United States Department of the Interior

FISH AND WILDLIFE SERVICE
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In reply refer to:
1-1-07-F-0445

DEC - 4 2007

Memorandum

To: Regional Director, California and Nevada Office, Sacramento, California

From: Field Supervisor, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Intra-Service Biological and Conference Opinion on Issuance of a Section 10(a)(1)(B) Incidental Take Permit to Pacific Gas & Electric Company (PG&E) for the San Joaquin Valley Operations and Maintenance Program Habitat Conservation Plan, for portions of Nine Counties in the San Joaquin Valley, California.

In accordance with section 7of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*)(ESA) and their implementing regulations (50 CFR §402), this document transmits the intra-service biological and conference opinion (Opinion) of the U.S. Fish and Wildlife Service (Service), Sacramento Fish and Wildlife Office (SFWO) regarding the California Nevada Operations Office (CNO) proposed issuance of an ESA section 10(a)(1)(B) incidental take permit (Permit) to the Pacific Gas & Electric Company (PG&E)(Applicant) for the implementation of the San Joaquin-Valley Operations and Maintenance Program Habitat Conservation Plan (HCP). The HCP addresses PG&E facilities located in portions of nine San Joaquin Valley counties: Kern, Kings, Tulare, Fresno, Madera, Merced, Mariposa, Stanislaus, and San Joaquin. The Service proposes to issue the Permit to PG&E for a period of 30 years.

By law, a section 7 consultation is a cooperative effort involving affected parties engaged in analyzing effects posed by the proposed action on listed species and critical habitat (USFWS 1998). Although the provisions of section 7 and section 10 of the ESA are similar, section 7 and its regulations introduce several considerations into the HCP process that are not explicitly required by section 10; specifically, analysis of indirect effects, effects on federally listed plants, and effects on designated critical habitat. If after consultation under section 7(a)(3) and a conclusion that the taking of a federally listed species is incidental to the agency's action, the Secretary of the Interior shall provide the Federal agency (here CNO) and the Applicant (here PG&E) a written Incidental Take Statement (ITS) that specifies the impact of such incidental taking on the species, specifies those reasonable and prudent measures that the Secretary considers necessary or appropriate to minimize such impact, and sets forth the terms and

conditions that must be complied with by the Federal agency and the applicant to implement the reasonable and prudent measures. The ITS on the proposed issuance of an ESA section 10(a)(1)(B) incidental take permit (Permit) to PG&E is attached to this Opinion.

The Applicant is requesting coverage under the Permit for a total of 65 species (Covered Species), 30 of which are currently listed as endangered or threatened under the ESA, and 35 that are currently unlisted. Of these 65 Covered Species, 23 are wildlife species and 42 are plant species.

The 23 wildlife Covered Species include 13 wildlife species currently listed under the ESA. Eight of these wildlife species are listed as endangered [vernal pool tadpole shrimp (*Lepidurus packardi*), blunt-nosed leopard lizard (*Gambelia sila*), Buena Vista Lake shrew (*Sorex ornatus relictus*), riparian brush rabbit (*Sylvilagus bachmani riparius*), riparian (San Joaquin Valley) woodrat (*Neotoma fuscipes riparia*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), giant kangaroo rat (*Dipodomys ingens*), San Joaquin kit fox (*Vulpes macrotis mutica*)], while 5of these wildlife species are listed as threatened [vernal pool fairy shrimp (*Branchinecta lynchi*), Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), California tiger salamander (*Ambystoma californiense*), California red-legged frog (*Rana aurora draytonii*), and giant garter snake (*Thamnophis gigas*)].

