bank, SMUD will restore oak savannah within approximately 280 acres located primarily in the northern portion of the Bank. Tree species that may be planted include blue oak (*Quercus douglasii*); valley oak (*Quercus lobata*); and possibly interior live oak (*Quercus wislizeni*) depending on the soil, slope, and availability of water.

3.3 Vegetation Communities and Habitats

The combination of soils, hydrology, and Mediterranean climate (cool wet winters and hot dry summers) supports plant species associated with the Sacramento Valley vegetation communities. Nine general vegetation communities or habitats types (including waters of the U.S. and wetlands) occur on the Bank: annual grassland, irrigated pasture, vernal pool, vernal swale, seasonal wetland, seasonal swale, Juncus wetland, intermittent drainage, and open water. Natural high-density vernal pool complexes (consisting of vernal pools, vernal swales, and adjacent uplands) occur throughout the Bank.

3.4 Endangered and Threatened Species/Rare Species and Species of Special Concern

Endangered and Threatened Species/Rare Species and Species of Special Concern (special-status species) on the Bank include species listed as threatened or endangered under the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA), species of special concern designated by CDFW, and species considered rare by the California Native Plant Society (CNPS). Based on the results of a biological evaluation and special-status species surveys conducted on the Bank to date, several state and/or federally protected plant and wildlfie species and several special-status local plant species (CNPS-listed plants) have been documented on the Bank (Figures 9 and 10). Five special-status plant species (Boggs Lake hedge-hyssop, legenere, Sacramento Orcutt grass, Lobb's aquatic buttercup, and dwarf downingia) are known to occur within vernal pools, vernal swales, seasonal wetlands, and open water habitats at the Bank (Figure 9). Special-status wildlife observed on the Bank include vernal pool tadpole shrimp, vernal pool fairy shrimp, California tiger salamander, burrowing owl (wintering), tricolored blackbird (nesting and foraging), short-eared owl (nesting), northern harrier (foraging), golden eagle (foraging), osprey (foraging), and Swainson's hawk (foraging). A description of each of these species, along with location information on the Bank, are provided in Exhibit C-1 of the BEI. Additional species surveys will occur in the future and the list of special-status species occurring on the Bank may expand.

3.5 Non-Native Invasive Plant Species

Non-native invasive plant species are plants that are not native to, yet can spread into, native ecosystems. These species also displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes (California Invasive Plant Council 2006). An invasive plant survey was conducted at the Bank on July 15, 2008. A list of non-native invasive plant species found on the Bank and their most current California Invasive Plant Council (Cal-IPC) ratings are provided in Exhibit C-1 of the BEI.

4.0 Management and Monitoring

The overall goal of long-term adaptive management is to provide for long-term viability of waters of the U.S., covered species, and covered habitats at the Bank. Long-term adaptive management and monitoring will be implemented after the Interim Monitoring Period is complete. Interim monitoring methods are detailed in Exhibit C-1 of the BEI. Long-term management and monitoring of the Bank is intended to assure the viability and protection of biological resources on the Bank in perpetuity.

For purposes of this Long-Term Management Plan, adaptive management is an approach to natural resource management that incorporates changes to management practices, including corrective actions as determined to be appropriate by the IRT in discussion with SMUD and the land manager. Adaptive management includes those activities necessary to address the effects of climate change, fire, flood, or other natural unforeseen events or conditions that may arise. Before considering any adaptive management changes to the Long-Term Management Plan, the IRT will consider whether such actions will help to ensure the continued viability of the Bank's biological resources.

Future research and monitoring results for the Bank may identify methods or techniques that could improve management activities or enhance habitat features on the Bank. As appropriate, improved management and monitoring tasks that enhance habitats and promote species on the Bank may be implemented if funding is available.

4.1 Biological Resources

The general approach to the long-term management of the Bank's biological resources is to conduct annual site examinations and monitoring of selected characteristics to determine stability and ongoing trends of the preserved, enhanced, restored, and established wetland habitats and covered habitats for vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, tricolored blackbird, Boggs Lake hedge-hyssop, legenere, Sacramento Orcutt grass, Lobb's aquatic buttercup, and dwarf downingia—as well as new sensitive species identified onsite and newly listed species. Annual monitoring will assess the Bank's condition, water quality, degree of erosion, infestation of non-native invasive species, fire hazard, and other characteristics that may warrant management actions. While a need for major management actions is not anticipated, an objective of this Long-Term Management Plan is to conduct monitoring to identify any issues that may arise and, through adaptive management, to determine the appropriate corrective actions. Monitoring of the Bank will be conducted by a qualified biologist with knowledge of the site and the experience necessary to accomplish monitoring responsibilities. Specific and measurable objectives were developed for covered species and covered habitats on the Bank using guidance provided in the USGS guide on *Designing Monitoring Programs in an Adaptive Management Context for Regional Multiple Species Conservation Plans* (Atkinson et al. 2004) and the Bureau of Land Management *Measuring and Monitoring Plant Populations* (Elzinga et al. 1998).

Numerous biological resources surveys conducted on the Bank from 1993 to 2009 including, wetland delineation, botanical surveys, and targeted wildlife surveys (large branchiopods, California tiger salamander, and nesting birds) provide baseline conditions for the Bank. Long-

term monitoring of biological resources will be evaluated against baseline conditions and previous surveys conducted during Bank management.

The land manager and monitoring personnel will implement the following biological resources management plan objectives and associated tasks.

4.1.1 General Biological Walk-Through

Objective L1: Qualitatively monitor general condition of habitats.

> **Task L1:** At least one annual walk-through survey will be conducted to qualitatively monitor the general condition of the Bank's habitats. General topographic conditions, hydrology, general vegetation cover and composition, invasive species, and erosion will be noted, evaluated, and mapped, as needed, during a site examination in spring. Notes to be made will include general observations of species encountered, water quality, general extent of wetlands, and any occurrences of erosion and weed invasion.

Performance Standard L1: None.

4.1.2 Waters of the U.S., Including Wetlands

A total of 52.57 acres of preserved jurisdictional waters of the U.S., comprised of vernal pools, vernal swales, seasonal wetlands, seasonal swales, Juncus wetlands, intermittent drainages, and open water habitats, are present at the Bank. Existing established wetlands at the Bank include 2.98 acres of vernal pools and vernal swales. Up to an additional 25 acres of vernal pool, vernal swale, and seasonal wetland habitat are proposed to be established at the Bank. Management and monitoring objectives and tasks for waters of the U.S. are discussed below.

Objective L2: Monitor, maintain, and preserve waters of the U.S., including wetlands at the Bank.

> **Task L2a:** A qualified biologist will conduct a spring survey every five years to qualitatively monitor the general condition of representative (10%) preserved and restored/established waters of the U.S., including wetlands on the Bank. Qualitative surveys will include a review of the overall condition, floristic character, and grazing effects of preserved and restored/established waters of the U.S., including wetlands on the Bank.
>
> **Task L2b:** Establish permanent photograph reference sites (photo stations) for preserved and restored/established wetlands on the Bank by utilization of Global Positioning System (GPS). Alternatively, utilize photo stations developed during the interim bank management period. A minimum of 10 photo stations will be established in order to document each preserved and restored/established wetland type within the Bank. The purpose of the photo stations is to provide representative photographs of wetland habitats, including floristic character, and to illustrate the year-to-year changes in the condition of wetlands on the Bank. Representative photographs will be taken from each of the photo stations during the general biological walk-through survey.

Performance Standard L2: All waters of the U.S., including wetlands surveyed in a given year exhibit positive wetland indicators as evidenced by dominance of hydrophytic plant species, unless it was a drought year with 70 percent (or less) of the normal rainfall.

4.1.3 Threatened and Endangered Wildlife Species

Three federally threatened or endangered wildlife species (vernal pool tadpole shrimp, vernal pool fairy shrimp, and California tiger salamander) are known to occur at the Bank. Management and monitoring objectives and tasks for these species are discussed below.

Objective L3: Monitor, maintain, and preserve populations of vernal pool fairy shrimp and vernal pool tadpole shrimp.

> **Task L3:** To monitor the long-term population status of vernal pool fairy shrimp and vernal pool tadpole shrimp on the Bank, a USFWS-permitted biologist will conduct wet-season invertebrate sampling every five years. Wet-season sampling will be conducted during the optimal time to observe vernal pool fairy shrimp and vernal pool tadpole shrimp, generally between February and April (depending on rainfall patterns and levels for the year) in representative (10%) preserved and restored/established wetlands on the Bank known to support vernal pool fairy shrimp and/or vernal pool tadpole shrimp. The approximate number of aquatic macroscopic (>2 cm in length) invertebrate assemblages within the representative wetlands will be recorded using the following methods.
>
> An 80-µm mesh size dip net will be used to sample the wetlands. All macroscopic aquatic invertebrates will be identified to the lowest justifiable taxon in the field and recorded on a data sheet. The relative number of individuals observed for each taxonomic group within the dip-net samples will be identified and used to extrapolate the approximate number of individuals within the entire pool. After the taxonomic identification and enumeration are completed, the contents of the net will be placed back into the pool from which they were collected.
>
> Additional information collected from each wetland will include the feature number and type of habitat (vernal pool, vernal swale, stock pond, or seasonal wetland) and may include the weather conditions (i.e., cloud cover, precipitation type, and ambient air temperature), greatest potential ponding depth, and average ponding depth.
>
> If significant changes in population trends are identified from the sampling results, overall habitat conditions (including rainfall data) will be assessed to determine whether management actions or additional surveys are necessary. Recommended tasks will be identified, prioritized, and implemented, as funding is available.

Performance Standard L3: Approximately 15 percent of the pools sampled for vernal pool fairy shrimp will contain vernal pool fairy shrimp and approximately 15 percent of the pools sampled for vernal pool tadpole shrimp will contain vernal pool tadpole shrimp in a given 5-year monitoring cycle , unless it is a drought year with 70 percent (or less) of the normal rainfall.

Objective L4: Monitor breeding status and trends, and maintain and preserve habitat for California tiger salamander.

Task L4: To monitor the breeding status of California tiger salamanders on the Bank, a USFWS-permitted biologist will conduct dip-net sampling for California tiger salamander larvae every five years during a normal (average) rainfall year. Sampling will be conducted during the optimal time to observe larvae, generally between March and May (after determining that rainfall levels for the year are within average levels) in all ponds/pools on the Bank known to support California tiger salamanders. If sampling is conducted in an above or below average rainfall year, then additional sampling will be conducted in the next average rainfall year. If significant changes in breeding status on the Bank are identified from the sampling results, overall habitat conditions (including wetland vegetation densities, presence of predatory fish, increased traffic along roadways, and rainfall data) will be assessed to determine whether management actions are necessary. Remedial tasks could include conducting additional surveys, removing vegetation, restricting grazing around the wetland (i.e., erecting a partial fence), draining perennial aquatic habitat, and removing non-native predatory species. It is assumed that remedial tasks may be implemented every five years.

Performance Standard L4: Successful breeding of California tiger salamander is documented in approximately 15% of the known breeding ponds/pools in a given 5-year monitoring cycle during normal (average) rainfall.

4.1.4 Threatened and Endangered Plant Species

One federally endangered plant (Sacramento Orcutt grass) and one state-endangered plant (Boggs Lake hedge-hyssop) is known to occur on the Bank. Management and monitoring objectives and tasks for these species are discussed below.

Objective L5: Maintain the population of Sacramento Orcutt grass and Boggs Lake hedge-hyssop on the Bank within a minimum of one wetland (locality) in a given 5-year monitoring cycle, unless there have been drought years with 70 percent (or less) of the normal rainfall.

Task L5: To monitor the population status of Sacramento Orcutt grass and Boggs Lake hedge-hyssop on the Bank, a qualified botanist will conduct a minimum of one survey for these species every five years. The surveys will be conducted within wetlands known to support the species and wetlands that provide suitable habitat but where the species was not previously identified. The surveys will occur during the appropriate blooming period, generally between May and July (depending on timing of the blooming period for the year). Abundance data will be assessed quantitatively using the following abundance categories: 0, 1–10, 11–50, 51–100, 101–500, 500–1,000, and >1,000. Because Sacramento Orcutt grass and Boggs Lake hedge-hyssop are annual species with a long-lived seedbank and occur in very few localities on the Bank (two locations for Sacramento Orcutt grass and one location for Boggs Lake hedge-hyssop), monitoring the population status of these species many not provide sufficient information to assess long-term population trends. Therefore, overall habitat conditions (including rainfall data, invasive species presence and densities, and changes in community composition) will be assessed to determine whether management actions or additional surveys are necessary. Recommended tasks will be identified, prioritized, and implemented, as funding is available.

Performance Standard L5: None.

4.1.5 Other Covered Species

Other covered special-status species occurring on the Bank include tricolored blackbird (designated as a state species of special concern) and three CNPS-listed plant species—Lobb's aquatic buttercup, legenere, and dwarf downingia. Management and monitoring objectives and tasks for these species are discussed below.

Objective L6: Monitor population status and trends of tricolored blackbird, Lobb's aquatic buttercup, legenere, and dwarf downingia.

> **Task L6:** During surveys conducted on the Bank for waters of the U.S. and threatened and endangered species, a qualified biologist will also note the status of tricolored blackbird, legenere, Lobb's aquatic buttercup, and dwarf downingia on the Bank and identify any changes from baseline conditions and previous surveys. Any necessary tasks to manage the covered species will be identified, prioritized, and implemented, as funding is available.

Performance Standard L6: Lobb's aquatic buttercup, legenere, and dwarf downingia are documented within at least one location in a given 5-year monitoring cycle, unless there have been drought years with 70 percent (or less) of the normal rainfall. Tricolored blackbird are documented nesting at the Bank in a given 5-year monitoring cycle.

4.1.6 Non-Native Invasive Plants

Non-native invasive plants are not native to the region, California, or the U.S. and are invasive, replacing native vegetation or native habitats. Invasive plant species pose a threat to the biological diversity and abundance of native plant species and can alter ecosystem processes such as, nutrient cycling, intensity and frequency of fire, hydrological cycles, sediment deposition, and erosion (Bossard et. al. 2000). The Bank supports numerous native plant species along with several naturalized non-native species. An invasive plant survey was conducted at the Bank on July 15, 2008 to document existing invasive nonnative plant populations and provide a baseline for future surveys (Section 3.11 in Exhibit C-1 of the BEI). Results of this survey determined that 25 nonnative invasive plant species (rated by the Cal-IPC [Cal-IPC 2006]) occur on the Bank (Table 4 in Exhibit C-1 of the BEI). Due to the widespread presence of naturalized non-native plants (i.e., soft chess [*Bromus hordeaceus*], ripgut brome [*Bromus diandrus*], wild oat [*Avena fatua*], hare barley [*Hordeum murinum* ssp. *leporinum*], and Mediterranean barley [*Hordeum marinum* ssp. *gussoneanum*]) on the Bank and throughout the Central Valley, eradiation or control of these species is not feasible. Management of nonnative invasive plants on the Bank will focus on newly introduced species.

Glyceria declinata, a non-native invasive plant species, has been identified in USFWS's 5-Year Review for Sacramento Orcutt grass (USFWS 2008) as an immediate threat to the species. Sacramento Orcutt grass is know to occur on the Bank; therefore, special attention will be given to monitoring populations of *Glyceria declinata* on the Bank. Because this threat was only recently identified, there is limited information on the management of *Glyceria declinata* in vernal pool landscapes. As additional research is conducted and provides management strategies

to control *Glyceria declinata*, this information, as appropriate, will be incoprorated into the management of non-native invasive plant species on the Bank. Local organizations with knowledge of this invasive species issue may be contacted to obtain current trend data including, but not limited to, SVC, TNC, and CNPS.

Management and monitoring objectives and tasks for non-native invasive plants are discussed below. In addition to these tasks, implementation of a grazing program (discussed under Section 4.1.7) will reduce thatch accumulation and will provide an effective tool to manage invasive plant species.

Objective L7: Based on the existence of non-native invasive species at the Bank, management of non-native invasive plants will be limited to monitoring and management of newly introduced non-native invasive plants, and controlling the spread of existing non-native invasive plant populations that are a threat to the conservation values of the Bank.

Task L7a: Concurrently with the waters of the U.S. monitoring, the biologist will conduct a survey of the Bank every 5 years to look for and document the presence of non-native invasive plants. This information will be compared against baseline conditions of the Bank, including a review of existing species lists (Section 3.11 in Exhibit C-1 of the BEI) to determine whether new non-native invasive species have been found. The monitoring biologist in coordination with the land manager will consult data provided by the Cal-IPC, California Department of Food and Agriculture's Integrated Pest Control Branch, and the University of California State Integrated Pest Management Program for current lists of exotic and invasive pest plants and noxious weeds, and guidance on management of and control of those species. This information will be used to determine which species have priority for management.

Task L7b: The monitoring biologist, under guidance from the land manager, will assess the presence of any newly introduced non-native invasive plant species during the surveys and recommend removal as needed. Three methods of removing or controlling these species are outlined below.

Hand/Mechanical Removal. Hand removal or use of small hand-powered or handheld equipment (such as a Weed Wrench or a chainsaw) should always be the preferred method of removing exotic pest plant species from the Bank. If hand removal methods are tried and found to be ineffective, or the problem is too widespread for hand removal to be practical, then use of mechanical methods via larger equipment with motors or biological controls as described below can be implemented. The land manager does not need to notify the IRT if removal will be done by hand or handheld equipment. The IRT will be notified if large equipment are proposed to be used.

Biological Controls. Biological controls can be used under the supervision of the County Agricultural Commissioner. The IRT will be notified and approval will be requested if biological controls are proposed to be used at the Bank.

Performance Standard L7: Non-native invasive plant populations do not significantly exceed baseline conditions and no new non-native invasive plants become established on the Bank.

4.1.7 Vegetation Management/Grazing Program

A description of baseline vegetation composition within habitats on the Bank is provided in the *Biological Evaluation and Special-Status Species Surveys for the SMUD Nature Preserve* (2010) (Exhibit H of the BEI). Presently, the Bank is grazed by cattle for approximately 9 months of the year under a grazing lease managed by SVC. The goal of the grazing program is to provide an adaptive management strategy that effectively reduces thatch accumulation. Grazing as an adaptive management technique, can provide an effective tool to manage invasive plant species. Management and monitoring objectives and tasks for managing grazing are discussed below.

Objective L8: Adaptively manage grazing on the Bank to determine the most appropriate grazing practices that will manage vegetation biomass for the benefit of covered species, covered habitats, and to prevent accelerated erosion from overgrazing.

> **Task L8a:** Implement a grazing program that will result in residual dry matter (RDM) within the range of 750 to 1,000 pounds per acre The RDM monitoring will be implemented after the summer season, prior to the onset of the rainy season (i.e., October), and prior to cattle being brought on the Bank for the next grazing season. RDM levels may be adjusted within portions of the Bank to target problem areas. RDM levels will be set annually and adaptively adjusted to promote native species diversity. The approximate grazing season will be October through June, with an estimated stocking rate of 1 animal unit (AU) per 6 acres. Rainfall and water availability may affect timing of the grazing season and/or the grazing rate. The grazing season and grazing rate may be shorter or the grazing rate may be lower if the Bank is dryer than normal, if grazing was heavy the previous year, or if disturbances such as fire remove substantial amounts of standing biomass. Additional fencing, changes to the AU, and changes to the grazing season will be implemented, as needed, to maintain target RDM levels and manage the habitat for biodiversity. Results of the long-term vegetation, hydrology, and nonnative invasive plant monitoring on the Bank will also be used to gauge the health of the vernal pool ecosystem and assist SMUD in determining appropriate grazing management modifications. The grazing program will also comply with the Grazing Management Plan developed for water quality in support of the Water Quality Certification (Clean Water Act Section 401 permit) obtained for the Bank and contained in Exhibit K of the BEI.
>
> **Task L8b:** Effectively monitor and manage RDM on the Bank yearly using the most appropriate RDM monitoring program, such as *Monitoring Annual Grassland Residual Dry Matter: A Mulch Manager's Guide for Monitoring Success* (Wildland Solutions 2008). This information will be used to determine whether RDM targets are being met and whether corrective actions are necessary (i.e., to increase or decrease rates or the season). A minimum number of measuring locations will be established on the Bank in order to adequately monitor RDM in each enclosed pasture and designated area within the Bank. These measuring locations will be created by using GPS.

Performance Standard L8: Yearly RDM levels are maintained within the range of 750 to 1,000 pounds per acre.

4.2 Security, Safety, and Public Access

The Bank boundary will be fenced and signed to prevent and deter unauthorized public access. The only public access allowed on the Bank is on the existing Howard Ranch Nature Trail and periodic foot races (approximately 10 a year) that follow the existing fence line and firebreak just east of Rancho Seco Lake (Figure 11). No off-trail or off-road activities are permitted during these races. *Sensitive habitat* signs will be posted along the Howard Ranch Nature Trail to deter off-trail usage and to inform users of state and federal laws that protect sensitive resources along the trail. In addition to restricted recreational use, the Bank may also provide opportunities to educate the local community on the importance of open space and habitat preservation and to encourage a sense of respect for these resources. Additionally, the Bank provides a wide range of scientific research opportunities based on the abundance of existing threatened and endangered species and diversity of habitats used by those species. Educational and research activities will be limited to passive uses unless authorized by the IRT. Any classroom events will be supervised by the land manager or an authorized representative. Access to the Bank also will be permitted in emergency or law enforcement situations, by medical, fire, or law enforcement personnel or vehicles.

Management and monitoring objectives and tasks related to trash and trespass are discussed below.

4.2.1 Trash, Trespass, and Public Access

Objective L9: Monitor and manage (as necessary) sources of trash, trespass, and public access on the Bank. Ensure that the Bank is properly signed to deter trespass and keep public on designated trails.

Task L9a: When the Bank is open to public access (i.e., Howard Ranch Nature Trail use, periodic foot races), the land manager will ensure that bi-weekly (once every two weeks) site visits are conducted on the Bank. If the Bank is closed to public access, site visits will be conducted at least twice a year. During site visits, occurrences of trash and incidences or evidence of trespass on the Bank will be documented. A description and location of these observations will be recorded, along with management recommendations to avoid, minimize, or rectify the trash or trespass impact. The Land Manager will also ensure that information on the number of public events (foot races and large group tours of over 20 people) held, number of participants, and general location of access on the Bank is collected on an annual basis.

Task L9b: Once a year, the land manager will ensure the collection and proper disposal of trash and debris. The land manager also will implement management recommendations by repairing vandalized structures and/or rectifying trespass impacts. The land manager will be responsible for erecting additional signs or gates as necessary to discourage unauthorized public access.

Task L9c: Signs will be posted and maintained around and within the Bank to discourage unauthorized public access, particularly where the Bank boundary abuts recreational use areas (i.e., Rancho Seco Lake and a camping area adjacent to the lake). Within the Bank, *sensitive habitat* signs will be posted along the existing Howard Ranch

Nature Trail (Figure 11) to prohibit domestic animals (with exception of assistance dogs), discourage users from going off trail, and to inform trail users of state and federal laws that protect sensitive resources that occur on the Bank. Additional signs will be posted and maintained around the perimeter of the Bank to denote the property as a nature preserve and its legal protection under state and federal laws. These signs will be posted at approximately half-mile intervals around the entire perimeter of the Bank.

Performance Standard L9: Documentation of excessive trash and vandalism or physical disturbance of habitat is minimal.