The 42 plant Covered Species include 17 species currently listed under the ESA. Ten of these plant species are currently listed as endangered [large-flowered fiddleneck (*Amsinckia grandiflora*), California jewelflower (*Caulanthus californicus*), palmate-bracted bird's-beak (*Cordylanthus palmatus*), Kern mallow (*Eremalche kernensis*), San Joaquin woollythreads (*Monolopia* [*Lembertia*] *congdonii*), Bakersfield cactus (*Opuntia basilaris* var. *treleasei*), hairy Orcutt grass (*Orcuttia pilo*sa), Hartweg's golden sunburst (*Pseudobahia bahiifolia*), Keck's checkerbloom (Keck's checkermallow)(*Sidalcea keckii*), and Greene's tuctoria (*Tuctoria greenei*)], while seven plant of these plant species are listed as threatened under the ESA [Mariposa pussypaws (*Calyptridium pulchellum*), succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*), Hoover's spurge (*Chamaesyce hooveri*), Springville clarkia (*Clarkia springvillensis*), Colusa grass (*Neostapfia colusana*), San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*), San Joaquin adobe sunburst (*Pseudobahia peirsonii*)]. The take prohibition for federally listed plants under the ESA is more limited than for listed animals. ESA section 9(a)(2)(B) only prohibits removal of listed plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of listed plants on non-Federal areas when in violation of State law or regulation (including State criminal trespass laws). Therefore, federally-listed plants typically do not need to be included in an ITS. However, plant species will be covered by the proposed Permit in recognition of the conservation benefits provided to the species under the HCP. In addition, the Service is still required to review the effects of its own actions on listed plants, even when those listed plants are found on private lands. This intra-Service section 7 consultation will also determine if issuing the proposed Permit could "jeopardize the continued existence" of any listed plant. Assurances provided under the Service's "No Surprises" rule at 50 C.F.R. 17.13, 17.22(b)(5) and 17.32(b)(5) will extend to all HCP Covered Species, including all plant Covered-Species.

Of the 35 Covered Species that are not listed under the ESA at the current time, 10 are wildlife species [Midvalley fairy shrimp (*Branchinecta mesovallensis*), limestone salamander (*Hydromantes brunus*), Swainson's hawk (*Buteo swainsoni*), white-tailed kite (*Elanus leucurus)*, golden eagle (*Aquila chrysaetos*), Western burrowing owl (*Athene cunicularia hypugea*), bank swallow (*Riparia riparia*), tricolored blackbird (*Agelaius tricolor*), San Joaquin (Nelson's) antelope squirrel (*Ammospermophilus nelsoni*), and bald eagle (*Haliaeetus leucocephalus*)], and 25 are plant species [lesser saltscale (*Atriplex minuscula*), Bakersfield smallscale (*Atriplex tularensis*), big tarplant (*Blepharizonia plumose* ssp. *plumosa*), tree-anemone (*Carpenteria californica*), slough thistle (*Cirsium crassicaule*), Mariposa clarkia (*Clarkia biloba* ssp. *australis)*, Merced clarkia (*Clarkia lingul*ata), Vasek's clarkia (*Clarkia tembloriensis* ssp. *calientensis*), hispid bird's-beak (*Cordylanthus mollis* ssp. *hispidus)*, Congdon's woolly sunflower (*Eriophyllum congdonii*), Delta button-celery (*Eryngium racemosum*), striped adobe lily (*Fritillaria striata*), Boggs Lake hedge-hyssop (*Gratiola heterosepala*), pale-yellow layia (*Layia heterotricha*), Comanche Point layia (*Layia leucopappa*), legenere (*Legenere limosa*), Panoche peppergrass (*Lepidium jaredii* ssp. *album*), Congdon's lewisia (*Lewisia congdonii*), Mason's lilaeopsis (*Lilaeopsis masonii*), Mariposa lupine (*Lupinus citrinus* var. *deflexus*), showy madia (*Madia radiata*), Hall's bush mallow (*Malacothamnus hallii*), pincushion navarretia (*Navarretia myersii* ssp. *myersii*), oil neststraw (*Stylocline citroleum*), and King's gold (*Twisselmannia californica*)]. Upon issuance of the purposed Permit, incidental take will be authorized for all Covered Species, and the Applicant will immediately implement HCP Conservation Strategy measures for all Covered Species, regardless of the current listing status of the particular Covered Species.

At this time, the Service is Conferencing on the unlisted wildlife and plant species that will be identified as Covered Species on the Permit. Should any of these 35 unlisted Covered Species become listed in the future during the term of the Permit, the Permit will become effective to authorize incidental take of that species concurrent with their listing under the ESA.

The 23 wildlife Covered Species include 7 migratory bird species (i.e. tricolored blackbird, bank swallow, western burrowing owl, white-tailed kite, Swainson's hawk, golden eagle, and the bald eagle). The Migratory Bird Treaty Act of 1918, as amended, (MBTA) (16 USC 703-712 *et seq.*) prohibits any means or manner to pursue, hunt, take, capture, kill, possess, sell, purchase, barter, or transport migratory birds, bird parts, eggs, or nests, including migratory bird species listed under the ESA. Federal regulations have defined "take" of any species (including non-listed and listed migratory birds) as: *to pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in such conduct* (50 CFR Part 10). The ESA further protects listed species by adding the conditions of "harass" and "harm" to the definition of "take" presented in 50 CFR 10.12 (see 16 USC 1532 and 50 CFR 17.3). PG&E actions conducted under the HCP and the HCP Implementing Agreement (IA) comply with the provisions of the MBTA. The Bald and Golden Eagle Protection Act of 1940, as amended, (BGEPA) (16 USC 668-668d *et seq.*) likewise prohibits the take, possession, sale, purchase or barter of golden and bald eagles, their eggs and parts. The BGEPA defines "take" as to pursue, shoot, shoot at, poison, wound, kill capture, trap, collect, molest, or disturb eagles. PG&E actions conducted under the HCP and the HCP Implementing Agreement (IA) comply with the provisions of the BGEPA. The Service has recently defined "disturb" under the BGEPA (72 FR 31132). The majority of actions considered

likely to incidentally take (harm or harass) eagles under the ESA also incidentally take (disturb) eagles under the BGEPA

The MBTA authorizes the Secretary of the Interior to permit "take" consistent with the underlying migratory bird treaties, and provides for the availability of "Special Purpose Permits" (50 CFR 21.27). Should tricolored blackbird, bank swallow, western burrowing owl, white-tailed kite, or Swainson's hawk become listed under the ESA during the 30-year term of the Permit, the Permit will constitute a MBTA Special Purpose Permit for incidental take of that listed bird-species in the amount and/or number and subject to the terms and conditions specified in this Opinion, for a three year term subject to renewal, as required under 50 CFR 13 and 50 CFR 21. Any such incidental take will not be in violation of the MBTA.

MBTA Special Purpose Permits are not available for eagles; permits for eagles are controlled by the BGEPA regulations found in 50 CFR part 22, which presently do not contain a provision equivalent to the Special Purpose Permit under 50 CFR 21.27. To the extent that this Opinion concludes that take of golden or bald eagle will result from the proposed action for which consultation is being made, the Service will not refer that incidental take for prosecution under the MBTA or the BGEPA, if such take complies with the terms and conditions (including amount and/or number) specified in this Opinion. Federal regulations permitting take of bald and golden eagles under the BGEPA recently have been proposed by the Service (72 FR 31141). If these proposed regulations become final after the proposed Permit is issued, the amount of bald and golden eagle incidental-take authorized by the proposed Permit will continue as the BGEPA authorization to conduct covered-activities as they relate to bald to golden eagles, provided that the Permit remains valid. A second permit under the BGEPA will not be required when the proposed regulations become final.
The Applicant is also requesting coverage under the Permit for effects to Critical Habitat. Of the 31 Covered Species listed as endangered or threatened under the ESA, five wildlife species and eight plant species presently have Critical Habitat designated. The Covered Species with designated Critical Habitat are: vernal pool tadpole shrimp, Buena Vista Lake shrew, vernal pool fairy shrimp, California tiger salamander, California red-legged frog, large-flowered fiddleneck, hairy Orcutt grass, Keck's checkerbloom, Greene's tuctoria, succulent owl's-clover, Hoover's spurge, Colusa grass, and San Joaquin Valley Orcutt grass. This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA and the August 6, 2004, Ninth Circuit Court of Appeals decision in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service* (No. 03-35279) to complete the following analysis with respect to critical habitat.

Federal wetland permitting for HCP Covered Activities remains subject to the Fish and Wildlife Coordination Act and the Clean Water Act, and may require additional avoidance, minimization, and compensation measures under these statutes. Some proposed Covered Activities might require additional section 7 consultation pursuant to the ESA. In this event, any take exemption to the Federal agency would be authorized through the section 7 consultation process.