4.2.2 Fire Hazard Reduction

Fire danger on the Bank is anticipated to be moderate to high due to the large amount of annual grassland habitat on and adjacent to the Bank. A plan will be implemented on the Bank, as described in Section 4.1.4, that will reduce fuel loads. Existing dirt access roads and established firebreaks are present within the Bank, reducing the need to drive motorized vehicles cross-country. Although not required by the IRT or the BEI, fire hazard reduction may be implemented on the Bank as needed to reduce fire danger.

The Herald Fire Department recommends a 12-foot wide firebreak to minimize fire danger (McGranahan pers. comm., June 19, 2009). As part of fire hazard reduction on their property, SMUD will maintain existing firebreaks and dirt access roads at a minimum 15-foot width within and around the Bank. The firebreak will be maintained using one of the following methods:

Disking. The disks will be set at an angle sufficient to cut the sod loose and adequately bury the growth of weeds, grass, or other vegetation.

Scraping. The blade will be set at an angle sufficient to cut the growth of weeds, grass, or other vegetation down to bare ground.

Disking or scraping practices are anticipated to be needed, at the most, once each year and would likely occur after the rainy season and prior to May 15. Disking and scraping will not be conducted on moderate to high fire danger days. To determine fire risk, the Herald Fire Protection District website (www.heraldfire.net) will be reviewed. (McGranahan pers. comm., June 26, 2009)

4.2.3 Mosquito Control

Aquatic habitat within the Bank may provide breeding areas for mosquitoes. Because the Bank will be adjacent to a public recreation area (Rancho Seco Lake), issues related to mosquito control may need to be addressed. Previous mosquito control activities have been performed on the Bank by the Mosquito Vector Control District and included use of *Bacillus thuringiensis* var. *israelensis* (Bti). Bti is a bacterial toxin that infects and kills mosquito larvae. It is considered safe and environmentally sound because it is highly selective, killing only mosquitoes and black flies. Bti contains no poisonous chemicals and is completely harmless to other living things. Management and monitoring objectives and tasks related to mosquito control are discussed below.

Objective L10: As necessary, mosquito abatement will be provided by the local Mosquito Vector Control District in a manner that maintains the habitat and conservation values of the Bank.

> **Task L10:** If a mosquito abatement plan is deemed necessary by the Mosquito Vector Control District, the land manager will coordinate with the Mosquito Vector Control District to select the most appropriate control mechanisms that are the least damaging to the habitats within the Bank. To date, the most appropriate and safe mosquito control would be the application of Bti, which is not harmful to branchiopods or amphibians. Any proposed mosquito control other than Bti will be submitted to the IRT for review and approval.

Performance Standard L10: Mosquito abatement on the Bank is a voluntary activity and should be implemented only as necessary. Therefore, no performance standards are identified for mosquito abatement.

4.3 Infrastructure and Facilities

4.3.1 Fences and Gates

The majority of the outer Bank boundary is currently fenced (barbed wire), except for a portion along the western and northwestern boundary. Existing fencing and gates also occur within the Bank to manage cattle herds and to denote areas. Where needed, additional fencing will be constructed to prevent unauthorized access on the Bank. A limited number of gates also will be installed to allow access to the Howard Ranch Nature Trail, for ranching activities, and for monitoring and maintenance activities described in this management plan. Existing fencing and gates, and proposed new fencing and gates to be constructed as part of Bank development, are shown in Figure 11. Management and monitoring objectives and tasks related to fences and gates are discussed below.

Objective L11: Monitor and maintain fences and gates to prevent/deter unauthorized public access and to manage onsite- activities.

> **Task L11:** During each site visit, the land manager or monitoring biologist will record the general condition of fences and gates within the Bank. Maintenance, including repair and replacement, of the fencing and gates will be the responsibility of the land manager (as funding allows).

Performance Standard L11: A minimum of 90 percent of the existing fences and gates will be intact and functioning properly in a given year.

4.4 Habitat Maintenance

To reduce the potential for reduced water quality and fill of wetland habitats, accelerated erosion should be minimized. Management and monitoring objectives and tasks related to erosion control are discussed below.

4.4.1 Erosion Control

Objective L12: Monitor (as necessary) areas of accelerated erosion at the Bank. Ensure that soils at the Bank are properly stabilized.

> **Task L12:** As needed, apply erosion control seed mix or mulch to stabilize areas of accelerated erosion. Pea gravel may be placed along the Howard Ranch Nature Trail as needed to control erosion.

Performance Standard L12: None.

4.5 Reporting and Administration

Management and monitoring objectives and tasks related to annual reporting are discussed below.

4.5.1 Annual Report

Objective L13: Provide an annual monitoring report to the IRT and other interested parties on monitoring and management tasks conducted on the Bank for the previous July 1 through June 30 management/monitoring season. This monitoring period will begin at the start of the wet season and will allow sufficient time to conduct late-season plant surveys and enable RDM measurements to be obtained at the end of the dry season for the same monitoring year. This will enable the land manager to compare data from both the wet season and following dry season, along with rates, to determine if adaptations to the regime are necessary.

> **Task L13a:** The land manager will prepare a management and monitoring report and associated documentation (i.e., field forms, photographs, and maps) that describes the general site conditions and provides results of monitoring and management activities conducted during the previous management/monitoring season. The report will include recommendations with regard to (1) any habitat enhancement measures deemed necessary; (2) any problem issues that need short- or long-term attention (i.e., weed removal, fence repair, erosion control, vegetation control, or vandalism or trespass measures); and (3) any proposed changes in monitoring or management of the Bank based on new information or past monitoring results on the site. The report will be submitted to the IRT by August 15 for the previous July 1 through June 30 management/monitoring season.

> **Task L13b:** The land manager will include associated documentation that compiles the results of surveys conducted during the previous management/monitoring season (i.e., waters of the U.S., and threatened and endangered species) in the annual report. The report will be submitted to the IRT by August 15 for the previous July 1 to June 30 management/monitoring season.

Performance Standard L13: The annual report will be submitted to the IRT by August 15 for the previous July 1 through June 30 management/monitoring season.

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5.0 Consistency with SMUD's Proposed Habitat Conservation Plan

Through collaboration with USFWS and CDFW, SMUD has developed a comprehensive approach for ESA and CESA compliance for future operations, maintenance, and construction activities that incorporates three main permitting options: (1) avoidance; (2) a Habitat Conservation Plan (HCP); and (3) individual permitting through either Section 7 or Section 10 of the ESA or Section 2081 of the CESA for larger SMUD projects.

SMUD is currently in the process of preparing a HCP covering SMUD's operations, maintenance, and construction activities within its service area. The HCP includes mitigation strategies for impacts of proposed activities to federally and state-protected species. One of these mitigation strategies is to offset future activity impacts through preservation and construction of mitigation habitats at the Bank. As such, the Bank proposes to integrate with the HCP.

USFWS published guidance for adaptive management in HCPs (65 Federal Register [FR] 35252) consists of four elements: (1) identify uncertainties and the questions that must be answered to resolve uncertainties; (2) develop alternative strategies and implement those that best meet the conservation goal and objectives; (3) integrate a monitoring program capable of detecting parameters necessary for evaluating the conservation strategy; and (4) incorporate feedback loops that link implementation and monitoring to a decision-making process.

If mitigation compliance with SMUD's HCP is provided for at the Bank, long-term adaptive management goals of the Bank would be made consistent with:

- The USFWS five-point policy (65 FR 35242; June 1, 2000).
- The USGS guide on *Designing Monitoring Programs in an Adaptive Management Context for Regional Multiple Species Conservation Plans* (Atkinson et al. 2004).
- The approved management and monitoring guidelines and procedures outlined in the HCP, including changed and unforeseen circumstances such as:
    - -- New species listings;
    - -- Delisting of a covered species;
    - -- Fire;
    - -- Flood;
    - -- Invasive species, pathogens, and disease;
    - -- Vandalism and illegal trespassing; and
    - -- Nuclear contamination.

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6.0 Transfer, Replacement, Amendments, and Notices

6.1 Transfer

Any subsequent transfer of responsibilities under this Long-Term Management Plan to a different land manager shall be requested by the land manager or SMUD in writing to the IRT, shall require written approval by the IRT, and shall be incorporated into this Long-Term Management Plan by amendment. Any subsequent property owner assumes land manager responsibilities described in this long-term management plan and as required in the Conservation Easement (Exhibit E-4), unless otherwise amended in writing by the IRT.

6.2 Replacement

If the land manager fails to implement the tasks described in this Long-Term Management Plan and is notified of such failure in writing by the IRT, the land manager shall have 90 days to cure such failure. If failure is not remediated within 90 days, the land manager may request a meeting with the IRT to resolve the failure. Such meeting shall occur within 30 days, or a longer period if approved by the IRT. Based on the outcome of the meeting, or if no meeting is requested, the IRT may designate a replacement land manager in writing by amendment of this Long-Term Management Plan. If the land manager fails to designate a replacement land manager, then such public or private land or resource management organization acceptable to and as directed by the IRT may enter onto the Bank in order to fulfill the purposes of this Long-Term Management Plan.

6.3 Amendments

The land manager**,** property owner**,** and the IRT may meet and confer from time to time, upon the request of any of the parties, to revise the Long-Term Management Plan in order to better meet management objectives and preserve the habitat and conservation values of the Bank. Any proposed changes to the Long-Term Management Plan shall be discussed with the IRT and the land manager. Any proposed changes will be designed with input from all the parties listed above. Amendments to the Long-Term Management Plan shall be approved by the IRT in writing, shall be required management components of the Plan, and shall be implemented by the land manager.

If CDFW or USFWS determine, in writing, that continued implementation of the Long-Term Management Plan would jeopardize the continued existence of a state or federally listed species, a written amendment to this Long-Term Management Plan—determined by either CDFW or USFWS as necessary to avoid jeopardy—shall be a required management component and shall be implemented by the land manager.

6.4 Notices

Any notices regarding this Long-Term Management Plan shall be directed as follows:

Land Manager and Property Owner:

Sacramento Municipal Utility District
Environmental Management
6201 S Street
Sacramento, CA 95817
Contact: Environmental Program Manager
Telephone: (916) 452-3211
Fax: (916) 732-6890

IRT, BEI Signatory Agencies:

U.S. Army Corps of Engineers
Sacramento District
1325 J Street, Room 1350
Sacramento, CA 95814-2922
Attn: Chief, Regulatory Division
Telephone: (916) 557-5100
Fax: (916) 557-5118

U.S. Environmental Protection Agency
Region 9
75 Hawthorne Street
San Francisco, CA 94105
Attn: Director, Water Division
Telephone: (415) 947-8707
Fax: (415) 947-3549

California Department of Fish and Wildlife
North Central Region
1701 Nimbus Road
Rancho Cordova, CA 95670
Attn: Regional Manager
Telephone: (916) 358-2900
Fax: (916) 358-2912

California Department of Fish and Wildlife
Habitat Conservation Branch
1416 Ninth Street, 12th Floor
Sacramento, CA 95814
Attn: Branch Chief
Telephone: (916) 653-4875
Fax: (916) 653-2588

U.S. Fish and Wildlife Service
Endangered Species Division,
Sacramento Office
2800 Cottage Way, Suite W2605
Sacramento, CA 95825-3901
Attn: Chief, Sacramento Valley Branch
Telephone: (916) 414-6600
Fax: (916) 414-6712

7.0 Funding and Task Prioritization

7.1 Funding

The anticipated costs of long-term monitoring and management for the Bank are provided in Table 4. These costs include estimates of time, materials, and funding needed to conduct the Bank monitoring and management tasks identified in this Long-Term Management Plan and a prorated calculation of funding needed to replace signs, gates, and fences every 10 to 30 years. Based on the costs for monitoring and maintenance, the net annual funding anticipated is approximately $39,564. Therefore, with the current annual estimated capitalization rate of 3.5 percent, the total endowment amount required will be $1,130,401 (Table 4).

The endowment principal and interest monies shall be held in an IRT-authorized trustee fund, which consists of monies that are paid into it in trust pursuant to law, and is appropriated to fulfill the purposes for which payments into it are made. These interest monies will fund the long-term management and monitoring activities on habitat lands in a manner consistent with this Long-Term Management Plan.

7.2 Task Prioritization

Due to unforeseen circumstances, prioritization of tasks—including tasks resulting from new requirements—may be necessary if insufficient funding is available to accomplish all tasks. The land manager will coordinate with the IRT to discuss task priorities and funding availability to determine which tasks will be implemented. In general, tasks are prioritized in this order: (1) tasks required by a local, state, or federal agency; (2) tasks necessary to maintain or remediate habitat quality; and (3) tasks that monitor resources, particularly if past monitoring has not shown downward trends. Equipment and materials necessary to implement priority tasks also will be considered priorities. Final determination of task priorities in any given year of insufficient funding will be determined in consultation with the IRT and as authorized by the IRT in writing.

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Table 4. Bank Management and Monitoring Activities, Levels of Effort, Frequency, and Cost

Management and Monitoring Activity	Description of Task(s)	Level of Effort	Cost per Unit	Total Task Cost	Frequency of Task	Schedule	Annual Cost
General Biological Walk-Through							
Monitor the general condition of Bank's habitats (Task L1)	Walk-through survey of general topographic conditions, hydrology, general vegetation cover and composition, invasive species, erosion, and map as needed; prepare notes	30 hours	$80/hr	$2,400.00	Annually	Spring	$2,400.00
Waters of the U.S., including Wetlands							
Monitor waters of the U.S. (Task L2a)	Surveys of 10% of waters of the U.S.; prepare notes and recommendations	30 hours	$80/hr	$2,400.00	Once every 5 years	Spring	$480.00
Establish photo stations and photograph waters of the U.S. (Task L2b)	Representative photographs at established photo stations	6 hours	$80/hr	$480.00	Annually	Spring	$480.00
Threatened and Endangered Wildlife Species							
Monitor vernal pool fairy shrimp and vernal pool tadpole shrimp population status (Task L3)	Aquatic sampling of up to 10% of wetlands known to support species; prepare notes and recommendations	30 hours	$75/hr	$2,250.00	Once every 5 years	February - April	$450.00
Monitor California tiger salamander breeding status (Task L4)	Aquatic sampling of all ponds/pools known to support species and wetlands that provide suitable habitat; prepare notes and recommendations	24 hours	$90/hr	$2,160.00	Once every 5 years	March - May	$432.00
Drain perennial aquatic California tiger salamander habitat, as necessary (Task L4)	If needed draining of perennial aquatic habitat for California tiger salamander will be conducted. Prior to dewatering dip netting and/or seining will be conducted to ensure that California tiger salamander larvae are not present.	225 hours	$90/hr	$20,250	As needed, estimated once every 5 years	August - September	$4,050
Drain perennial aquatic California tiger salamander habitat, as necessary (Task L4)	Direct costs for the task above	1 item	$2,108.50 /item	$2,108.50	As needed, estimated once every 5 years	August - September	$421.70

Table 4. Bank Management and Monitoring Activities, Levels of Effort, Frequency, and Cost (continued)

Management and Monitoring Activity	Description of Task(s)	Level of Effort	Cost per Unit	Total Task Cost	Frequency of Task	Schedule	Annual Cost
Threatened and Endangered Plant Species							
Monitor Sacramento Orcutt grass and Boggs Lake hedge-hyssop population status (Task L5)	Botanical survey in wetlands known to support the species and wetlands that provide suitable habitat; prepare notes and recommendations	10 hours	$80/hr	$800.00	Once every 5 years	May - July	$160.00
Covered Species							
Monitor covered plant species population status (Task L6)	Survey for covered plant species during the appropriate identification period	10 hours	$80/hr	$800.00	Once every 5 years	Spring	$160.00
Monitor tricolored blackbird population status (Task L6)	Survey for tricolored blackbird nesting; prepare notes and recommendations	12 hours	$80/hr	$960.00	Once every 5 years	Spring/ Summer	$192.00
Non-Native Invasive Plants							
Monitor non-native invasive plants (Task L7a)	Survey to identify newly introduced or existing expanded non-native invasive plant populations; prepare notes and recommendations	60 hours	$80/hr	$4,800.00	Once every 5 years	Spring/ summer	$960.00
Remove non-native invasive plants (Task L7b)	Hand/mechanical removal or biological controls	40 hours	$40/hr	$1,600.00	Once every 5 years	Spring	$320.00
Vegetation Management/ Program							
Adaptively manage (Task L8a)	Implement a program that will result in optimal RDM levels and non-native invasive plant management	20 hours	$80/hr	$1,600.00	Annually	Fall	$1,600.00
Monitor and manage RDM levels (Task L8b)	Perform RDM measurements at established measuring locations; prepare notes and recommendations	10 hours	$40/hr	$400.00	Annually	End of period	$400.00

Table 4. Bank Management and Monitoring Activities, Levels of Effort, Frequency, and Cost (continued)

Management and Monitoring Activity	Description of Task(s)	Level of Effort	Cost per Unit	Total Task Cost	Frequency of Task	Schedule	Annual Cost
Trash, Trespass, and Public Access							
Monitor trash, trespass, and public access (Task L9a)	Survey bank; document observations or evidence of trash and trespass; collect information of public events	2 hours	$40/hr	$80.00	Every 2 weeks (26 visits)	As needed	$2,080.00
Manage trash and trespass (Task L9b)	Collect and properly dispose of trash and repair vandalized structures and/or rectify trespass impacts onsite	1 trip	$500.00/ trip	$500.00	Annually	As needed	$500.00
Maintain sensitive habitat signs (Task L9c)	Replace two sensitive habitat signs along nature trail every 10 years	2 signs	$200/ sign	$400.00	Once every 10 years	As needed	$40.00
Maintain Bank boundary signs (Task L9c)	Replace 20 signs around Bank boundary every 20 years	20 signs	$70/sign	$1,400	Once every 20 years	As needed	$70.00
Mosquito Control							
Mosquito abatement (Task L10)	Coordinate with the Mosquito Vector Control District	4 hours	$80/hour	$320.00	Annually	Spring	$320.00
Fences and Gates							
Maintain fences and gates (Task L11)	Inspect fences and gates; prepare notes and recommendations	3 hours	$40/hr	$120.00	Four times per year	Spring winter, summer, and fall	$480.00
Repair fences (Task L11)	Repair/replace 72,070 feet of barbed-wire fencing every 30 years	72,070 ft	$6/ft	$432,420.00	Once every 30 years	Summer	$14,414.00
Repair gates (Task L11)	Repair/replace 26 gates every 20 years	26 gates	$150/ gate	$3,900.00	Once every 20 years	Summer	$195.00
Habitat Maintenance							
Erosion control (Task L12)	Application of erosion control seed mix and mulch	5 acres	$100/ acre	$500.00	Once every 5 years	As needed	$100.00

Table 4. Bank Management and Monitoring Activities, Levels of Effort, Frequency, and Cost (continued)

Management and Monitoring Activity	Description of Task(s)	Level of Effort	Cost per Unit	Total Task Cost	Frequency of Task	Schedule	Annual Cost
Annual Report							
Annual Report Preparation (Task L13)	Compile notes and recommendations for general monitoring/maintenance activities and results of waters of the U.S., threatened and endangered species, and non-native invasive plant monitoring; prepare a management and monitoring report to submit to IRT	12 hours 40 hours	$120/hr $35/hr	$1,440.00 $1,400.00	Annually	August 15 of each year for the previous July 1 to June 30 monitoring season	$2,840.00
Overall Bank Operation							
						Subtotal(rounded up to nearest dollar)	*$33,544.70*
						Contingency (10%)	$3,354.47
						Administration (from PAR)	$8,567.52
						Total annual cost of monitoring and maintenance	**$45,466.69**
						Current annual capitalization rate	**3.5%**
						TOTAL ENDOWMENT (from PAR)	**$1,299,048**

8.0 Citations

8.1 Printed References

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_____. 2010b. Sacramento County GIS Data sets for land use, land use codes, and zoning. Available online: <http://www.msa.saccounty.net/>. Accessed: May 25, 2010.

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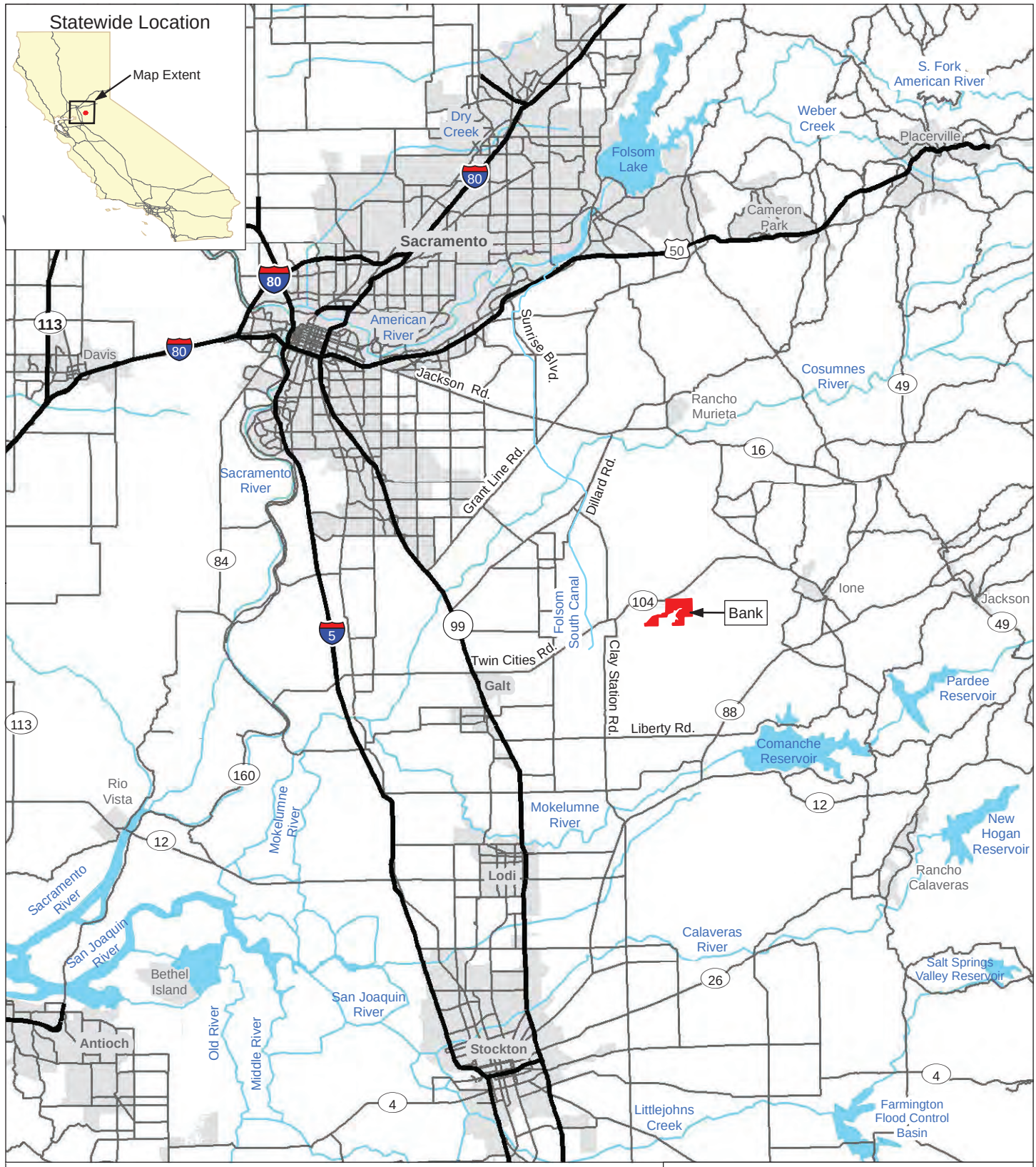
8.2 Personal Communications

McGranahan, Chris (Deputy Chief, Herald Fire Protection District). Phone conversation with Becky Rozumowicz (Area West Environmental, Inc.) on June 19, 2009 regarding firebreaks on the SMUD Nature Preserve Mitigation Bank.

McGranahan, Chris (Deputy Chief, Herald Fire Protection District). Phone conversation with Angela Alcala (Area West Environmental, Inc.) on June 26, 2009 regarding firebreaks on the SMUD Nature Preserve Mitigation Bank.

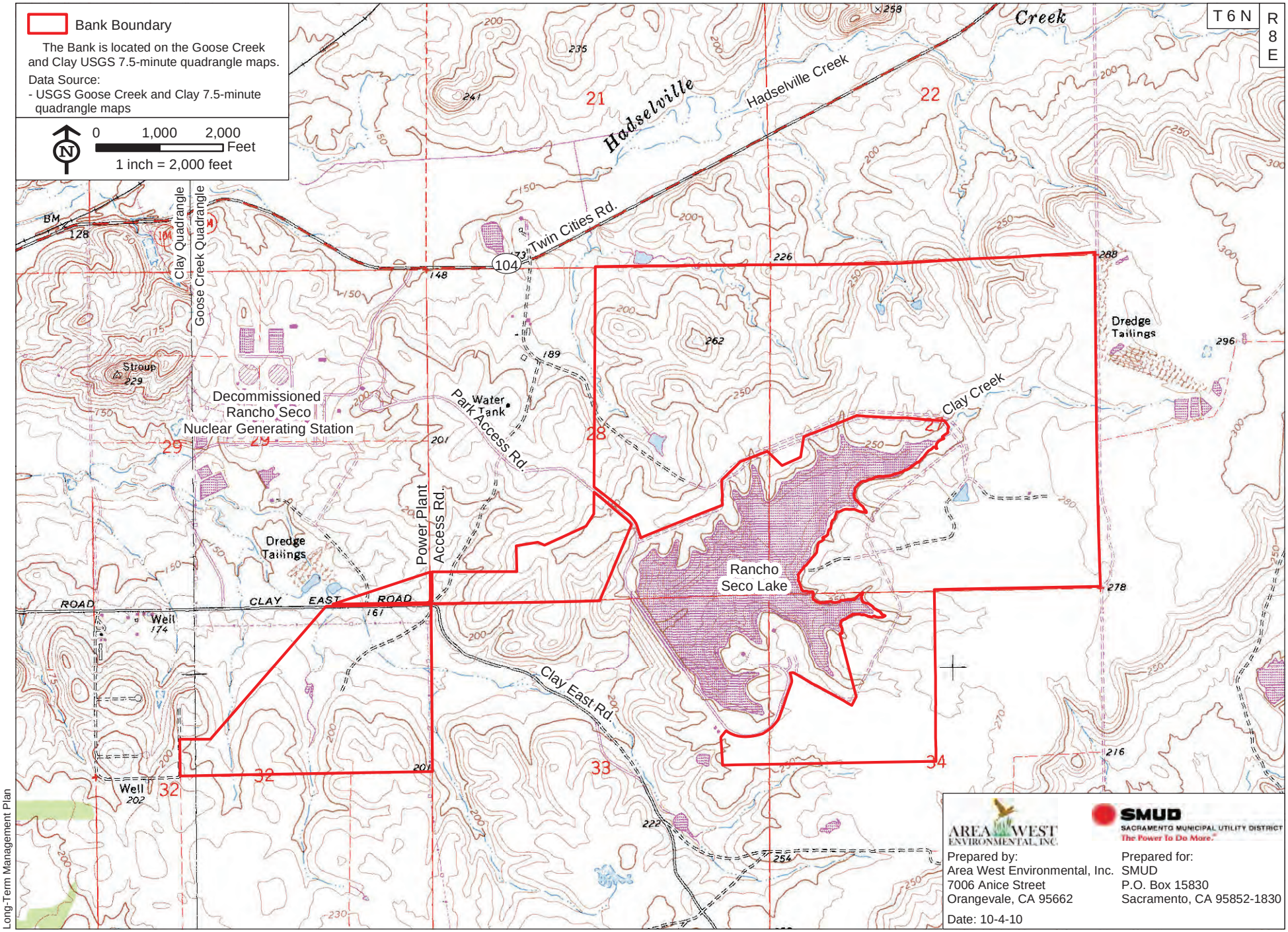
Scott, Ron (Sacramento Municipal Utility District). Email to Becky Rozumowicz (Area West Environmental, Inc.) on April 21, 2009 regarding the Biological Assessment for the SMUD Nature Preserve Mitigation Bank.

Appendix A
Figures 1 through 11



Long-Term Management Plan

Figure 1. General Location of the SMUD Nature Preserve Mitigation Bank



Long-Term Management Plan

Figure 2. SMUD Nature Preserve Mitigation Bank Location

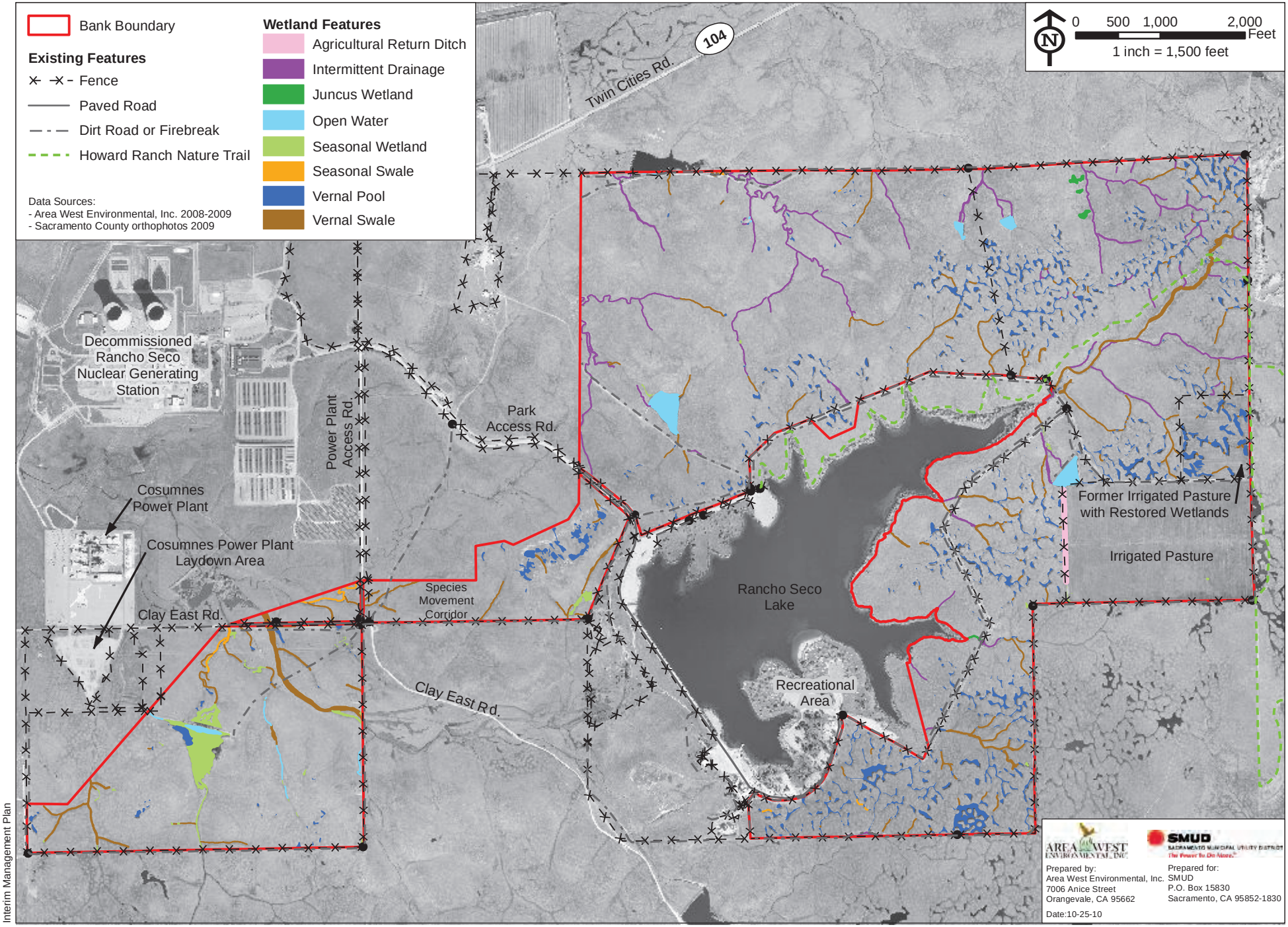


Figure 3. Waters of the U.S. at the SMUD Nature Preserve Mitigation Bank

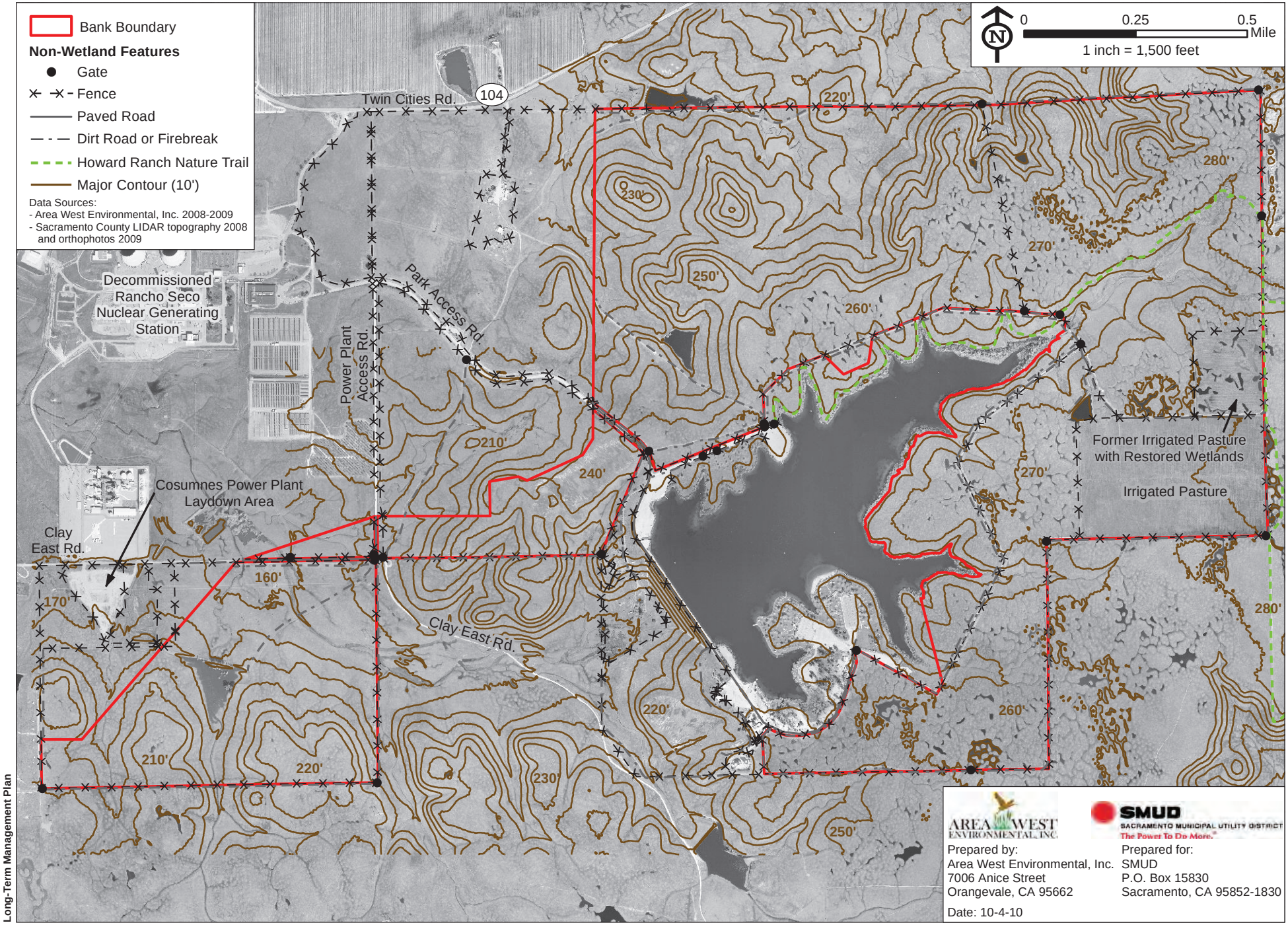
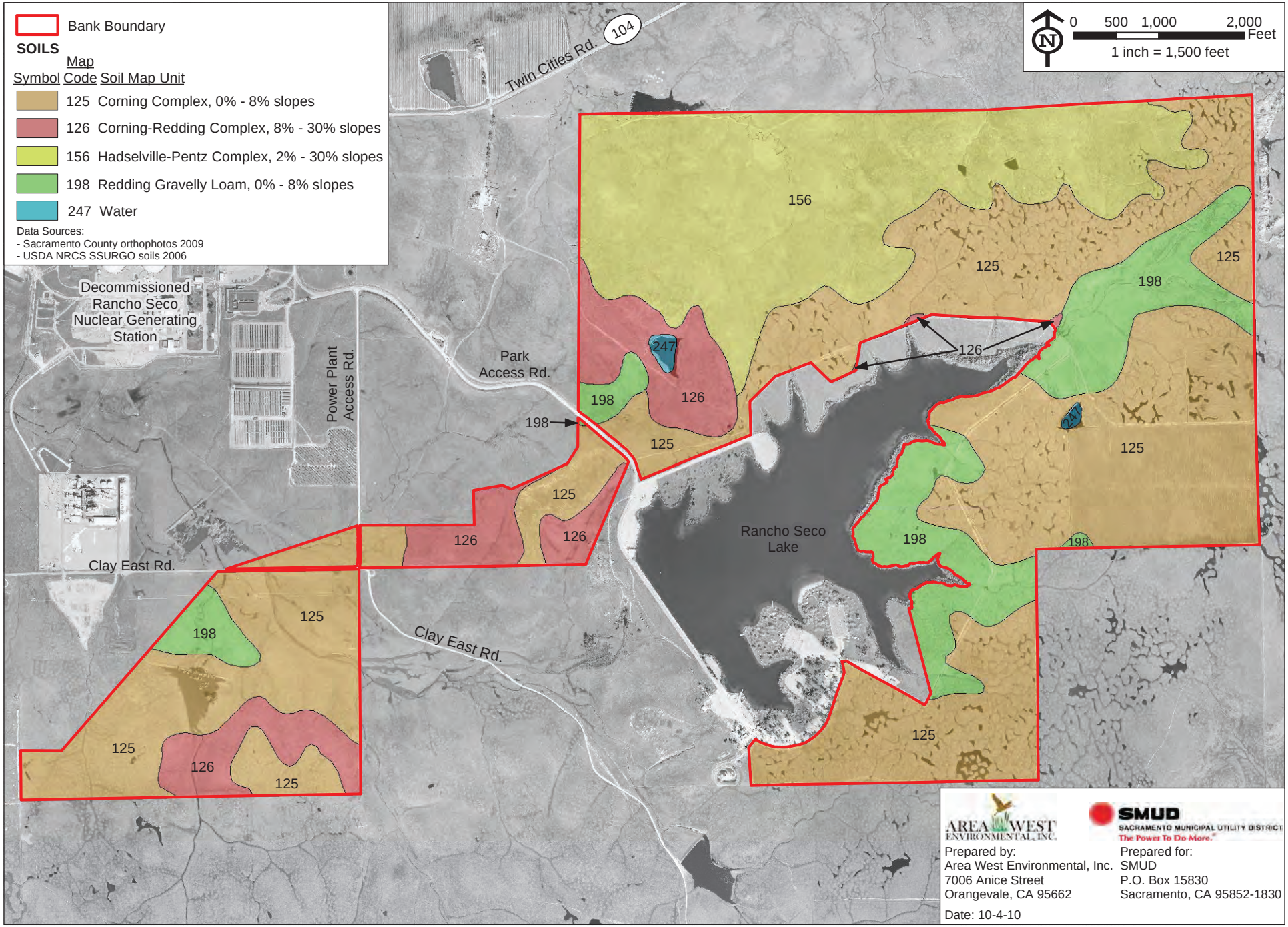
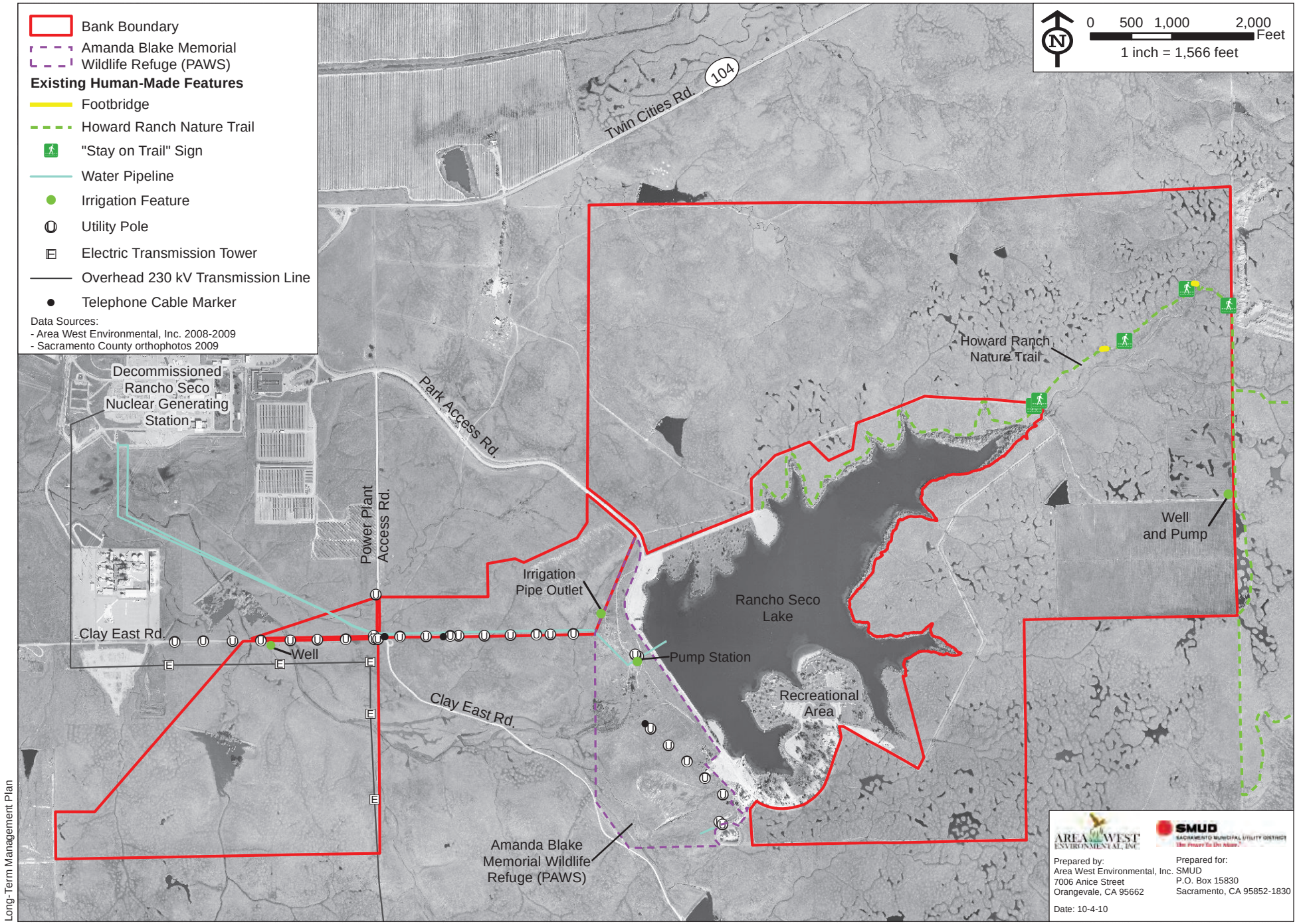