Only the 65 wildlife and plant species addressed in the HCP and listed above are covered under this Opinion and the proposed Permit. If other federally-listed or federally-proposed species or

their critical habitat are found in locations where PG&E facility-extension covered-activities occur over the next 30 years, any effect on their critical habitat or any take in the form of harassment, harm, or mortality to individuals are not covered in this Opinion, and will not be exempt from the take prohibitions of the ESA. This opinion does not cover the federally endangered longhorn fairy shrimp (*Branchinecta longiantenna*) or the federally endangered conservancy fairy shrimp (*Branchinecta conservatio*).

This Opinion was prepared using information provided in the following documents that are hereby incorporated by reference:

1. The March 2006 draft HCP, and supporting technical analyses and reports;
2. The March 2006 draft Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) and supporting technical analyses and reports;
3. The November 2006 final HCP, and supporting technical analyses and reports;
4. The November 2006 final EIS/EIR and supporting technical analyses and reports;
5. The November 2006 draft IA;
6. Available scientific literature and interviews with species and area experts.
7. Various other published and unpublished agency and academic literature and information in the Service's files.

CONSULTATION HISTORY

PG&E is the largest investor-owned electric and gas utility in the United States, serving more than 4.8 million electricity customers and 4 million natural gas customers and employing more than 20,000 people. PG&E's service area encompasses approximately 70,000 square-miles in 48 of California's 58 counties. Nearly 30% of the total PG&E service area lies within nine counties in the San Joaquin Valley. The existing PG&E infrastructure requires long-term operation and maintenance (O&M) to deliver reliable energy to its customers. PG&E's San Joaquin Covered Activities to date had not been seriously constrained by restrictions imposed under the ESA; however, because species continue to become listed as threatened or endangered, PG&E entered into discussions with the Service in 1995 regarding development of a Habitat Conservation Plan (HCP) pursuant to section 10(a)(1)(b) of the ESA. The HCP will allow PG&E to manage its facilities and conduct activities in compliance with the ESA and the California Endangered Species Act (CESA). Although informal consultation was initiated in 1995, the effort was never completed. In October, 2000, PG&E reinitiated informal consultation with the Service to address their O&M and minor construction activities in the San Joaquin Valley. The HCP represents more than 7 years of work with PG&E, the Service, and the California Department of Fish and Game (CDFG).

On 25 March 2004, the Service published in the **Federal Register** (69 FR 15363) a Notice of Intent to prepare an Environmental Impact Statement on the proposed issuance of an Incidental Take Permit associated with an Habitat Conservation Plan for PG&E's Operation and Maintenance Activities in the San Joaquin Valley, California. Public scoping meetings were held on 6 April 2004 and 7 April 2004 in Stockton California and Fresno California, respectively. Scoping comments were received from the public through 25 April 2004.

The draft HCP was developed in 2004, 2005, and early 2006. The HCP development process entailed numerous PG&E corporate discussions as well as input from both State and Federal agencies including Service staff, CDFG staff, PG&E field supervisors, biologists, and other natural resource planners.

On December 20, 2002, PG&E submitted its application to the Service for an incidental take permit to authorize take of 65 Covered Species in the PG&E service area within the nine counties of the California San Joaquin Valley

On 23 June 2006 the Service published a Notice of Availability in the **Federal Register** (71 FR 36132) announcing the availability of the draft HCP, draft IA, and draft EIS/EIR for public review. The stated purpose of the HCP was to enable PG&E to continue to conduct current and future O&M and minor construction activities in the San Joaquin Valley while minimizing, avoiding, and compensating for possible direct, indirect, and cumulative adverse effects on threatened and endangered species or designated critical habitat which could result from such management activities. The draft HCP was unique because it primarily addressed small-scale temporary effects dispersed over a very large geographic area, unlike typical HCPs which usually address land development, permanent land conversion, and permanent loss of habitat. Public meetings on the draft documents were held on 1 August 2006 and 2 August 2006 in Stockton and Fresno California, respectively. Comments on the draft documents were received during a 90-day public review period ending 21 September 2006. Six comment letters were received. No substantial changes were made to the draft HCP or supporting documents based on comments received.

On March 23, 2007, the Service announced the availability of the final HCP, IA, and final EIS/EIR in the **Federal Register** (72 FR 13818-3820). The Service received comments on the final documents for a 30-day review period.

BIOLOGICAL AND CONFERENCE OPINION

The PG&E San Joaquin Valley Operations and Maintenance Program Habitat Conservation Plan (HCP) is a multi-species, 30-year plan intended to protect and conserve 65 Covered Species and other biological resources at facilities and easements managed by PG&E in the San Joaquin Valley. The habitat conservation plan is designed to support an application for a Federal Permit under section 10(a)(1)(B) of the ESA, as well as applications for a permit under State law pursuant to section 2081(b) of the California Fish and Game Code for current and future PG&E routine minor construction and operation and maintenance activities within the San Joaquin Valley. This HCP is unique because it primarily addresses small-scale temporary effects that are dispersed over a very large geographic area.

The HCP relies on a conservation strategy which utilizes three mechanisms to avoid, minimize, and compensate for impacts on sensitive habitats and species populations: general avoidance and minimization measures (AMMs), pre-activity species surveys to trigger Additional-AMMs, and compensation for unavoidable impacts. The HCP's basic compensation strategy is to protect

and manage in perpetuity 3 acres of habitat for every one-acre of permanent habitat loss and 0.5 acre of habitat for every one-acre of temporary habitat loss.

The purpose of the proposed HCP is to enable PG&E to continue to conduct current and future minor construction and Covered Activities in the San Joaquin Valley while avoiding, minimizing, and compensating for possible direct, indirect, and cumulative adverse effects on threatened and endangered species or designated critical habitat which could result from such management activities. The intent of the HCP is to minimize incidental take of the Covered Species in the action area and to provide avoidance, minimization, and compensation measures for the impacts of Covered Activities on the Covered Species and their habitat. The HCP is described in greater detail below.

Description of the Proposed Action

The proposed Federal discretionary action is the issuance of a section 10(a)(1)(B) incidental take permit (Permit) which addresses 65 species (14 listed animals, 17 listed plants and 34 unlisted plants and animals) that could be affected by the PG&E activities proposed for coverage in the HCP.

Action Area

The entire perimeter of the HCP's San Joaquin Valley planning area encompassed a 12.1 million-acre area (18,900 square-miles) (Figure 1). The boundary was established based on elevation, land cover types, ownership, and land use information. The HCP's planning area did not include lands at elevations above 3,000 feet because the species composition and natural communities found in the San Joaquin Valley do not extend or they change in composition above that elevation, and because this elevation is consistent with the Biological Opinion PG&E has already secured for the effects of their operation and maintenance activities on the Valley elderberry longhorn beetle in the San Joaquin Valley (USFWS 2003c).

Portions of nine San Joaquin Valley counties were included in the HCP planning area: San Joaquin, Stanislaus, Merced, Fresno, Kings, Kern, Mariposa, Madera, and Tulare counties (Figure 1).

The northern boundary of the planning area was the northern San Joaquin County line.

On the east side of the San Joaquin Valley, the boundary in the northeastern portion of the planning area followed the San Joaquin and Stanislaus County lines. The remainder of the eastern boundary followed the perimeter of Federal lands or the 3,000-foot elevation contour, whichever is lower, along the western Sierra Nevada foothills.

On the west side of the San Joaquin Valley, the planning boundary followed the western boundary of San Joaquin, Stanislaus, Merced, Fresno, Kings, and Kern counties.

The southern limit of the HCP's San Joaquin Valley planning area boundary was the 3,000-foot elevation contour just north of the Kern County line.

The entire perimeter of the HCP's San Joaquin Valley planning area encompassed a 12.1 million-acre area; however, the HCP's "focus area" where covered-activity work and direct

effects would occur, is an approximately 276,350 acre area (432 square-miles). The focus area is defined in the HCP to include PG&E's gas and electrical transmission and distribution line facilities, the lands owned by PG&E and/or subject to PG&E easements for the facilities, right-of-ways (ROWs) for the gas and electric transmission and distribution line facilities, ROW access areas or access roads, private access routes to infrastructure associated with the Covered Activities, approximately 1,350 acres which will compensate for impacts resulting from HCP Covered Activities, and approximately 1,110 miles of minor construction of line facility expansions. In total, underground gas transmission pipelines may expand 150 miles, electric pole distribution lines may expand 900 miles, and electric transmission tower lines may expand 60 miles outside the boundaries of existing ROWs over the 30-year term of the proposed Permit. Most of these facility-line expansion Covered Activities would provide gas or electric service to newly constructed residences and/or new businesses, and are expected to occur near existing cities (Modesto, Merced, Fresno, Bakersfield) and the along the western foothills of the Sierra Nevada Mountains, inside the 276,350-acre "focus area." All Covered Activities would be limited to PG&E ROWs. The minor construction facility-expansion Covered Activities include the acquisition of additional ROW acreages.