Figure 4. Topographic Map of the SMUD Nature Preserve Mitigation Bank



Long-Term Management Plan

Figure 5. Soils Mapped at the SMUD Nature Preserve Mitigation Bank



Long-Term Management Plan

Figure 6. Existing Infrastructure at the SMUD Nature Preserve Mitigation Bank

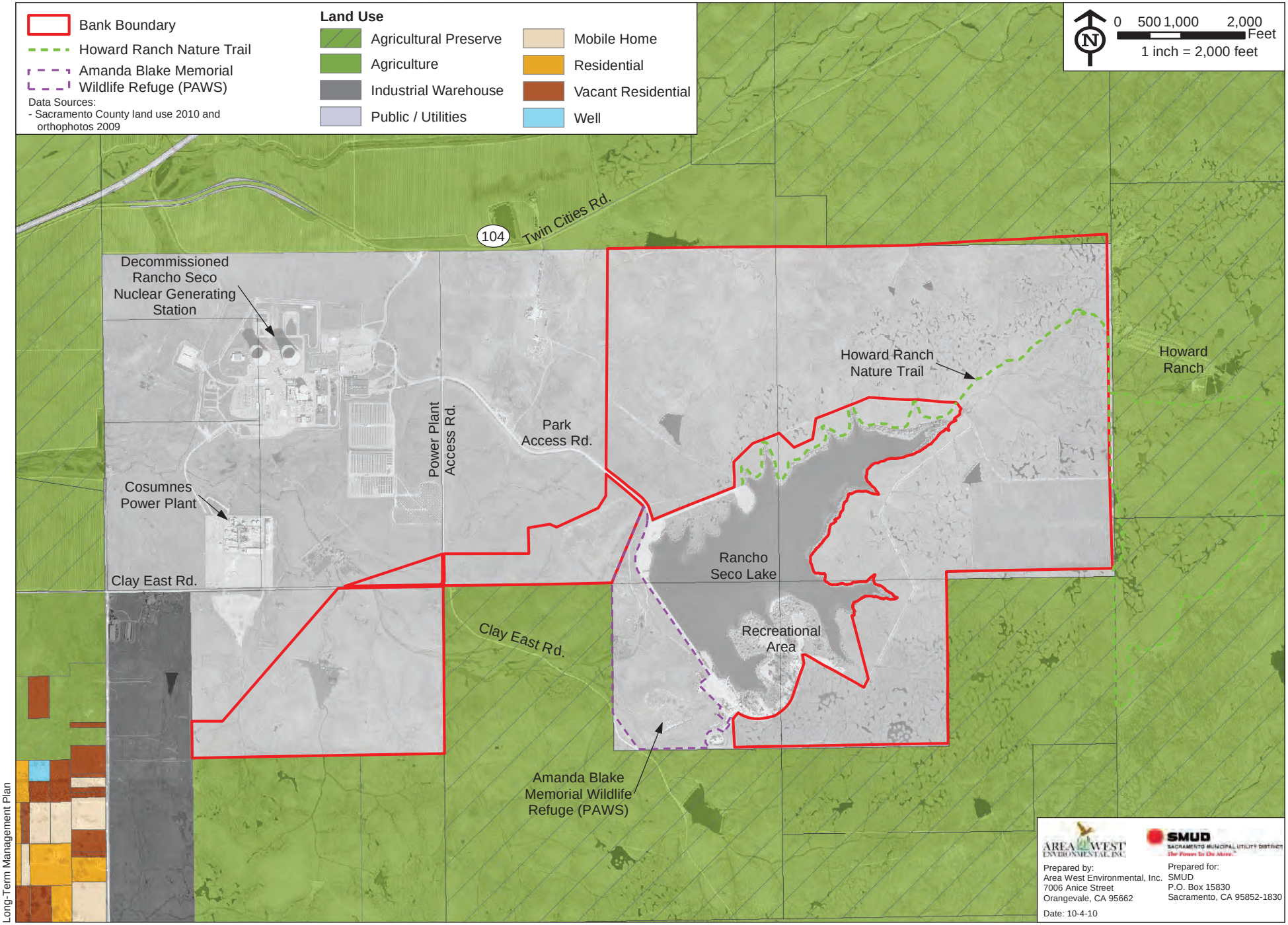


Figure 7. Land Use in the Vicinity of the SMUD Nature Preserve Mitigation Bank

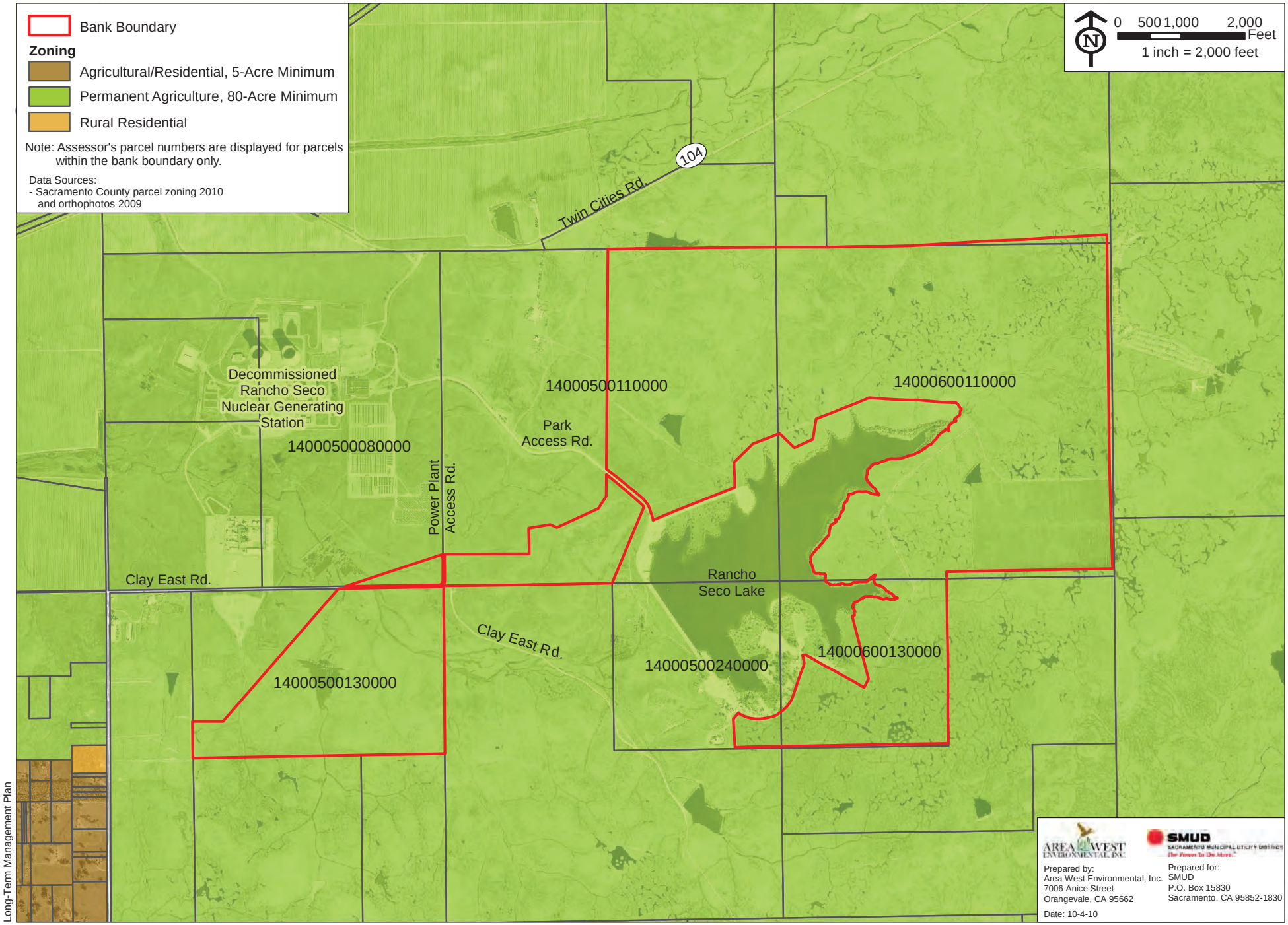


Figure 8. Zoning in the Vicinity of the SMUD Nature Preserve Mitigation Bank

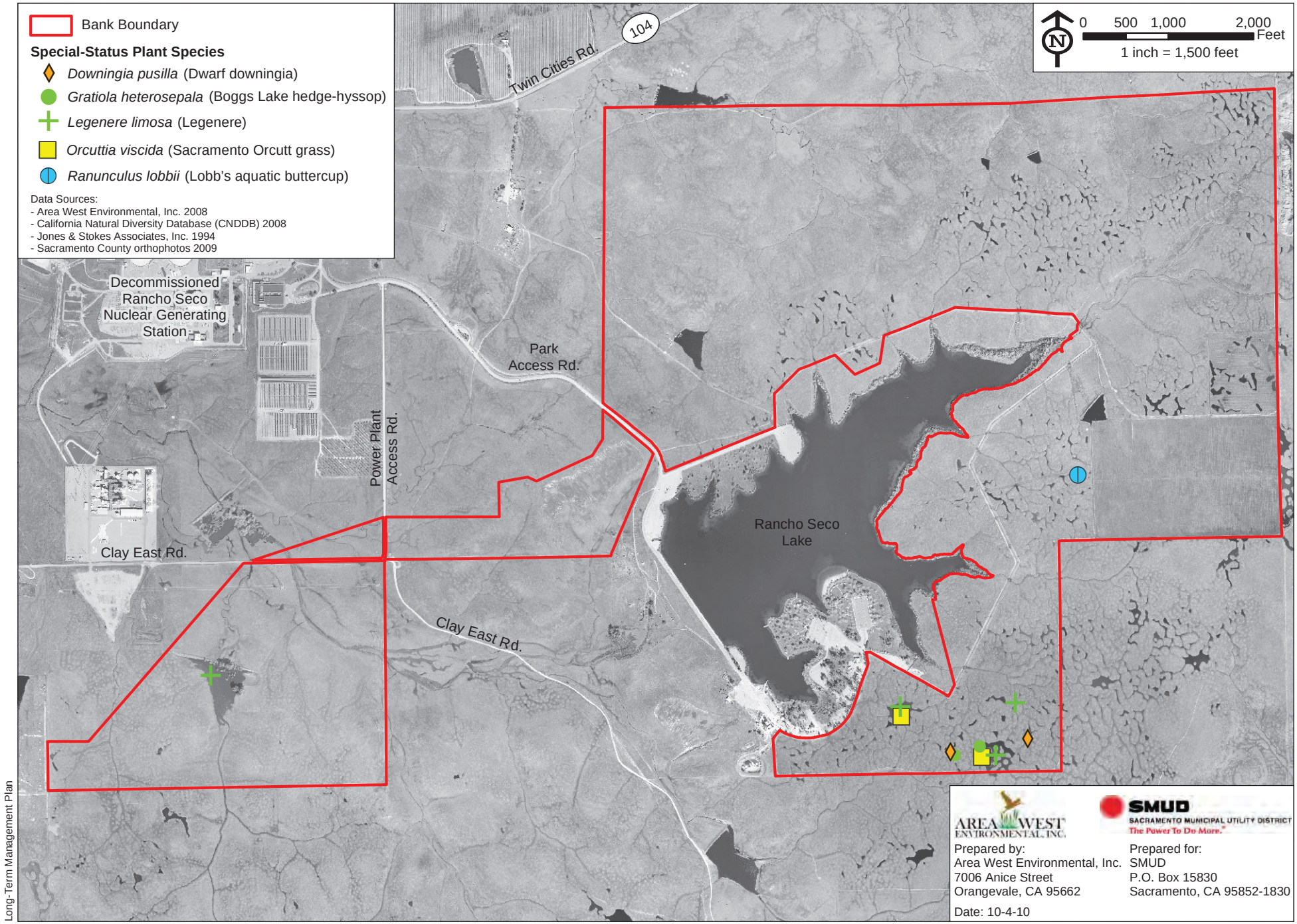


Figure 9. Special-Status Plant Locations at the SMUD Nature Preserve Mitigation Bank

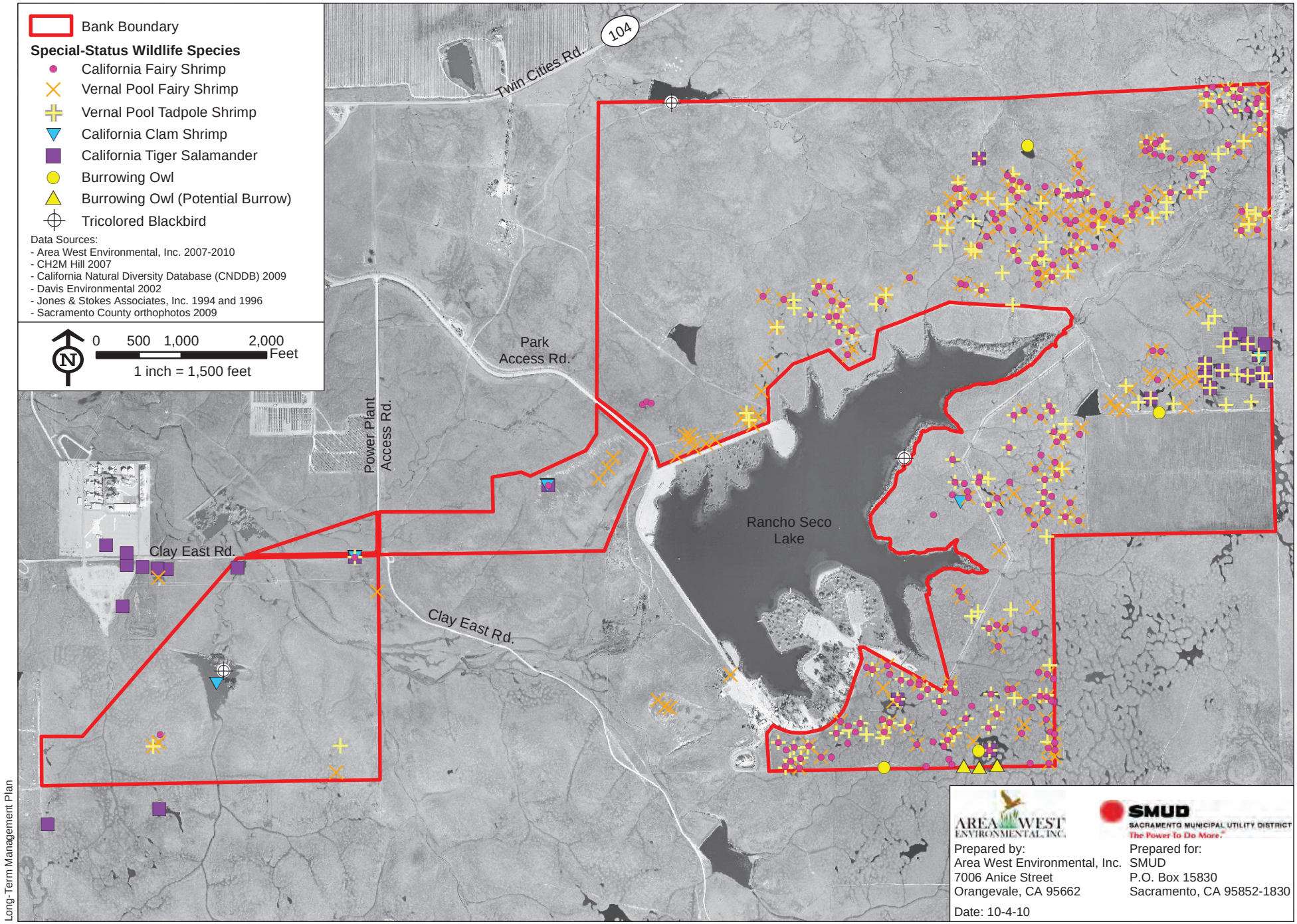


Figure 10. Special-Status Wildlife Locations at or Adjacent to the SMUD Nature Preserve Mitigation Bank

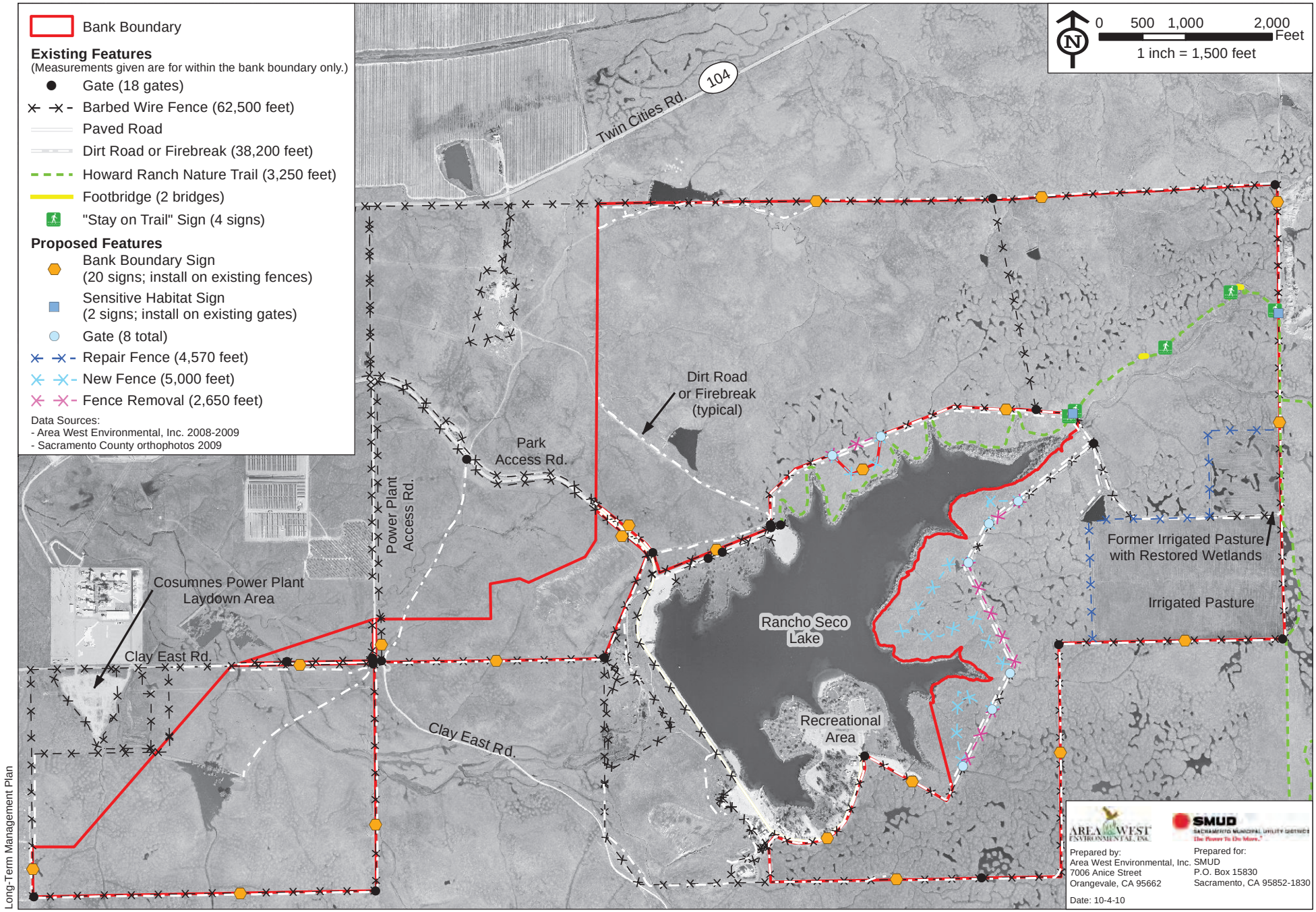


Figure 11. Location of Fences, Gates, Firebreaks, and Signage at the SMUD Nature Preserve Mitigation Bank

MITIGATION AGREEMENT – 09/20/13

EXHIBIT C
Endowment Analysis for Bank Property

Endowment Fund Analysis and Schedule

The amount of the Endowment Fund was based on the results of a Property Analysis Report (PAR) (Attachment 1) prepared for the Bank property and is in an amount sufficient to fully provide for the financial requirements of the long-term management of the Bank as described in Exhibit D-5 of the BEI. Based on a capitalization rate of 3.5%, the required Endowment for the Bank was determined to be $1,130,401.00. The schedule for funding of the Endowment is based on the number and percent of credit releases. The Sacramento Municipal Utility District (SMUD) shall fund the Endowment Principal through Endowment Deposits according to the following schedule, as required by Section VI.E.2 and Section VII.B.2.a of the BEI.

- 15% of the Endowment must be funded prior to the second credit release (second ledger entry) and release of 40% of the total anticipated credits.
- 40% of the Endowment must be funded prior to the third credit release (third ledger entry) and release of 55% of the total anticipated credits.
- 70% of the Endowment must be funded prior to the fourth credit release (fourth ledger entry) and release of 70% of the total anticipated credits.
- 100% of the Endowment must be funded prior to the fifth credit release (fifth ledger entry) and release of 100% of the total anticipated credits.

Until the Endowment is fully funded, the amount of the Endowment Principal shall be adjusted by SMUD annually, on January 2 of each year following the Bank Establishment date (referred to as the Adjustment Date) as specified in Section VI.E.3 of the BEI. The adjustment shall be a percentage equal to the percentage increase, if any, in the California Consumer Price Index (CPI), published by the California Department of Industrial Relations, Division of Labor Statistics and Research. Adjustment of the Endowment Principal is the percentage increase in the CPI published most immediately preceding the Adjustment Date, as compared to the CPI published most immediately preceding the date of this BEI. The adjustment shall be applied to the amount of the initial Endowment Principal.

As required under Section VI.E.4 of the BEI, SMUD shall notify the Interagency Review Team (IRT) of each Endowment Deposit made, within 30 days of such deposit using the Endowment Deposit Form provided in Exhibit D-3 of the BEI.

Management of the Endowment Fund shall occur as follows, in accordance with Section VIII.E.2.b of the BEI:

- The Endowment Principal amount should not decrease in value through expenditure or investment strategy. The Endowment Principal amount is intended to increase in value to keep up with inflation. Therefore a portion of the interest and earnings on the Endowment Principal balance shall be reinvested into the Endowment Fund as required to adjust the Endowment Principal using the same CPI adjustment formula described above. After the Endowment Principal is fully funded, even if interest earnings are

insufficient to increase the Endowment Principal to keep up with inflation, no additional Endowment monies will be required from SMUD or the current property owner.

- Interest earnings beyond those necessary to provide for Endowment Principal Growth commensurate with inflation will be made available to fund annual management of the Bank property in accordance with the terms of this BEI and Exhibit D-5 of the BEI.
- Any Endowment Fund revenues (including earnings and interest) remaining after the Endowment Principal is adjusted for inflation that exceed the anticipated annual management expenses of the Bank property shall be retained in the Endowment Fund and made available to fund unexpected expenses and adaptive management needs.
- The property owner shall invoice endowment holder for management activities following the invoicing instructions in Exhibit D-3 of the BEI.
- If there is not sufficient funding available from the Endowment Fund interest and earnings or if long-term management expenses exceed those estimated in Table 5, then SMUD shall consult with the IRT to identify the most effective means to implement the management measures and tasks with the resources available. After consultation with the IRT, SMUD shall submit the resulting proposal in writing to the IRT within 60 days after completion of its consultation. Upon written approval of the IRT, SMUD shall implement the approved management measures and tasks.

Attachment 1 to Exhibit D-2 Endowment Fund Analysis

Property Analysis Record (PAR)

PAR

Habitat Planning In Perpetuity

The Property Analysis Record

Title: SMUD Nature Preserve Mitigation Bank

Par Code: RS1

Prepared by: Becky Rozumowicz

AWE

Date: 07/05/2013

The Center for Natural Lands Management prepared this software to assist habitat conservation planners to develop the management tasks and costs of long-term stewardship. While the sources are thought to be reliable, the Center makes no representations about the accuracy of cost estimates. The date of the cost information is 2007. The operation of the program is not guaranteed by the Center. Management requirements are determined by the user. Users should consult with their own financial advisors before relying on the results of their analysis.

Section 1 - Property Information

Property Title: SMUD Nature Preserve Mitigation Bank PAR ID: RS1 Last Modified: 07/09/2013

Location/Jurisdiction	Rancho Seco
County	Sacramento
Address	
City, State, Zip	Herald, CA 95638
Conserved Acres	1132
Management type	Fee Title Ownership
Date Created	11/12/2008 05:05:50 PM
Prepared for	SMUD
Prepared by	Becky Rozumowicz
	AWE

Project Management Information		Developer/Proponent Information	
Contact	Emily Bacchini	Contact	Emily Bacchini
Company	SMUD	Company	SMUD
Address	6201 S Street	Address	6201 S Street
City, State, Zip	Sacramento, CA 95817	City, State, Zip	Sacramento, CA 95817
Phone	916-732-6334	Phone	916-732-6334
Fax		Fax	
E-Mail address	emily.bacchini@smud.org	E-Mail address	emily.bacchini@smud.org

Cost Year	2016
Date of site visit:	07/17/2008
Development Project	
Project Name	SMUD Nature Preserve Mitigation Bank
Total Project Acres	1132
Stage of planning	Final Review by IRT

Notes

SMUD is proposing to establish the Bank on approximately 1,132 acres in southeastern Sacramento County. The intended purpose of the Bank is to create a multi-species/multi-habitat mitigation bank that provides for long-term protection of covered species and habitats covered within the Bank's service areas.
Imported by ADMIN on 06/10/2013
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Section 2 - Division of Responsibility

Property Title: SMUD Nature Preserve Mitigation Bank PAR ID: RS1 07/05/2013

Description:	Responsible Party:	Notes:
Biological Surveys	Other	A qualified biologist will conduct biological surveys consistent with the long-term management plan.
Debris Removal	Manager	The Manager will ensure that accumulations of trash and other unwanted debris are removed from the Preserve during annual inspections.
Erosion Control	Manager	Construction areas that expose soil in upland habitat will be seeded with an erosion control seed mix and mulched. This will reduce the potential for sedimentation in constructed and nearby existing wetlands during the rainy season. Additional erosion control will be implemented as needed.
Fence Installation	Manager	New fencing will be installed to include lands within the Bank along the perimeter of Rancho Seco Lake.
Fence Maintenance	Manager	The Manager will be responsible for inspecting and maintaining the fence.
Fire Zone/Buffer Management	Other	A minimum 20-foot-wide corridor around the perimeter of the Bank will be disked or scraped between May 15 and June 15 each year.
Gate Maintenance	Manager	The manager will be responsible for the inspection and maintainance of authorized gates on the site and for keeping them locked to prevent unauthorized vehicle access. Repair/replace gates as needed.
Grazing	Manager	Residual Dry Matter (RDM) will be monitored annually. The Manager will determine the appropriate management decision based on the target RDM levels identified in the grazing program.
Habitat Restoration	Other	To be completed prior to long-term management.
Hiking Trail Maintenance	Manager	Howard Ranch Nature Trail within the Bank will be maintained by the Manager.
Maintenance, Road	Manager	Existing dirt access roads/firebreaks are present within the Bank and will be maintained as part of the existing grazing lease.
Monitoring, Plant	Other	A qualified biologist will be retained on-call during all construction to monitor special-status plant species and habitat.
Monitoring, Wildlife	Other	A qualified biologist will be retained on-call during all construction to monitor special-status wildlife species and habitat.

Description:	Responsible Party:	Notes:
Non-native plant removal - Ongoing	Manager	The Biologist will assess the presence of any newly introduced nonnative invasive plant species during the biological inspections and recommend removal as needed.
Plant Surveys	Other	A qualified botanist will perform the plant surveys.
Signs, Access Control	Manager	The Manager is responsible for the maintainance and replacement, as needed, of all Bank boundary signs.
Signs, Interpretive	Manager	The Manager is responsible for the maintainance and replacement, as needed, of Sensitive Habitat signs.
Wildlife Surveys		A qualified wildlife biologist will perform the wildlife surveys.

Section 3 - Property Details

Property Title: SMUD Nature Preserve Mitigation Bank PAR ID: RS1 07/05/2013

Title	Permitted	Future Permitted	Problem Level	Location	Notes
Conservation Easements	Yes	Yes	None	Both	Temperorary conservation easement to December 2011

Section 4 - Contacts

Property Title:SMUD Nature Preserve Mitigation Bank PAR ID: RS1 07/09/2013

Contacts List

Name:	,	Phone:	916-447-2677
Position:		Mobile:	- -
Company/Agency:	California Native Plant Society	Fax:	- -
Address:	2707 K Street, Suite I	Email:	cnps@cnps.org
City, State & Zip:	Sacramento, CA 95816-5113		

Name:	,	Phone:	- -
Position:		Mobile:	- -
Company/Agency:	Ione Band of Miwok Indians	Fax:	- -
Address:	14 West Main Street P.O.Box 1190	Email:	
City, State & Zip:	Ione, CA 95640		

Name:	Bacchini, Emily	Phone:	916-732-6334
Position:	Env Mangmt Specialist III	Mobile:	- -
Company/Agency:	SMUD	Fax:	916-732-6890
Address:	6201 S Street	Email:	emily.bacchini@smud.org
City, State & Zip:	Sacramento, CA 95817		

Name:	Marty, Jaymee	Phone:	916-683-6497
Position:		Mobile:	- -
Company/Agency:	The Nature Conservancy	Fax:	- -
Address:	13501 Franklin Blvd	Email:	jmarty@tnc.org
City, State & Zip:	Galt, CA 95632		

Name:	Rozumowicz, Becky	Phone:	916-987-3362
Position:	Project Manager	Mobile:	916-300-4655
Company/Agency:	Area West Environmental	Fax:	916-988-2677
Address:	7006 Anice Street	Email:	becky@areawest.net
City, State & Zip:	Orangevale, CA 95662		

Name:	Rutledge, Aimee	Phone:	916-492-0908
Position:	Executive Director	Mobile:	- -
Company/Agency:	Sacramento Valley Conservancy	Fax:	- -
Address:	P.O. Box 163351	Email:	bond13mac@aol.com
City, State & Zip:	Sacramento, CA 95816		

Section 5 - Purpose of Preservation

Property Title: SMUD Nature Preserve Mitigation Bank PAR ID: RS1 07/05/2013

Purpose of Preservation	Prioritize	Goals and Objectives
Endangered Species	1	The primary purpose of the SMUD Nature Prserve Mitigation Bank is to protect and conserve the special status species and wetlands on site. This includes maintaining habitat features and monitoring population status and trends.
Wetlands	1	The primary purpose of the SMUD Nature Preserve Mitigation Bank is to protect and conserve the endangered species and wetlands at the site. This includes maintaining the wetland features on site.

Section 6 - Site Conditions

Property Title: SMUD Nature Preserve Mitigation Bank PAR ID: RS1 07/05/2013

Fire/Fuel Management	Permitted/ Legal	Future Permitted	Problem	Location	Notes
Fire Breaks	Yes	Yes	Low	On-Site	Existing and maintained firebreaks occur around and within the Bank.

Hydrological Features	Problem	Location	Notes
Water Flow Impediments	None	On-Site	Five ponds occur onsite that are used to provide water for cattle. These features capture water flowing through ephemeral drainages and impound the water by use of earthen berms.
Wells, Sumps	None	On-Site	Old wells are located along Clay East Road in the southwestern portion of the Bank and near the irrigated pasture at the east boundary.

Structures	Permitted/ Future Legal	Permitted	Problem	Location	Notes
Power or Utility Lines	Yes	Yes	Low	On-Site	Within the Bank an existing electrical power line and telephone line occurs along the south side of Clay East Road. The electrical power line continues from the eastern edge of Clay East Road along the Bank boundary toward Rancho Seco Lake.
Towers	Yes	Yes	Low	On-Site	A total of four electrical towers occur in the southwest corner of the Bank. These towers require very little maintenance.

Section 7 - Land Use

Property Title: SMUD Nature Preserve Mitigation Bank PAR ID: RS1 07/05/2013

Adjacent Land Use	Permitted	Future Permitted	Problem	Location	Notes
Agricultural	Yes	Yes	None	South	Grazed annual grassland to the north, south, and east.
Industrial	Yes	Yes	Low	West	The Rancho Seco Nuclear Power Plant and the Cosumnes Power Plant are located to the west of the Bank.
Other	Yes	Yes	None	East	Howard Ranch has permanent protective restrictions and is currently grazed vernal pool grassland.

Agriculture	Permitted	Future Permitted	Problem	Location	Notes
Grazing	Yes	Yes	Low	Both	The Bank is grazed by cattle for approximately 9 months of the year under a grazing lease managed by the Sacramento Valley Conservancy. Target RDM levels were determined with the objective of maintaining habitat for special-status species.

Cultural Elements	Permitted	Future Permitted	Problem	Location	Notes
Historical Landscape	Yes	Yes	None	On-Site	Historic placer mine tailings are present on the Bank. These are not within any area of proposed disturbance associated with wetland restoration/establishment, wildlife enhancement, or tree planting areas.
Other	Yes	Yes	None	On-Site	Two prehistoric resources were identified onsite. Neither of these areas occur near proposed ground disturbance associated with site development. A cultural monitor will be present during tree planting.

Development	Permitted	Future Permitted	Problem	Location	Notes
Gravel or Dirt Roads	Yes	Yes	Low	Both	Dirt road/fire breaks occur throughout the Bank along exitsing fencelines for purposes of cattle ranching and land management and will be maintained on the Bank.
Recreational	Yes	Yes	Low	Adjacent	Rancho Seco Lake (camping, fishing) is surrounded by and adjacent to the Bank.

Recreation	Permitted	Future Permitted	Problem	Location	Notes
Trails	Yes	Yes	Low	Both	A portion of the Howard Ranch Nature Trail (foot trail) extends throught the eastern portion of the Bank.

Resource Use	Permitted	Future Permitted	Problem	Location	Notes
Livestock Grazing	Yes	Yes	Low	Both	The Bank is grazed by cattle for approximately 9 months of the year under a grazing lease managed by the Sacramento Valley Conservancy in accordance with an established grazing program.

Section 8 - Biological Assessment

Property Title: SMUD Nature Preserve Mitigation Bank PAR ID: RS1 07/05/2013

ANIMALS

Common Name: / Scientific Name:	Ranking: / Status:	Acreage:	Individual:	Notes:
AMPHIBIANS				
California Tiger Salamander *(Ambystoma californiense)*	Global: G2 Breeding	National: N2N3 1.011	State: S2S3 20	California tiger salamander have been observed in several wetlands on the Bank. Annual grasslands provide suitable upland habitat.
BIRDS				
Bald Eagle *(Haliaeetus leucocephalus)*	Global: G5 Visitor	National: N5B,N5	State: S2 1	
Burrowing Owl *(Athene cunicularia)*	Global: G4 Occassional	National: N4B,N4 unknown	State: S2 2	Burrowing owls have been observed on the Bank during the winter season. Potential breeding and foragin habitat is present in agriculture throughout Bank.
Swainson's Hawk *(Buteo swainsoni)*	Global: G5 Occassional	National: N5B 1.140	State: S2 unknown	Annual grassland provides suitable foraging habitat.
Tricolored Blackbird *(Agelaius tricolor)*	Global: G2 Breeding	National: N2N3 unknown	State: S2 unknown	Tricolored blackbirds were observed nesting within riparian scrub habitat on the Bank in 2009. Annual grasslands on the Bank provide suitable foraging habitat for tricolored blackbirds.
FAIRY, CLAM, AND TADPOLE SHRIMPS				
Vernal Pool Fairy Shrimp *(Branchinecta lynchi)*	Global: G3 confirmed	National: N3 44.624	State: S2S3 unknown	Known from throughout site.
Vernal Pool Tadpole Shrimp *(Lepidurus packardi)*	Global: G4 confirmed	National: N4 44.624	State: S2S3 unknown	Known from throughout site.

PLANTS

Common Name: / Scientific Name:	Ranking: / Status:	Acreage:	Individual:	Notes:
FLOWERING PLANTS				
Boggs Lake Hedge-hyssop *(Gratiola heterosepala)*	Global: G3 National: N3 State: S3.1	1.705	unknown	Known from one wetland within southeast corner
Dwarf Downingia *(Downingia pusilla)*	Global: G3 National: N3 State: S3.1	0.174	unknown	Known from two wetlands within southeast corner
Legenere *(Legenere limosa)*	Global: G2 National: N2 8.06 State: S2.2	8.06	unknown	Known from four wetlands on the Bank
Sacramento Orcutt Grass *(Orcuttia viscida)*	Global: G1 National: N1 State: S1.1	2.979	unknown	Known from two wetlands within southeast corner

There are no records for this section.

There are no records for this section.

Section 11 - Reports Required

There are no records for this section.

Section 12 - Mitigation Bank

Mitigation:

Credit Owner:	Bacchini, Emily - SMUD
Bank Manager:	Bacchini, Emily - SMUD
Bank Owner:	Bacchini, Emily - SMUD
Habitat Type:	Vernal pool grassland
Species Type:	Vernal pool endemics, grassland species
Description:	
Acres:	1132
Ratio:	1:1
Total Amount:	
Credits Available:	TBD
Credit Svc Map:	
Fund Account:	0
Credit Sales:	0
Credit Account:	0
Credit Sales Date:	
Fund Reqmt:	N/A
Credit Type:	N/A
Notes:	

Section 13 - Phase List

Property Title: SMUD Nature Preserve Mitigation Bank PAR ID: RS1 07/05/2013

There are no records for this section.

There are no records for this section.

Section 15 - Ongoing Tasks and Costs

Property Title: SMUD Nature Preserve Mitigation Bank PAR ID: RS1 07/05/2013

Task List	Specific Description	Unit	Number of Units	Cost / Unit	Annual Cost	Years Divide	Cont %	Total Cost
BIOTIC SURVEYS								
CA Tiger Salamander	Aquatic sampling; note &	L. Hours	24.00	90.00	2,160.00	5.0	10.0	475.20
Ca Tiger Salamander	Drain of Peren Pond	Item	1,260.00	0.56	705.60	5.0	10.0	155.23
Ca Tiger Salamander	Drain of Peren Pond	Item	1.50	935.27	1,402.90	5.0	10.0	308.63
Ca Tiger Salamander	Drain of Peren Pond	L. Hours	225.00	90.00	20,250.00	5.0	10.0	4,455.00
Photo Stations (L2b)	Photograph waters of the	L. Hours	6.00	80.00	480.00	1.0	10.0	528.00
Plant Surveys (L5)	Sacramento Orcutt and	L. Hours	10.00	80.00	800.00	5.0	10.0	176.00
Plant Surveys (L6)	Survey for covered plant	L. Hours	10.00	80.00	800.00	5.0	10.0	176.00
Tricolored Blackbird	Tricolored blackbird	L. Hours	12.00	80.00	960.00	5.0	10.0	211.20
Vernal Pool Survey (L3)	Vrnal pool fairy and	L. Hours	30.00	75.00	2,250.00	5.0	10.0	495.00
Waters of the U.S. (L2a)	Survey waters of the U.S	L. Hours	30.00	80.00	2,400.00	5.0	10.0	528.00
Sub-Total								7,508.27
GENERAL MAINTENANCE								
Boundary Signs (L10c)	Replace Bank boundary	Item	20.00	70.00	1,400.00	20.0	10.0	77.00
Fences & Gates (L13)	Inspect fences and gates;	L.C.Y.	12.00	40.00	480.00	1.0	10.0	528.00
Habitat Signs (L10c)	Replace snsitive habitat	Item	2.00	200.00	400.00	10.0	10.0	44.00
Repair Fences (L13)	Repair/replace barbed	Lin. Ft.	72,070.00	6.00	432,420.00	30.0	10.0	15,855.40
Repair Gates (L13)	Repair & replace gates	Item	26.00	150.00	3,900.00	20.0	10.0	214.50
Trash Removal (L10b)	Remove debris	Trip	1.00	500.00	500.00	1.0	10.0	550.00
Trash, Trespass, Public		L. Hours	52.00	40.00	2,080.00	1.0	10.0	2,288.00
Sub-Total								19,556.90
HABITAT MAINTENANCE								
General Condition (L1)	Walk-thru Survey	L. Hours	30.00	80.00	2,400.00	1.0	10.0	2,640.00
Grazing Management	Adaptively manage	L. Hours	20.00	80.00	1,600.00	1.0	10.0	1,760.00
Invasive Plant Removal	Hand removal	L. Hours	40.00	40.00	1,600.00	5.0	10.0	352.00
Invasive Plant Survey	Non-native invasive plant	L. Hours	60.00	80.00	4,800.00	5.0	10.0	1,056.00
RDM measurements	Perform RDM	L. Hours	10.00	40.00	400.00	1.0	10.0	440.00
Sub-Total								6,248.00
HABITAT RESTORATION								
Erosion Control (L14)	Apply erosion control seed	Acre	5.00	100.00	500.00	5.0	10.0	110.00
Sub-Total								110.00
REPORTING								
Annual Report (L15)	Compile survey results,	L. Hours	40.00	35.00	1,400.00	1.0	10.0	1,540.00
Annual Report (L15)	Prepare management and	L. Hours	12.00	120.00	1,440.00	1.0	10.0	1,584.00
Sub-Total								3,124.00
WATER MANAGEMENT								
Mosquito Abatement	Coordinate with Mosquito	L. Hours	4.00	80.00	320.00	1.0	10.0	352.00
Sub-Total								352.00
Subtotal								36,899.17
Administration								8,567.52
Total								45,466.69

Section 16 - Financial Summary

Property Title: SMUD Nature Preserve Mitigation Bank Date: 07/05/2013

1st Budget Year: 2016 ***State: CA*** ***PAR Code: RS1***

Item Descriptions	*Total*
Initial & Capital Financial Requirements	
Revenues	$0
Management Costs	$0
Contingency Expense	$0
Initial & Capital Management Total Costs	$0
Administrative Costs of Total Management Costs	$0
Initial & Capital Gross Costs	$0
Initial & Capital Net Costs	$0
Annual Ongoing Financial Requirements	
Revenues	$0
Ongoing Costs	$33,545
Contingency Expense	$3,354
Ongoing Management Total Costs	$36,899
Administrative Costs of Total Management Costs	$8,568
Ongoing Gross Costs	$45,467
Ongoing Net Costs	$45,467
Endowment Requirements for Ongoing Stewardship	
Endowment to Produce Income of $45,467	$1,299,048
Endowment per acre $1,148	
Stewardship costs are based on 3.50% of Endowment Earnings per Year	
Ongoing management funding per year is $45,467	
Resulting in a per acre per year cost of $40	
Total Funding Required	$1,299,048

Section 17: Labor Summary

Property Title:SMUD Nature Preserve Mitigation Bank PAR ID: RS1 07/05/2013

Position Description	Initial & Capital Hours	Initial & Capital Cost	Ongoing Hours	Ongoing Cost	Total Hours	Total Cost
Not Assigned	0.00	0.00	535.00	13,652.00	535.00	13,652.00
Preserve Manager	0.00	0.00	12.00	1,440.00	12.00	1,440.00
Administrative Assistant	0.00	0.00	40.00	1,400.00	40.00	1,400.00
Biologist	0.00	0.00	28.00	832.00	28.00	832.00
Total			615.00	17,324.00	615.00	17,324.00

Exhibit D-4

Interim Management Plan

Interim Management Plan
for the
SMUD Nature Preserve Mitigation Bank
Sacramento County, California

Prepared for:

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
The Power To Do More.®

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June 2013

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Appendix A. Figures 1 through 8

LIST OF ABBREVIATED TERMS

Bank	SMUD Nature Preserve Mitigation Bank
BEI	Bank Enabling Instrument
County	County of Sacramento
CPP	Cosumnes Power Plant
Development Plan	Development Plan for the SMUD Nature Preserve Mitigation Bank
HUC	Hydrologic Unit Code
IRT	Interagency Review Team
SMUD	Sacramento Municipal Utility District
State	State of California
SVC	Sacramento Valley Conservancy
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

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1.0 Introduction

The following Interim Management Plan was developed for the Sacramento Municipal Utility District's (SMUD's) Nature Preserve Mitigation Bank (Bank) located in southern Sacramento County (Figure 1, all figures are located in Appendix A).

The Bank Enabling Instrument (BEI) signatory agencies are the Sacramento District of the U.S. Army Corps of Engineers, Region 9 of the U.S. Environmental Protection Agency, the Sacramento Office of the U.S. Fish and Wildlife Service (USFWS), and the North Central Region of the California Department of Fish and Wildlife. These agencies comprise and are referred to jointly as the Interagency Review Team (IRT).

Establishment of the Bank will result in preservation of 52.57 acres of existing wetland habitats and associated plant and wildlife species, preservation of 2.98 acres of previously restored wetlands and up to 25 acres of restored/established vernal pools, vernal swales, seasonal wetlands, and seasonal swales (Table 1).

Establishment of the Bank will also result in preservation of approximately 1,034 acres of annual grasslands that provide upland habitat for California tiger salamanders (Table 2). Additionally, Bank establishment will result in the preservation of 0.801 acre of previously documented nesting habitat for tricolored blackbird within uplands associated with riparian scrub vegetation (Table 2).

In addition to the habitats and species listed in the Tables 1 and 2, SMUD—working with the IRT—will request additional credit releases under the following circumstances:

- If additional locations of special-status species or habitat are identified at the Bank;
- If new resources are identified at the Bank;
- If additional areas with restoration potential are identified; or
- If resources that occur at the Bank are provided additional federal, state, or local protections.

Table 1. Existing and Proposed Wetlands and Special-Status Species Habitats at the SMUD Nature Preserve Mitigation Bank

Wetland Type	Special-Status Species Habitat[a]	Acres of Habitat for Each Species or Group of Species within a Wetland Type	Total Acreage for Each Wetland Type
Preserved Existing Wetlands			
Intermittent drainage	No special-status species habitat	3.336	3.336
Juncus wetland	No special-status species habitat	0.335	0.335
Open water	VPFS, VPTS, CTS	0.253	4.888
	TCBB[b]	0.407	
	No special-status species habitat	4.228	
Seasonal swale	No special-status species habitat	0.307	0.307
Seasonal wetland	VPFS, VPTS, LELI	2.497	7.614
	VPFS, VPTS	3.361	
	VPFS, VPTS, LELI, TCBB[b]	1.756	
Vernal pool	VPFS, VPTS, CTS	0.587	28.822
	VPFS, VPTS, LELI, TCBB[b]	0.405	
	VPFS, VPTS, DOPU	0.174	
	VPFS, VPTS, LELI	0.423	
	VPFS, VPTS, LELI, GRHE, ORVI, CTS	1.705	
	VPFS, VPTS, LELI, ORVI, CTS	1.274	
	VPFS, VPTS, RALO	0.049	
	VPFS, VPTS	24.205	
Vernal swale	VPFS, VPTS	7.266	7.266
		Total preserved wetland acreage	***52.57***
Previously Restored Wetlands			
Vernal pool	VPFS, VPTS	1.208	2.924
	VPFS, VPTS, CTS	1.716	
Vernal swale	VPFS, VPTS	0.053	0.053
		Total previously restored wetland acreage	***2.98***
Proposed Restored/Established Wetlands			
Vernal pool and/or seasonal wetlands	VPFS, VPTS	23.5	23.5
Vernal swale/or seasonal swale	VPFS, VPTS	1.5	1.5
		Total proposed restored/established wetland acrege	***Up to 25.00***

[a] Species abbreviations:

CTS California tiger salamander (*Ambystoma californiense*)
VPFS Vernal pool fairy shrimp (*Branchinecta lynchi*)
VPTS Vernal pool tadpole shrimp (*Lepidurus packardi*)
TCBB Tricolored blackbird (*Agelaius tricolor*)
DOPU Dwarf downingia (*Downingia pusilla*)
GRHE Boggs Lake hedge-hyssop (*Gratiola heterosepala*).
LELI Legenere (*Legenere limosa*).
ORVI Sacramento Orcutt grass (*Orcuttia viscida*).
RALO Lobb's aquatic buttercup (*Ranunculus lobbii*).

[b] Tricolored blackbird nesting habitat: The 2.57 acres of nesting habitat for tricolored blackbird is based on acreage of the vegetated portions (i.e., willows) of open water, seasonal wetland, and vernal pool habitats where breeding has been documented.

Table 2. Existing and Proposed Upland Habitats and Special-Status Species at the SMUD Nature Preserve Mitigation Bank

Upland Habitat Type	Special-Status Species	Total Preserved Upland Habitat (Acres or # of tress)
Existing Upland Habitat		
Annual Grassland	California tiger salamander (upland)[a]	1,034
	Tricolored blackbird (nesting)[b]	0.801
	Total preserved upland acreage	***1,035***

Notes:

[a] Acreage of existing California tiger salamander upland habitat on the Bank was determined by calculating non-aquatic habitat (annual grassland) within 0.7 mile of a known breeding site on the Bank (1,059 acres) and subtracting 25 acres of proposed wetlands to be restored on the Bank.

[b] Tricolored blackbird nesting habitat occurs within 0.801 acre of uplands, consisting of riparian scrub vegetation within a grassland area where breeding activity has been previously documented.

1.1 Purpose of the Bank

The purpose of the Bank is to provide preserved, enhanced, restored, and established mitigation habitats that can be used to compensate for habitat impacts associated with future public or private agency-approved projects.

1.2 Interim Management Period

The interim management and monitoring period (hereafter, Interim Management Period) includes the short-term management, monitoring, and reporting activities to be conducted from the time the Bank is established until the endowment fund has been fully funded for 1 year and all performance standards identified in the Development Plan for the SMUD Nature Preserve Mitigation Bank, Sacramento, California (2010) (Exhibit C-1 of the BEI) have been met. Typically, this is a 5-year period but is subject to the provisions of the BEI.

1.3 Interim Management Responsibilities

As the bank sponsor, SMUD shall fund and implement all interim management responsibilities identified in this plan, including monitoring and survey requirements, corrective actions (as necessary), and reporting. Any actions proposed by SMUD that could affect preserved, enhanced, restored, or established habitats or covered species on the Bank that are not described in this Interim Management Plan must be approved by the IRT. The permanent conservation easement holder will be notified of the action. SMUD is the bank sponsor and will act as the land manager during the Interim Management Period.

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2.0 Property Description

A physical description of the Bank property is provided below.

2.1 Bank Size, Location, and Ownership

The Bank encompasses approximately 1,132 acres owned by SMUD and is located in southeast Sacramento County, approximately 12 miles east of State Route 99, south of State Route 104, and east of the decommissioned Rancho Seco Nuclear Generating Station (shut down in 1989) towers (Figures 1 and 2, all Figures located within Appendix A). The Bank occurs mostly within Township 6 North, Range 8 East, Sections 27, 28 29, 32 ,33, and 34 of the Goose Creek U.S. Geological Survey (USGS) 7.5-minute quadrangle, with a small portion along the western boundary of the Bank occurring in Section 29 of the Clay USGS 7.5-minute quadrangle (Figure 2).

2.2 Physical Setting

The Bank is characterized by rolling hills covered with native and naturalized non-native annual grasses typical of the Sacramento County region. Wetlands and other waters of the U.S. are present throughout much of the Bank and include vernal pools, vernal swales, seasonal wetlands, seasonal swales, Juncus wetlands, intermittent drainages, open water, and an agricultural return ditch (Figure 3). Clay Creek runs through the northeastern corner of the Bank (Figure 2) and is dammed to create Rancho Seco Lake (outside of the Bank). SMUD maintains the water level of Rancho Seco Lake at an elevation of approximately 237 feet above mean sea level throughout the year. The lake level is maintained by natural flow into the lake and from water pumped into the lake from the Folsom South Canal (Figure 1).

2.3 History and Land Use

In 1966, SMUD purchased 2,100 acres (including the Bank) in southeast Sacramento County for construction of a nuclear power plant. Construction of the Rancho Seco Nuclear Generating Station began in 1969. Commercial operation started in 1975, in Clay Station, approximately 0.5 mile west and north of the Bank. The power plant was operated until 1989, when it was closed by public vote.

As part of the development agreement to construct and operate the power plant, SMUD contracted with the State of California (State) to operate part of the power plant site as a public park for 50 years. SMUD entered into the contract with the State that granted SMUD funding for construction of the Rancho Seco dam and reservoir, recreational facilities, and water and sanitary facilities. This contract requires SMUD to maintain these facilities in a manner that supports public recreational use and fisheries. The reservoir may not be drawn down below an elevation of 237 feet without the prior written consent of the State. The contract remains in effect until December 31, 2022.

In accordance with the State contract, SMUD entered into a contract with the County of Sacramento (County) for the management of public recreational uses. Under the terms of the contract with the County, SMUD agreed to construct water, sanitary, and recreation facilities and to operate the reservoir and the County would manage the public recreational uses. However, a budget shortfall in 1992 resulted in the County discontinuing management of the park facilities in September 1992 and SMUD assuming those responsibilities.

In October 2006, SMUD teamed with Sacramento Valley Conservancy (SVC) and The Nature Conservancy to set aside approximately 1,200 acres of land on the SMUD-owned Rancho Seco property as a temporary nature preserve. SMUD granted SVC a 30-month temporary easement for the protection of critical ecological and agricultural resources, including wetlands that support species that are state and federally listed as threatened and endangered. SVC assumed management of grazing on the land, which is leased to a cattle rancher. The temporary conservation easement was extended to December 31, 2011 and the grazing lease is still active. As long as the Bank Enabling Instrument (BEI) is progressing toward approval, SMUD anticipates extending the temporary conservation easement annually, to be terminated upon Bank establishment.

2.4 Cultural Resources

Existing infrastructure within the Bank includes several well-maintained interior dirt access roads. These interior roads allow access through locked gates from the paved road to Rancho Seco Lake and associated recreational facilities, and from Clay East Road. There are no buildings on the Bank. There are no levees on the Bank; however, existing berms surround several of the reservoirs (open water) located on the Bank, which were constructed for livestock drinking water. The majority of the Bank boundary is fenced, with occasional locked gates for access onto the site. Several interior fences are present on the Bank to restrict cattle movement during grazing. In addition, no State-owned historic properties are located on the Bank.

The majority of the Bank has been previously surveyed for cultural resources. The entire Bank was surveyed in 2007 by Golden Hills Consulting. Previous surveys include:

- *Cultural Resource Assessment of the Proposed SMUD Photovoltaic Project, Sacramento County, California* (Peak & Associates 1984);
- *Cultural Resources Report for Rancho Seco Park, Sacramento County, California* (Costello et al., Foothill Resources 1993);
- *Documentation and National Register of Historic Places, Evaluation of Historic Resources for the Rancho Seco Park Project, Sacramento County, California* (Marvin and Fryman, Foothills Resources 1994); and
- *Cultural Resource Survey of Selected Locations for the Cosumnes Power Plant Project Rancho Seco, California* (Sharpe and Bard, CH2M HILL 2002).

Potential impacts to recorded prehistoric or historic cultural resource locations are not anticipated from monitoring and management of the Bank. High and moderate sensitivity areas occur on the

Bank. No ground disturbance will occur in high sensitivity areas (areas where cultural resources have been previously recorded). Any future ground disturbance during the Interim Management Period that occurs within areas of moderate cultural sensitivity will be monitored by a cultural resources specialist.

2.5 Hydrology and Topography

The Bank occurs within the Laguna and Lower dry Creek subwatersheds, in the USGS 10 digit Hydrologic Unit Codes (HUCs) 1804001307 and 1804001209, respectively.

The terrain of the Bank consists of rolling gentle slopes with many small collection tributaries that drain runoff from incidental rainfall (Figure 4). The Bank ranges in elevation from 130 to 280 feet above mean sea level. Most land on the Bank drains, eventually, to Hadselville Creek; either through small intermittent tributaries to Hadselville Creek or to Clay Creek, which is also a tributary to Hadselville Creek. Hadselville Creek drains into Laguna Creek, which conveys flow westerly to the Cosumnes River and then into the Mokelumne River. The Bank and vicinity have not historically been prone to flooding and are not likely to flood even under heavy rainfall (SMUD 1991).

Rancho Seco Lake, which is surrounded by the Bank but not included in the Bank, has a tributary area of approximately 1,000 acres in the upper reaches of Clay Creek. The lake covers an area of approximately 160 acres and has an approximate storage capacity of 2,850 acre-feet (Jones & Stokes Associates 1993).

The flow in Clay Creek, which was an intermittent stream before construction of Rancho Seco Lake, is dominated downstream of the Bank by water discharge from the Rancho Seco site. Water transfers from the Folsom South Canal to a seasonal unnamed creek that is a tributary of Clay Creek from the decommissioned Rancho Seco Nuclear Generating Station on a continual basis at an average flow of 6,000 gallons per minute. Water can be transferred either through the power plant to the unnamed creek or to Rancho Seco Lake. (Scott pers. comm.)

2.5.1 Vernal Pool Hydrology

The Bank contains a significant number of vernal pools. Vernal pools provide important hydrologic functions, in addition to sustaining biological resources, by linking the flow of precipitation, surface water, and groundwater between the upstream and downstream portions of a watershed. Vernal pools may retard the flow of surface runoff, reduce flow velocities, and reduce erosion potential. Vernal pools can also contribute to groundwater recharge and discharge as surface water.

Within the Bank, vernal pools are underlain by an impermeable duripan and/or clay layers (claypan). In general, direct inception of precipitation is the main source of water filling vernal pools and evaporation/transpiration are the main causes of water loss. Overland and subsurface flow can also contribute to filling vernal pools. Water may also be lost by subsurface flow. This is especially true for vernal pools not connected to an upstream channel or swale. Overland flow between vernal pools on the Bank is probably not a major hydrologic pathway; soils have a low

infiltration rate, but the gentle slopes allow water to be retained in the soil. This condition can result in the presence of perched groundwater.

2.6 Landforms and Soils

The Bank is located on two distinct landforms: Laguna Formation and Mehrten Formation. Based on the Sacramento County Soil Survey (U.S. Department of Agriculture Natural Resources Conservation Service 1993), these geologic formations support five soil map units (Table 3 and Figure 5).

Table 3. Geologic Formations and Associated Soil Map Units of the SMUD Nature Preserve Mitigation Bank

Soil Map Unit	Geologic Formation
125 – Corning complex, 0–8% slopes	Laguna
126 – Corning-Redding complex, 8–30% slopes	Laguna
156 – Hadselville-Pentz complex, 2–30% slopes	Mehrten
198 – Redding gravelly loam, 0–8% slopes	Laguna
247 – Open water	Not applicable

2.7 Existing Utilities, Easements, and Leases

Existing utility infrastructure on the Bank includes an active pole line, owned by SMUD, which is located along the southwest side of the Rancho Seco Lake dam and extends westward along a dirt access road (Figure 6). The portion of this pole line that occurs on the Bank consists of approximately 16 poles situated along the northern extent of the pole line. These 16 poles and overhead wires are located on the Bank boundary and along a disturbed corridor (i.e., dirt road and/or fire break). Additionally, Pacific Gas and Electric (PG&E) maintains four lattice towers and associated 230 KV transmission lines located along the Bank boundary in the southwest corner of the Bank (Figure 6). An underground telephone cable owned and maintained by AT&T (formerly Pacific Bell) is also present within the Bank to service existing SMUD facilities adjacent to the Bank. This cable line extends from the north end of the Performing Animal Welfare Society (PAWS) area within a dirt access road/firebreak along the Bank Boundary and continues westward along Clay East Road (Figure 6).

The majority of existing utility infrastructure on the Bank occurs within an existing disturbed corridor (i.e., dirt access road/firebreak or adjacent to a paved roadway) and any necessary maintenance activities associated with these facilities will be conducted in a manner that would avoid and/or minimize effects to nearby waters of the U.S., including wetlands, and associated special-status species. Any maintenance activities occurring on the Bank would likely trigger the need for additional permitting and consultation with the IRT would be required.

The Proforma Title Report for the Bank is provided as Exhibit E-2 (Attachment 1) of the BEI.

2.8 Surrounding Land Uses and Zoning

Surrounding lands consist mostly of grazed annual grasslands with large vernal pool complexes. Adjacent developed areas include the decommissioned Rancho Seco Nuclear Generating Station (shut down in 1989), the Cosumnes Power Plant (CPP), Rancho Seco Lake and associated recreational facilities, and the Amanda Blake Memorial Wildlife Refuge (Figure 7). Lands surrounding the Bank are zoned Permanent Agriculture, 80 acre minimum (Figure 8) (County of Sacramento 2010a). No known development is planned on private lands adjacent to the Bank (County of Sacramento 2010b). However, SMUD has the option to construct a second 500-megawatt natural gas power plant associated with the CPP (within the existing CPP footprint shown on Figure 7), and SMUD may consider installation of solar power-generation facilities on SMUD-owned lands west and north of the Bank.

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3.0 Interim Management

3.1 Goals and Objectives

The primary goal of the Interim Management Plan is to meet the performance standards identified in the Development Plan for the SMUD Nature Preserve Mitigation Bank, Sacramento County, California (Development Plan) (Exhibit C-1 of the BEI) for preserved, enhanced, and restored/established waters of the U.S., covered species, and covered habitats at the Bank. Implementation of the Interim Management Plan is intended to achieve SMUD's (bank sponsor) overall goals and objectives of maintaining and increasing habitat functions and values throughout the Bank and providing mitigation credits for impacts on sensitive resources within the Bank service areas.

3.2 Performance Standards

Performance standards have been identified for waters of the U.S., special-status plants, special-status wildlife, and erosion control. Performance standards are identified in the Development Plan (Exhibit C-1 of the BEI), within the section titled Performance Standards.

3.3 Monitoring Methods

Specific interim (short-term) management, monitoring, and reporting methods are described in the Exhibit C-1 of the BEI for preserved, enhanced, and restored/established wetlands, special-status species, non-native plants, vegetation management/grazing, trash and trespass, infrastructure and facilities, erosion control, oak tree planting, and overall site quality. Monitoring tasks associated with interim monitoring and management of the Bank are listed in Table D-1 in Exhibit D-1 of the BEI, along with the frequency of each task, schedule, and average annual cost. Exhibit D-1 also includes a description of financial assurances provided by SMUD to ensure that all required fencing is installed according to the Development Plan (Exhibit C-1 of the BEI).

Long-term adaptive management and monitoring will be implemented after the Interim Monitoring Period is complete. Long-term adaptive management and monitoring methods are detailed in Exhibit D-5 of the BEI.

3.4 Corrective Management Actions

As described in Exhibit C-1 of the BEI, adaptive management strategies will be used during the interim monitoring period to ensure the success of habitat restoration/establishment. If constructed wetlands or other improved habitats do not achieve performance standards in a timely fashion, corrective actions may be implemented to ensure success of the overall habitat improvement effort. SMUD, in coordination with a qualified biologist, will be responsible for implementation of corrective actions.

Before any physical corrective action is implemented, the benefit of the action will be weighed against any potential impacts of the action on existing functions and values of the habitat. In addition, the IRT will be consulted before any significant physical corrective action is undertaken. The permanent conservation easement holder will be notified of the change.

Seasonal variations in the physical conditions of the site, weather patterns, and management regimes may affect the rate at which enhanced, restored, and established habitats reach their performance standards. Enhanced, restored, and established habitats that do not meet the performance standards after 5 years may have functions and values that meet the performance standards soon after the 5-year monitoring period. Therefore, a corrective measure such as increasing the monitoring period by an additional year may be appropriate in some cases.

Corrective actions for proposed enhanced, restored, and established habitats at the Bank are described in the Development Plan (Exhibit C-1 of the BEI, within the section titled Corrective Management Actions).

3.5 Reporting Schedule

A report that includes as-built design drawings and photographs depicting wetland boundaries, planting zones, and other conditions will be prepared by a qualified biologist and submitted to the IRT within 90 days after completion of wetland construction (Section VII.A.2 of the BEI).

Annual monitoring reports, which include waters of the U.S. and special-status species surveys, will be submitted by August 15 of each year for the previous July 1 to June 30 monitoring season to the IRT and any other appropriate parties. Monitoring report requirements are included in Exhibit C-1 of the BEI, within the section titled Reporting Schedule.

4.0 Citations

4.1 Printed References

County of Sacramento. 2010a. Sacramento County Planning Project Viewer. Available online: <http://www.planningdocuments.saccounty.net/>. Accessed: May 25, 2010.

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Appendix A
Figures 1 through 8

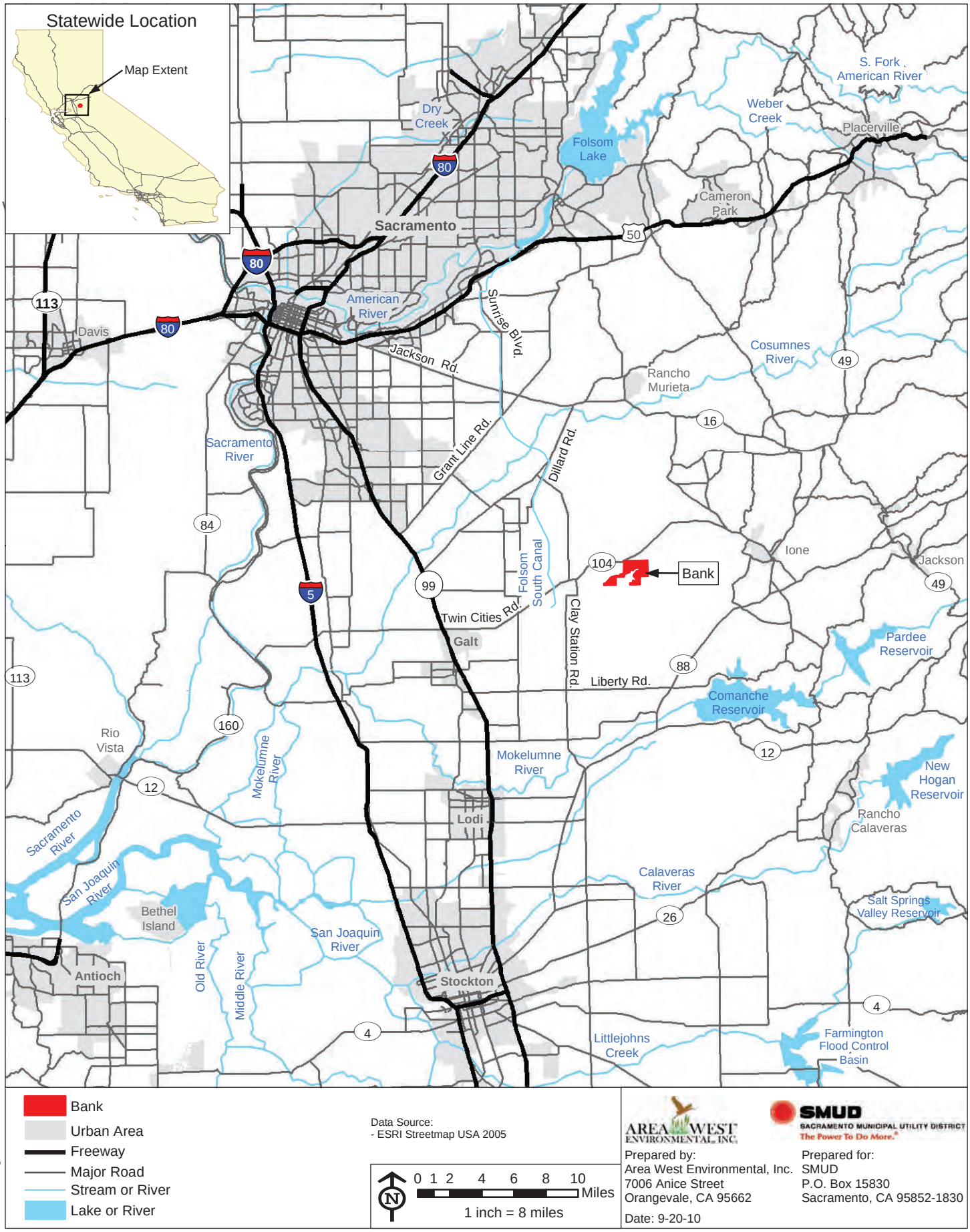
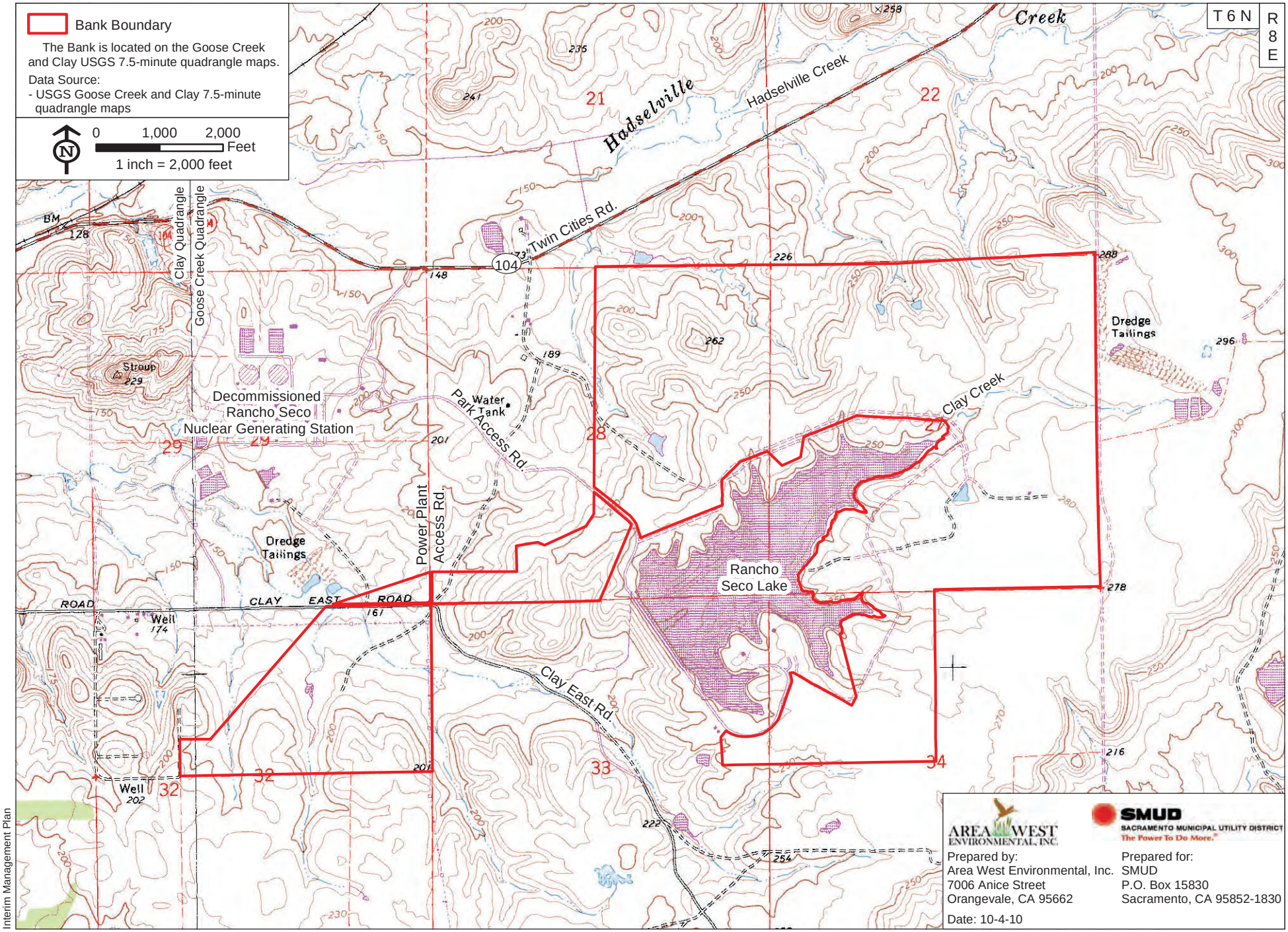


Figure 1. General Location of the SMUD Nature Preserve Mitigation Bank



Interim Management Plan

Figure 2. SMUD Nature Preserve Mitigation Bank Location

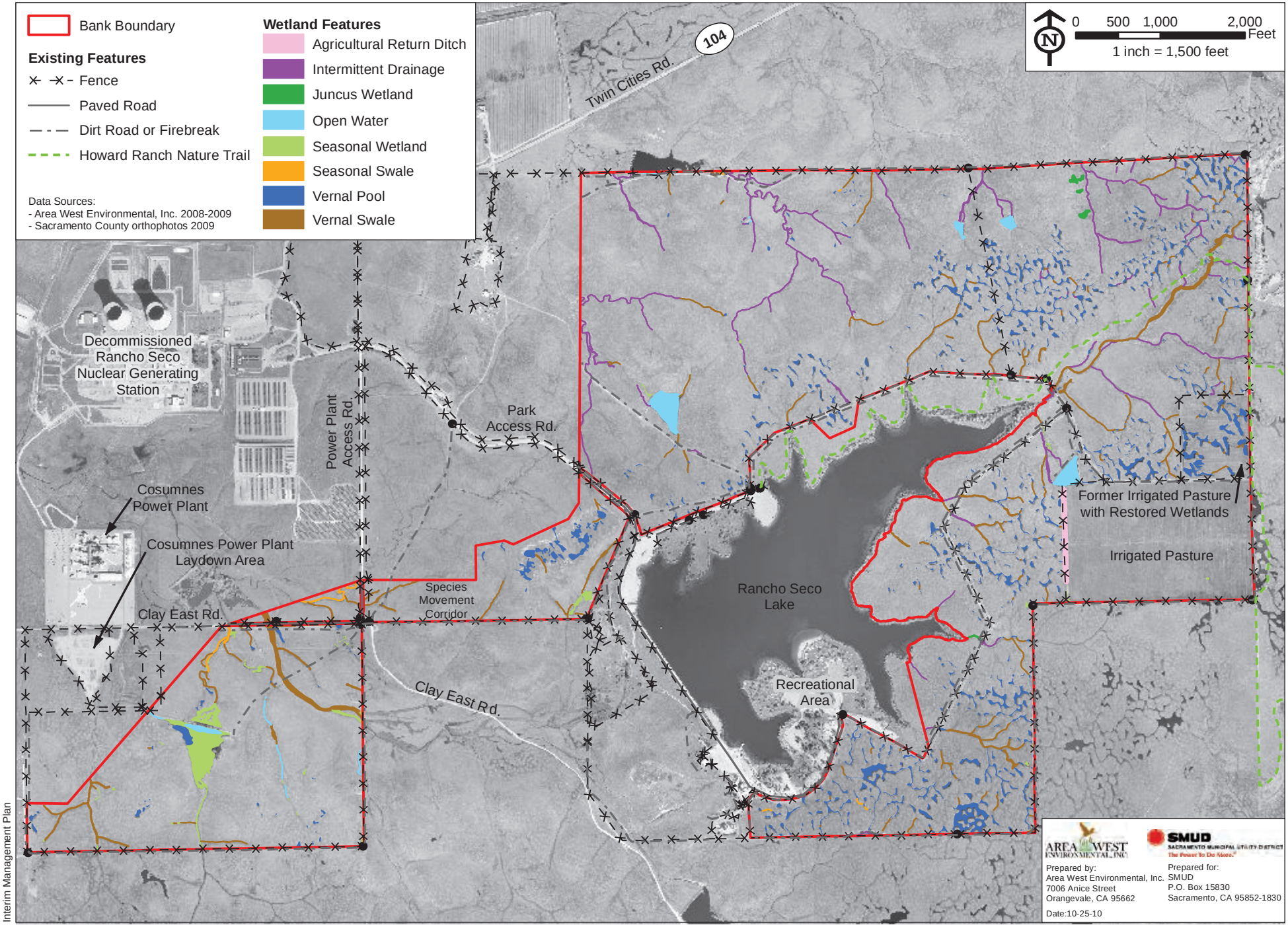
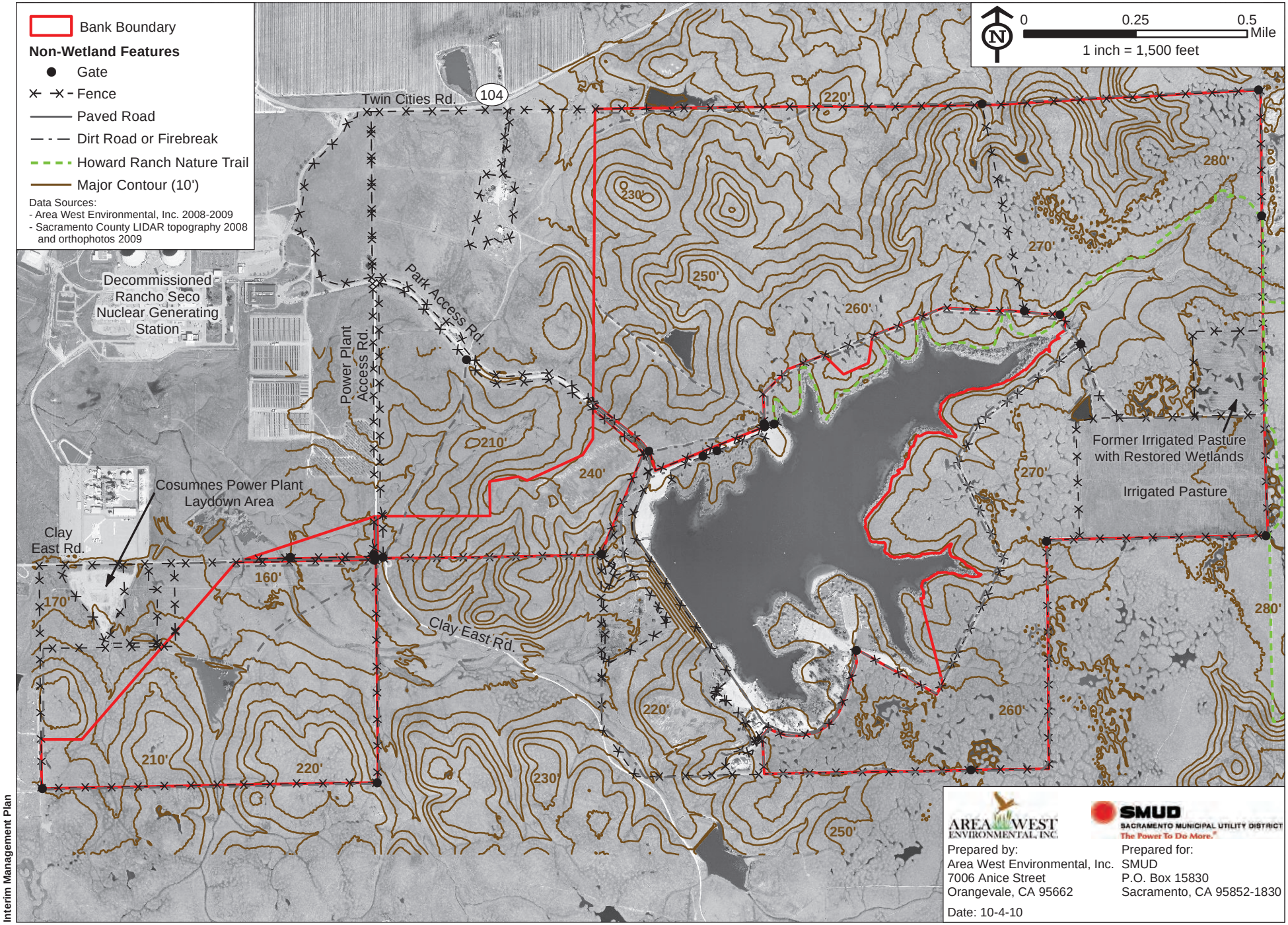
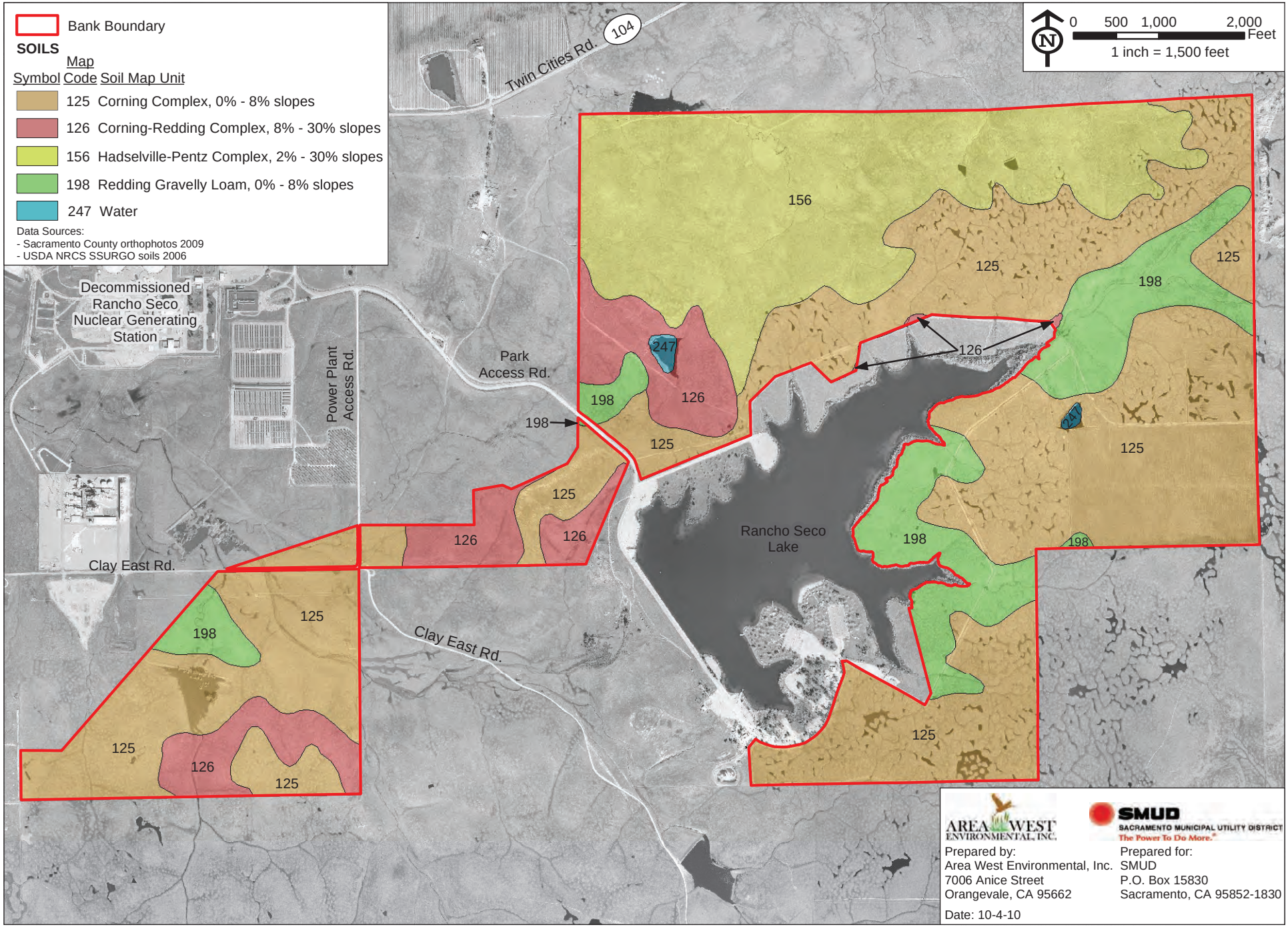


Figure 3. Waters of the U.S. at the SMUD Nature Preserve Mitigation Bank



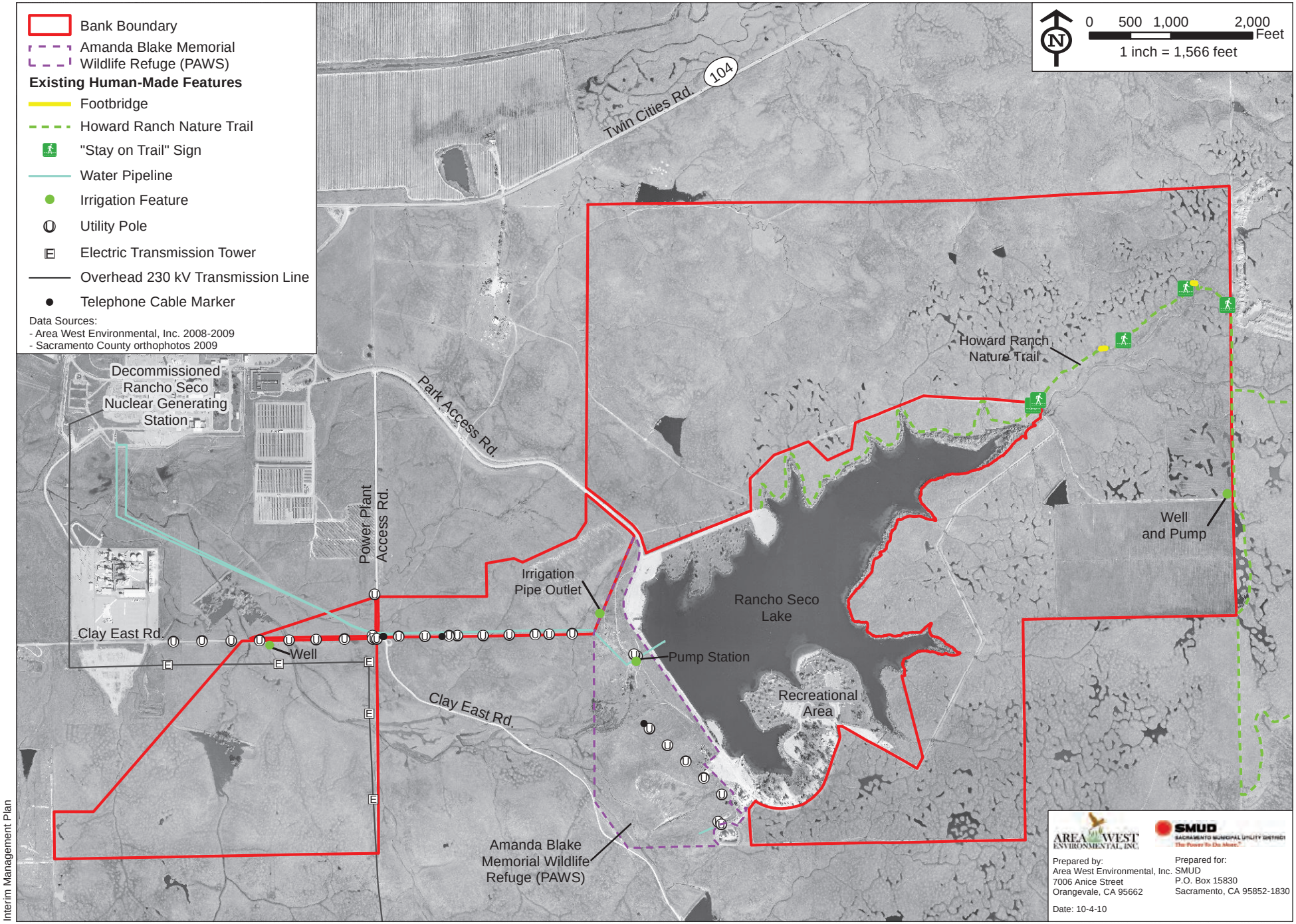
Interim Management Plan

Figure 4. Topographic Map of the SMUD Nature Preserve Mitigation Bank



Interim Management Plan

Figure 5. Soils Mapped at the SMUD Nature Preserve Mitigation Bank



Interim Management Plan

Figure 6. Existing Infrastructure at the SMUD Nature Preserve Mitigation Bank

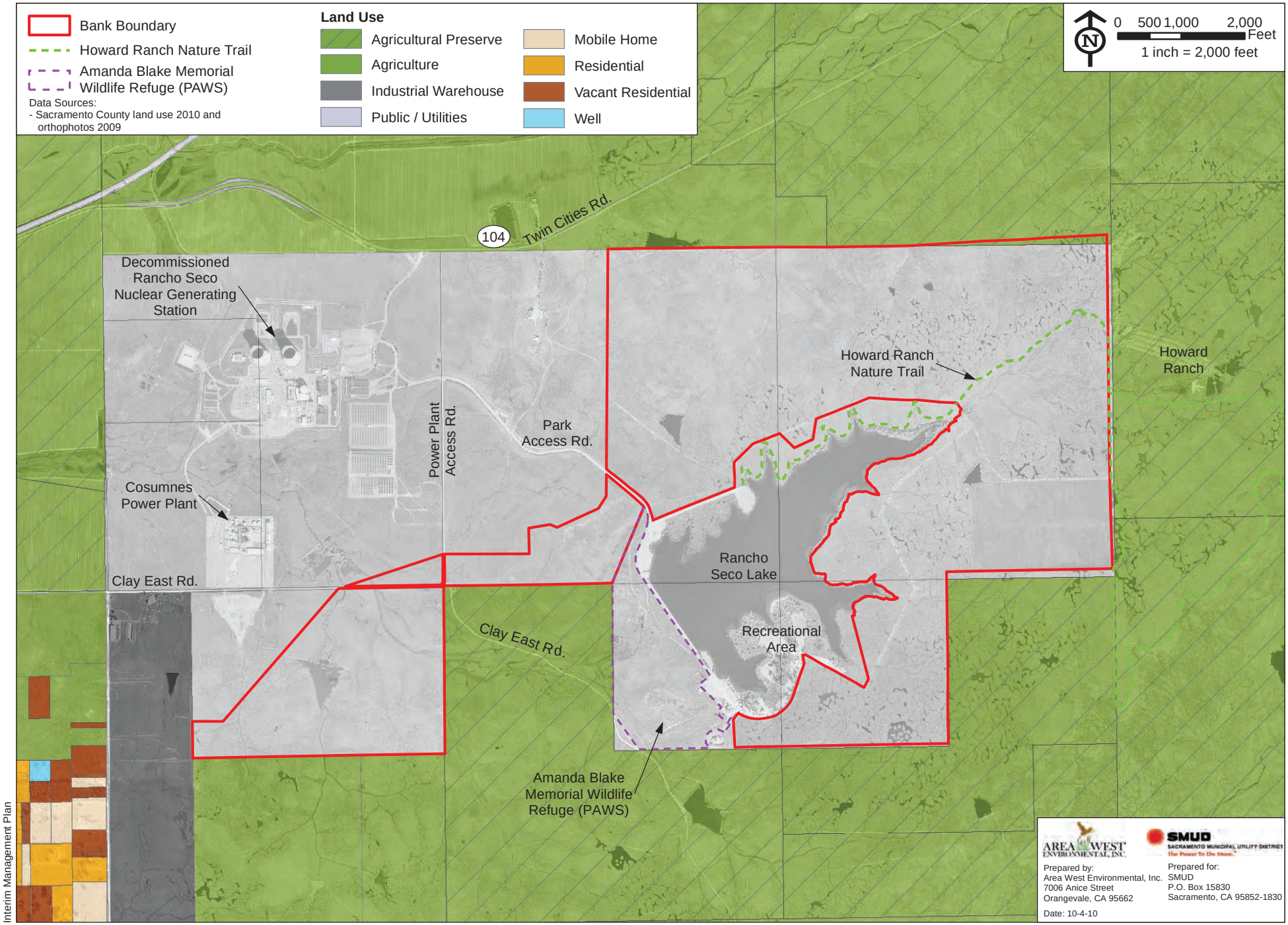


Figure 7. Land Use in the Vicinity of the SMUD Nature Preserve Mitigation Bank

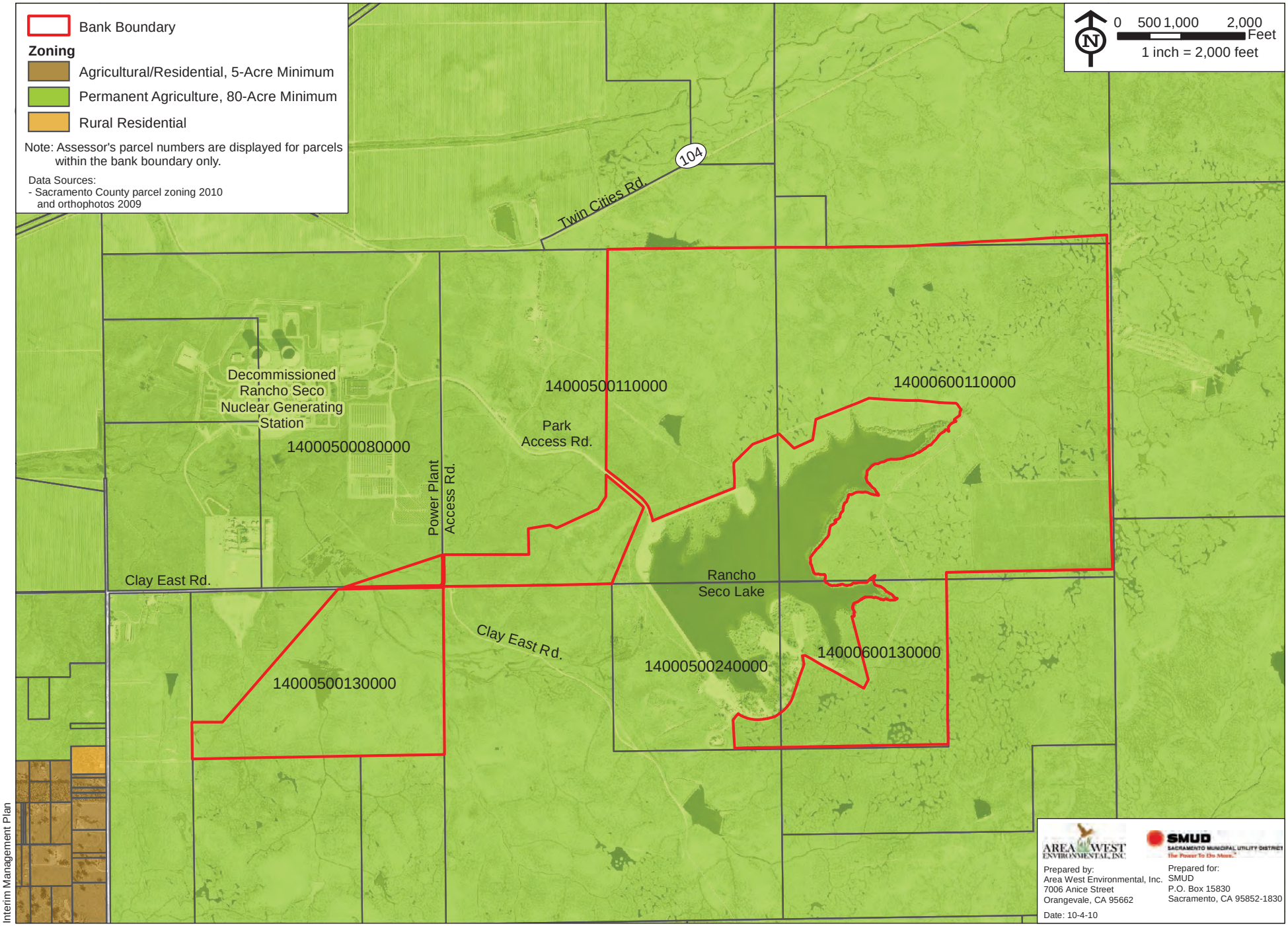


Figure 8. Zoning in the Vicinity of the SMUD Nature Preserve Mitigation Bank

APPENDIX G CTS RELOCATION PLAN

Giant Garter Snake (*Thamnophis gigas*)
Mortality Reduction and
Relocation Plan for Covered Activities in Modeled Habitat

1. Purpose

As described in Chapter 5, *Conservation Strategy,* GGS-AMMX, SMUD developed a Mortality Reduction and Relocation Plan (Relocation Plan) for giant garter snake (*Thamnophis gigas*; GGS) captured within Covered Activity work areas.

This Relocation Plan provides:

- the required qualifications of a biologist who will relocate GGS;
- habitat descriptions;
- measures to minimize impacts to GGS;
- capture, handling, and relocation methods;
- description of relocation procedure for captured GGS and reporting; and
- identification of a wildlife rehabilitation center or veterinary facility that routinely evaluates or treats reptiles.

2 Required Qualifications for Biologists

Incidental take, including handling and relocation of GGS is authorized through the HCP Permit and California Department of Fish and Wildlife Incidental Take Permit. Qualified biologists are those biologists who have the experience, education, and training necessary to perform the tasks described in the SMUD HCP accurately and in an unbiased fashion. The term qualified biologist is used generically to mean a biologist who is trained to perform the given task. Such a person is, more specifically, a wildlife biologist, botanist, or biological consultant who has been trained in wildlife biology or botany. Training must be in the field to which the task is related. For example, a wildlife biologist may not perform a covered plant survey or delineate land cover types for a project application unless the individual is competent in those fields.

If the activity being conducted by the biologist will need to handle federal or state listed species, the qualified biologist must be Agency-approved. An Agency-approved biologist is a qualified biologist who has written approval from USFWS and CDFW to perform activities that could result in take of Covered Species, such as handling individuals for relocation. During the first year of HCP implementation, SMUD will submit a list of proposed biologists with their qualifications to USFWS and CDFW. Once these biologists are approved by USFWS and CDFW, they are eligible for the entire permit term to perform activities designated to Agency-approved biologists. To minimize wildlife agency workload, if SMUD needs to add persons to the list of qualified biologists after the initial approvals, SMUD will submit proposals in batches on an annual basis as needed.

3 Modeled Habitat and Habitat for Relocation

Giant garter snakes that are found within Covered Activity work areas, and are trapped or at risk of being injured would be relocated to suitable habitat that is at least 300 feet and no more than half-a-mile from the Covered Activity work area.

GGS are closely associated with emergent wetlands in the Central Valley, occurring in marshes, sloughs, ponds, small lakes, and low-gradient waterways such as small streams, irrigation and drainage canals, and rice fields (USFWS 2012; Stebbins and McGinnis 2012). Habitat for GGS consists of adequate water during the active season, emergent herbaceous wetland vegetation (such as tules [*Schoenoplectus* sp.] and cattails [*Typa* spp.]) for escape and foraging habitat; grassy banks and openings in waterside vegetation for basking; and higher elevation upland habitat for cover and refuge from flooding (USFWS 2012). GGS require permanent water during the active season (early spring through mid-fall), which maintains dense populations of food organisms. GGS typically inhabit small mammal burrows and other soil and rock crevices during the colder months of winter (October to April) (Hansen and Brode 1993; Wylie *et al.* 1997; Wylie *et al.* 2003). Large rivers and wetlands with sand, gravel, or rock substrates do not support this species (USFWS 1999).

4 Measures to Minimize Impacts on Giant Garter Snakes

SMUD will implement the avoidance and minimization measures as described in the HCP Chapter 5, *Conservation Strategy* to minimize impacts on GGS as well as follow the protocols described below.

5 Capture and Handling Methods

Reptiles may carry some bacteria in their intestines and feces that are human pathogens, such as the bacteria and Salmonella. Hence, it is always best to practice good personal hygiene after handling any reptile (namely, thoroughly wash your hands with soap and water).

1. Capture of GGS can be done by hand (preferred) or facilitated with a snake hook. The snake can be pinned down by placing a hand or snake hook directly behind its head and applying gentle pressure. The amount of pressure required will depend on the size of the snake but it should be sufficient to prevent it from moving its head without injuring the animal. Note that all snakes should be handled firmly but with great care as smaller individuals are easily damaged through bruising and fractured ribs.

2. Pick the snake up gently mid-body and deposit it in the bottom of a snake bag. Support the body of a snake in addition to holding behind the head. A snake held without the body supported may thrash around sufficiently to cause itself severe injury.

3. Following capture, tie the top of the sack/pillowcase with a cord.

Note that wearing protective gloves during capture and handling snakes is not recommended as this reduces dexterity and may result in injury to the snake.

Transport Methods

1. All equipment to be used for snake capture, handling and transportation should be well maintained and must be checked before use. If a container other than a snake bag is used it should be inspected so that it has no sharp edges, protrusions, or rough surfaces that could cause injury during transport.

2. Transported GGS should be protected from exposure to inclement weather, harsh environmental conditions, and major temperature fluctuations and extremes. Animals should be observed periodically to determine their state of well-being during transportation.

3. Following use, all items used for transport must be cleaned thoroughly and disinfected, or discarded, as appropriate.

4. Following snake handling appropriate hand washing is advised immediately afterward to avoid human health risks.

6 Relocation Procedures

In most cases, GGS will be allowed to move out of work areas on their own accord, with capture and handling used as a last resort. If a GGS is encountered, the following should occur:

1. Stop work within a 100-foot radius of the animal and immediately contact the HCP Administrator or agency-approved qualified biologist, if one is not already onsite, to assess the situation

2. If the GGS is not in danger of disturbance/injury/death and can be avoided, it should be. The biologist should monitor the GGS to ensure the avoided GGS is not affected by activities

3. If the GGS is trapped or at risk of being injured, it should be captured and carefully examined for injuries. If no injuries are observed, the snake will be placed in a snake bag or pillow case and transported at least 300 feet and no more than half-a-mile from the edge of the work area and placed in similar habitat or in a burrow that is a similar size to the burrow the snake was found in. The qualified biologist will record the location of the relocated giant garter

snake with a GPS unit and photograph the snake, relocation burrow/habitat, and surroundings.

4. The burrow with the relocated giant garter snake will be monitored to ensure that the snake stays within the burrow or moves to a safe location.

5. Work at the site will resume once the snake has moved out of the work area on its own accord or has been relocated.

6. If the animal is handled, a report will be submitted to the USFWS and CDFW within 2 business days. The report should include date, location, habitat description, corrective measures taken to protect the GGS, a figure showing the location of where it was found and relocated to, and photographs of where it was found and relocated to.

7. In the event that the a GGS needs to be relocated during the inactive season and, if conditions such as low temperatures would reduce the likelihood of survival of the snake, individuals will be transported to a USFWS- and CDFW-approved wildlife rehabilitation or veterinary facility. A clean snake bag will be kept onsite to transport the injured animal. The proposed treatment facilities are included below in Section 9.

Animal Release Guidelines

The following conditions for releasing captive GGS have been adapted from the U.S. Geological Survey National Wildlife Health Center guidance on the use and care of wildlife during field research. As a general rule, field-captured animals should be released only:

1. In habitat suitable for species survival;

2. When the released animal can be reasonably expected to function normally within the population;

3. When local and seasonal conditions are conducive to survival; and

4. When release is not likely to spread pathogens or contribute to disease processes in other ways.

5. When a GGS has been determined by the qualified biologist to meet these criteria it will be released in adjacent suitable habitat or at a designated, location as described below. If a GGS is injured, field staff or the qualified biologist shall notify the HCP Administrator immediately. The qualified biologist shall take the

injured GGS to the wildlife rehabilitation center or veterinary facility provided below.

SMUD will contact the Wildlife Agencies within 24 hours of an encounter with a GGS and if a GGS is handled, SMUD will provide a written report to both agencies within 2 days.

Containers used to relocate GGS shall be thoroughly cleaned and disinfected prior to being transported to the project site and shall be rinsed with freshwater on site immediately prior to usage unless doing so would result in injury or death of an individual due to the time delay.

7 Landowner Permission for Relocation

If a GGS needs to be relocated on to private property, the landowner permission will be obtained prior to relocating the snake on their property.

9 Wildlife Rehabilitation Center or Veterinary Facility

In the event that an injured, viable GGS is identified, individuals will be transported to a USFWS- and CDFW-approved wildlife rehabilitation or veterinary facility. A clean snake bag will be kept onsite to transport the injured animal. The proposed treatment facility is:

University of California
Veterinary Medical Teaching Hospital
One Shields Avenue
Davis, California 95616-8747
Contact: Dr. Ray Wack, DVM
(916) 808-8808

Injured GGS will be held in captivity until they are deemed releasable. CDFW and USFWS will be consulted for further recommendations regarding the treatment of such individuals. CDFW and USFWS will be consulted prior to euthanizing GGS.

Any dead GGS will be salvaged and will be frozen as soon as possible. The carcass then will be provided to a designated depository. The proposed designated depository is:

U.S. Geological Survey
Dixon Field Station
800 Business Park Drive, Suite D
Dixon, CA 95620

Other depositories may be used if approved by CDFW and USFWS.

10 References

Hansen, G.E., and M. Brode. 1993. *Results of Relocating Canal Habitat of the Giant Garter Snake (Thamnophis gigas) during widening of SR 99/70 in Sacramento and Sutter Counties, California. Final Report for Caltrans Interagency Agreement 03E325 (FG7550) (FY 87/88-91-92)*. Rancho Cordova.

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Wylie, Glenn D., M.L. Casazza, and J.K. Daugherty. 1997. "1996 Progress Report for the Giant Garter Snake Study." (unpublished report, USGS, Biological Resources Division, Dixon Research Station, Dixon, California).

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California Tiger Salamander (*Ambystoma californiense*)
Mortality Reduction and
Relocation Plan for Activities at
Rancho Seco

1. Purpose

As described in Chapter 5, *Conservation Strategy,* CTS-AMM7, SMUD developed a Mortality Reduction and Relocation Plan (Relocation Plan) for California tiger salamanders (*Ambystoma californiense*; CTS) captured within Covered Activity work areas that occur within 1.3 miles of Rancho Seco.

SMUD owns approximately 2,400 acres at its Rancho Seco Property. There are a variety of uses on this property including the decommissioned Rancho Seco Nuclear Generation Facility (approximately 160 acres); electrical generation at the Cosumnes Power Plant (approximately 30 acres), and the Rancho Seco Photovoltaic (PV) projects (approximately 629 acres); recreational uses at the Rancho Seco Lake and Park (approximately 160 acres); SMUD Nature Preserve Mitigation Bank, including the Howard Ranch Trail (approximately 1,114 acres); and the Amanda Blake Memorial Wildlife Refuge (approximately 75 acres). The Rancho Seco Property, is located at 14440 Twin Cities Road, Herald, CA and is bounded by Twin Cities Road to the north, Howard Ranch to the east, vineyard habitat to the west, and Clay East Road to the south.

This Relocation Plan provides:

- The required qualifications of a biologist who will relocate California tiger salamanders;
- habitat descriptions;
- measures to minimize impacts to California tiger salamanders;
- identification of refuge areas;
- Capture, handling, and relocation methods;
- a map of the relocation area(s) for captured California tiger salamanders, which consist of upland burrows determined to be suitable for Covered Species placement, close proximity to aquatic habitat, and no potential barriers for movement; and
- Identification of a wildlife rehabilitation center or veterinary facility that routinely evaluates or treats amphibians.

2 Required Qualifications for Biologists

Incidental take, including handling and relocation of CTS is authorized through the HCP Permit and California Department of Fish and Wildlife Incidental Take Permit. Qualified biologists are those biologists who have the experience, education, and training necessary to perform the tasks described in the SMUD HCP accurately and in an unbiased fashion. The term qualified biologist is used generically to mean a biologist who is trained to perform the given task. Such a person is, more specifically, a wildlife biologist, botanist, or biological consultant who has been trained in wildlife biology or botany. Training must be in the field to which the task is related. For example, a wildlife

biologist may not perform a covered plant survey or delineate land cover types for a project application unless the individual is competent in those fields.

If the activity being conducted by the biologist will need to handle federally listed species, the qualified biologist must be Agency-approved. An Agency-approved biologist is a qualified biologist who has written approval from USFWS and CDFW to perform activities that could result in take of Covered Species, such as handling individuals for relocation. During the first year of HCP implementation, SMUD will submit a list of proposed biologists with their qualifications to USFWS and CDFW. Once these biologists are approved by USFWS and CDFW, they are eligible for the entire permit term to perform activities designated to Agency-approved biologists. To minimize wildlife agency workload, if SMUD needs to add persons to the list of qualified biologists after the initial approvals, SMUD will submit proposals in batches on an annual basis as needed.

3 Rancho Seco Facilities and Habitat for Relocation

California tiger salamanders that are found within the developed portions of Rancho Seco, including the Decommissioned Rancho Seco Nuclear Generation Facility, Cosumnes Power Plant, Rancho Seco Photovoltaic (PV) project, and recreational areas at Rancho Seco Park and are at risk of harm would be relocated to the adjacent SMUD Nature Preserve and Mitigation Bank. The Nature Preserve and Mitigation Bank consists of approximately 1,051 acres of annual grasslands and approximately 63 acres of wetland habitat.

The predominant habitat type on the SMUD Nature Preserve and Mitigation Bank is annual grassland which is interspersed with vernal pools, seasonal wetlands, and swales. Other wetland types on the Bank include ephemeral drainage, open water, and drainage ditch. Annual grassland on the Nature Preserve and Mitigation Bank supports a variety of nonnative grasses as well as native and nonnative forbs. Annual grassland habitats on the Nature Preserve and Mitigation Bank, and throughout the state, vary in species composition and abundance depending on site factors such as soil chemistry and texture, topography, and disturbance regime. Species composition and abundance also vary temporally from season to season and year to year (Sawyer et al. 2009). Typically, the annual grasslands on the project site are dominated by the following nonnative species: slim oat (*Avena barbata*), ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), medusa head (*Elymus caput-medusae*), Italian ryegrass (*Festuca perennis*), foxtail barley (*Hordeum murinum*), black mustard (*Brassica nigra*), yellow star thistle (*Centaurea solstitialis*), big heron bill (*Erodium botrys*), hawkbit (*Leontodon saxatilis*), shamrock (*Trifolium dubium*), rose clover (*T. hirtum*), and subterranean clover (*T. subterraneum*). Although nonnative species dominate this cover type, numerous species of native wildflowers are also present, such as harvest brodiaea

(*Brodiaea elegans*), low brodiaea (*B. minor*), narrow tarplant (*Holocarpha virgata*), Fitch's spikeweed (*Centromadia fitchii*), blue dicks (*Dichelostemma capitatum*), royal larkspur (*Delphinium variegatum*), wild hyacinth (*Triteleia hyacinthina*), valley tassels (*Castilleja attenuata*), blow wives (*Achyrachaena mollis*), and miniature lupine (*Lupinus bicolor*).

4 Measures to Minimize Impacts on California Tiger Salamanders

SMUD will implement the avoidance and minimization measures as described in the HCP Chapter 5, *Conservation Strategy* to minimize impacts on CTS.

5 Capture, Handling, and Relocation Methods

The qualified biologist(s) shall follow both the federal and state permits, as well as the Restraint and Handling of Live Amphibians protocols described in CDFW's CTS Technical Review (October 2015) or most updated protocols.

Agency-approved biologists will follow the Fieldwork Code of Practice as relevant to prevent the spread of pathogens in amphibian populations in accordance with CDFW's CTS Technical Review (October 2015) or most updated protocols.

Amphibians may carry some bacteria in their intestines and feces that are human pathogens, such as the bacteria, Salmonella and Leptospira. Hence, it is always best to practice good personal hygiene after handling any amphibian (namely, thoroughly wash your hands with soap and water).

5.1 Restraint and Handling of California tiger salamanders

The main dangers of handling CTS are skin damage that could result in secondary skin infections, and bone and muscle injuries caused by struggling while being held. For salamanders, there are three major dangers associated with handling: 1) loss (automizing) of the tail, 2) damage to the very delicate external gills (in neotenes), and 3) back injury during whip-like thrashing movements.

Methods of Physical Restraint

Medium and large size salamanders (those about 5 grams and larger) should be grasped in the middle of the body between the forelimbs and hind limbs. Under no circumstances should salamanders be grasped by the tail or picked up by the tail. The sex and age class (juvenile or adult), weight, and length (snout-vent) shall be determined and recorded for each captured CTS prior to transferring the animal into the storage and relocation container. If a CTS is injured prior to its discovery, or is injured during capture and relocation, the following assessment and triage will occur by the Agency-approved biologist.

Broken leg, toe, or finger:

If a major bone of a limb is broken during capture or handling, the animal should be euthanized or taken to a wildlife rehabilitation center or veterinarian for treatment. Injuries to digits (toes and fingers) generally are not life threatening; if the skin of the injured toe also is wounded, then treatment with Bactine® prior to immediate release is acceptable. If a toe bone is broken and protruding through the skin, the affected toe may be amputated just proximal to the site of the fracture, the stump should be sprayed with Bactine®, and the animal may be released.

Automized tail:

If a salamander automizes (detaches) its tail during capture or handling, the stump should be treated (sprayed) with Bactine®; the salamander can then be promptly released.

Crushing injuries to head and body:

Amphibians that have serious injuries to skin, muscles and bones should be promptly euthanized.

Snout abrasions:

Amphibians that are held in glass or clear plastic containers may jump headfirst into the glass or may rub their snout against the container in attempts to burrow out. If amphibians are held for more than an hour in a clear container (bottle, aquarium, etc.), they should be examined for evidence of skin injury at the tip of the snout and elsewhere around the head prior to release. If abrasions are detected, they should be sprayed with Bactine® prior to release.

6 Relocation Procedures

When relocating a CTS, the qualified biologist(s) shall follow the recommendations in CDFW's CTS Technical Review (October 2015) or most updated protocols.

If a CTS is encountered, the following should occur:

1) Stop work and immediately contact the HCP Administrator or qualified biologist, if one is onsite, to assess the situation

2) If the CTS is not in danger of disturbance/injury/death and can be avoided, it should be. The biologist should monitor the CTS to ensure the avoided CTS is not affected by activities

3) If the CTS is in danger, it should be captured and relocated to the designated location

4) The HCP Administrator will contact the Wildlife Agencies within 24 hours

If a CTS is injured, field staff or the qualified biologist shall notify the HCP Administrator immediately. The qualified biologist shall take the injured CTS to the wildlife rehabilitation center or veterinary facility provided below. SMUD will contact the Wildlife Agencies within 24 hours and provide a written report to both agencies within 2 days.

The following procedures will be followed when relocating CTS.

If a CTS needs to be relocated, the qualified biologist(s) shall capture it and place the individual in a dark, clean plastic container of suitable size (e.g., enough room so the animal can move freely). The qualified biologist(s) shall keep the container moist with damp paper towels, soft foam rubber, or soap-free natural or synthetic sponge. Containers used for holding or transporting CTS shall not contain any standing water. The lids of the containers shall have small air holes for ventilation. Sponges shall not be reused and all other housing materials shall be disinfected between occupants according to the Fieldwork Code of Practice. The qualified biologist(s) shall place only one animal in each plastic container and shall keep individual plastic containers containing the CTS in an ice chest, and place ice packs on top of the containers to maintain a cool temperature comparable to a refrigerator. The qualified biologist(s) shall keep the ice chests in a cool, dark, quiet, secure place until the animal is released.

Any CTS captured within Rancho Seco facilitates will be relocated as soon as possible to a burrow within one of the proposed relocation sites, described below (see Figure 1). When releasing CTS, the animal will be gently removed from the container and released at ground level into an inundated pool, pond, or opening of a burrow. The relocation site would be determined on a case-by-case basis and would depend on time of the breeding season, hydrology conditions, and year class of the CTS. For example, if it's early winter and the individual was likely migrating to a pool for breeding, the CTS shall be relocated to aquatic habitat. If the individual is likely leaving aquatic habitat, the CTS shall be relocated to upland aestivation habitat. The animal shall be watched as it moves into the pool or deeper into the burrow before the qualified biologist(s) leave the relocation site. If the animal is lethargic and does not move after being placed at the pool or burrow, the qualified biologist shall take the animal to the wildlife rehabilitation center or veterinary facility provided below. The release location shall be recorded on the map including the date and time of release, as well as existing environmental conditions (i.e., weather) and the status of the captured CTS.

Containers used to relocate CTS shall be thoroughly cleaned and disinfected prior to being transported to the project site and shall be rinsed with freshwater on site immediately prior to usage unless doing so would result in injury or death of an individual due to the time delay.

CTS Relocation Site

SMUD is proposing to relocate any CTS to designated relocation areas on its Nature Preserve Mitigation Bank. The proposed relocation sites would be stock ponds or seasonal wetlands where CTS have been observed breeding or adjacent uplands with a high density of active California ground squirrel burrow complexes, along with some vole and pocket gopher activity. CTS will be relocated to areas that are managed on a rotating basis to eradicate bullfrogs or invasive fish species. Based on the presence of known breeding habitat, abundant underground refugia (small mammal burrows), and suitable dispersal habitat, the Nature Preserve Mitigation Bank is considered high quality habitat for CTS.

7 Landowner Permission for Relocation

The relocation sites are SMUD-owned property.

9 Wildlife Rehabilitation Center or Veterinary Facility

Should an injured CTS be found, the qualified biologist will take it to the following facility:

Wildlife Care Association
5211 Patrol Road
McClellan, CA 95652
(916) 965-9453

10 References

California Department of Fish and Wildlife. 2015. California Tiger Salamander Technical Review: Habitat, Impacts, and Conservation. October 2015.

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APPENDIX H CRITICAL HABITAT IMPACTS

Appendix H. SMUD HCP Covered Species Critical Habitat Effects by Unit

1. Slender and Sacramento Orcutt grass

	Type	**Modeled Habitat**	**Upland Land Cover (excluding Urban)**							
		Vernal pool, seasonal wetland, and swale	Grasses and forbs	Pasture	Valley oak woodland	Blue oak woodland	Eucalyptus Woodland	Orchard/Vineyard	Cropland	**Total Upland Land Cover Area (excluding urban)**
Unit 1[a]	Permanent	0	0	0	0	0	0	0	0	0
	Temporary	0	0	0	0	0	0	0	0	0
Unit 2	Permanent	0	.0004	0	0	0	0	0	0	.0004
	Temporary	0	.91	0	0	0	0	0	0	.91
Unit 3	Permanent	2.52	.28	.0004	<.0001	<.0001	0	0.0009	0	.28
	Temporary	0.007	2.80	.12	.01	.24	0.0001	0.61	0.0005	3.78
TOTAL	**Permanent**	**2.52**	**0.28**	**0.0004**	**<.0001**	**<.0001**	**0**	**0.0009**	**0**	**.28**
	Temporary	**0.007**	**3.71**	**0.12**	**0.01**	**0.24**	**0.0001**	**0.61**	**0.0005**	**4.70**

2. Vernal pool fairy shrimp and vernal pool tadpole shrimp

	Type	**Modeled Habitat**	**Upland Land Cover (excluding urban)**							
		Vernal pool, seasonal wetland, and swale	Grasses and forbs	Pasture	Valley oak woodland	Blue oak woodland	Barren Disturbed	Orchard/Vineyard	Cropland	**Total Upland Land Cover (excluding Urban)**
Unit 13	Permanent	1.08	0.0009	0	0	0	<0.0001	0	0	0.0009
	Temporary	0.003	2.07	0	0	0	0.02	0	0	2.08
Unit 14a	Permanent	2.16	0.28	<.0001	<.0001	0.0001	0	0.0009	<.0001	0.28
	Temporary	0.01	6.12	.05	.01	.24	0	0.59	0.0005	6.47
Unit 14b	Permanent	0.36	<.0001	0	0	0	0	0	0	<.0001
	Temporary	0.0002	0.12	0	0	0	0	0	0	0.12
TOTAL	**Permanent**	**3.6**	**.28**	**<.0001**	**<.0001**	**0.0001**	**<0.0001**	<.0001	**<.0001**	**0.28**
	Temporary	**0.01**	**8.31**	**0.05**	**0.01**	**0.24**	**0.02**	**0.59**	**0.0005**	**8.67**

3. Valley elderberry longhorn beetle

	Type	Riparian
VELB critical habitat	Permanent	1 shrub
	Temporary	5 shrubs

4. California tiger salamander

		Aquatic Habitat (acres)	**Upland Habitat** (acres)			**Total Habitat** (acres)
	Type	**Vernal pool, seasonal wetland, and swale**	Grasses and forbs	Pasture	**TOTAL Upland Habitat**	
Unit 3	Permanent	1.8	0.34	0.0005	0.34	2.14
	Temporary	0.002	5.48	0.51	5.99	5.99
Unit 4	Permanent	0	<.0001	<.0001	<.0001	<.0001
	Temporary	0	0.02	0	0.02	0.02
TOTAL	**Permanent**	**1.8**	0.34	0.0005	**0.34**	**2.14**
	Temporary	**0.002**	5.5	.51	**6.01**	**6.01**