An ESA action area is defined as all areas to be affected directly or indirectly by the Federal action, and not merely the immediate area involved in the action (50 CFR 402.02). An action area will commonly extend beyond the project footprint or action site, and is defined by the extent of potential impacts from the proposed discretionary action. For the purposes of this Opinion, the Service has determined that the 276,350-acre "focus area" is the action area (see Figure 1, attached).

Covered Activities

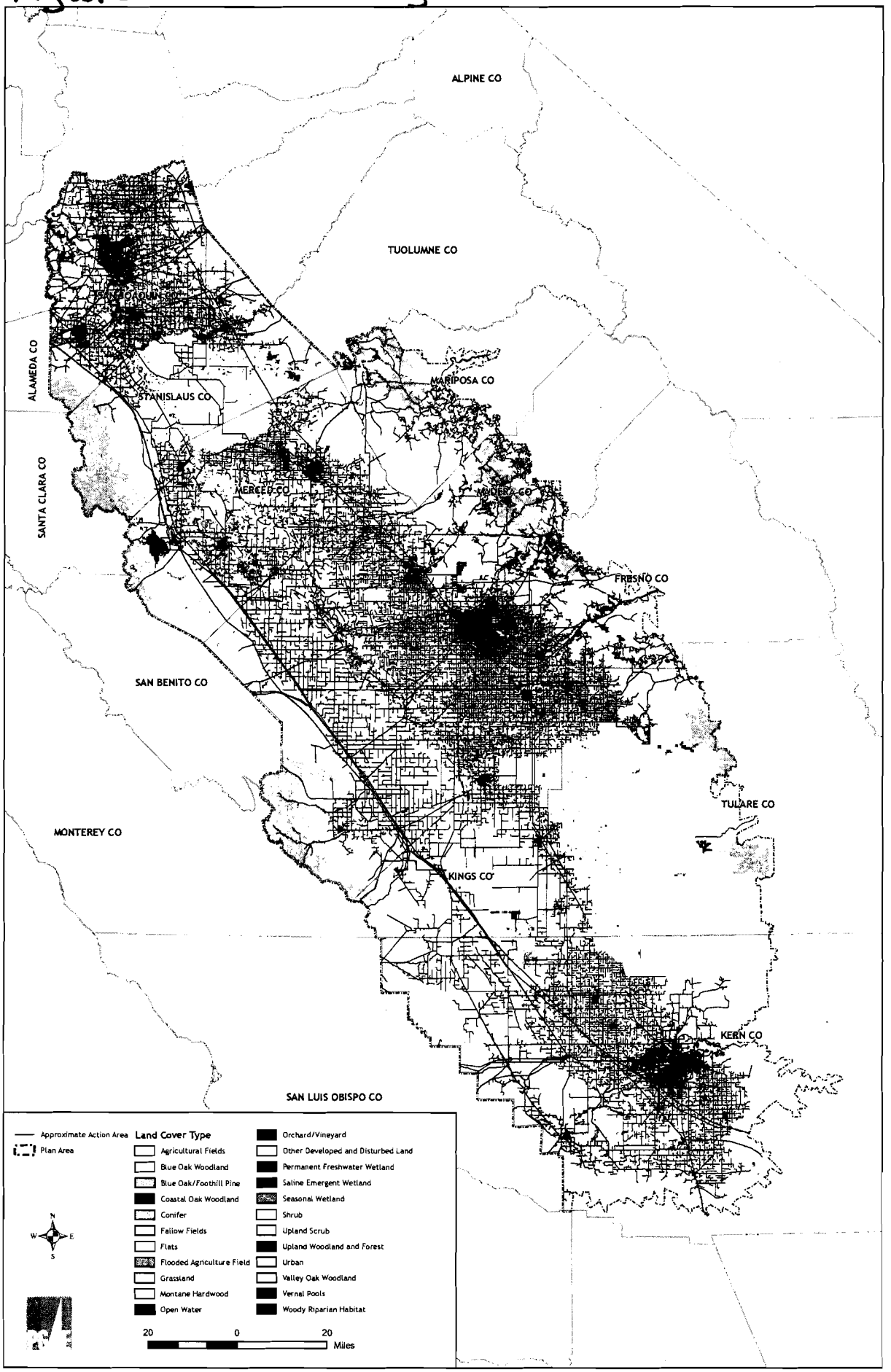
The activities addressed in the HCP and proposed Permit are necessary for the safe and efficient operation of PG&E's electrical transmission and distribution and PG&E's natural-gas transmission and distribution systems in the action area. The activities addressed in the HCP and the proposed Permit includes three categories of activities for which PG&E is requesting take authorization:

- Operation Activities typically include inspecting, monitoring, testing, and operating valves, reclosures, switches, etc. These activities involve personnel working at facilities and using existing access roads.

- Maintenance Activities include repairing and replacing facilities, structures, and access roads. They also include emergency repair and replacement, and vegetation management, including tree trimming and firebreaks.

- Minor Construction Activities include installing new or replacement structures to upgrade existing facilities or to extend gas-line or electric-line service to new customers. These activities are limited to 1 mile or less of new electric or gas line extensions, and 0.5-acre or less expansion of permanent facilities (i.e. substations). The length of service extension allowed under minor construction is a total length of 1 mile from the current terminus of an existing line, regardless of the nature of the facilities involved. Multiple consecutive (end-to-end) extensions with a total length exceeding 1 mile would not be covered under the

Figure 1. HCP Planning Area Boundary and Action Area



Jones & Stokes

San Joaquin Valley O&M HCP
Plan Area and Action Area

Figure 1. HCP Planning Area Boundary and Region Here

proposed HCP. Multiple 1-mile extensions in different geographic areas would be covered, but each would be treated as a separate activity. The size of each minor construction project would be estimated as the total footprint, expressed in acres. Both linear and acreage estimates will be required to address the entirety of each proposed project; consistent with the requirements of Federal and State environmental review, the HCP will not allow segmentation of proposed construction to obtain coverage under the HCP.

The Covered Activities do not include any facilities outside the defined action area or new types of construction actions (new construction) that are unrelated to the maintenance, repair, and operation of the existing pipeline and transmission/distribution lines. Covered Activities area described in more detail in Chapters 2 and 3 of the HCP document.

Natural Gas System Covered Activities. PG&E's natural gas system consists of approximately 9,880 miles of transmission pipelines, compressor stations, regulator stations, and distribution pipelines in the action area. PG&E estimates that an additional 150 miles of underground pipeline may be constructed under the proposed action to meet increases in energy need over the 30-year permit term.

The natural gas transmission system comprises three primary gas transmission lines totaling approximately 1,550 miles of pipeline in the action area. Gas transmission pipelines are typically buried several feet underground. The transmission pipelines carry large quantities of gas at high pressure, and compressor stations along the pipeline help push the gas to its final destination. The pressure regulators help reduce the high-pressure gas in the transmission system to lower pressures used in the distribution system, which is the system that serves homes and businesses. One compressor station, located near Kettleman City, occurs in the action area.

In the San Joaquin Valley action area, PG&E presently owns 1,550 miles of natural gas transmission pipelines and 8,326 miles of natural gas distribution pipelines:

Line 401 is a 42-inch-diameter transmission pipeline running from the California/Oregon border south to PG&E's Panoche Metering Station in Fresno County. Approximately 426 miles of Line 401 are in the action area.

Line 2 is a 12- to 20-inch-diameter transmission pipeline running from the Brentwood Compressor Station to the Panoche Metering Station. Approximately 115 miles of Line 2 are in the action area.

Lines 300A and B are dual 34-inch-diameter transmission pipelines running from the California/Arizona border near Needles, California, to PG&E's Milpitas Terminal in the San Francisco Bay Area. Approximately 502 miles of each line are in the action area.

Natural gas is transported through the transmission system in steel pipelines buried with 3-4 feet (measured to the top of the pipe) of native soil. The diameter of the transmission pipelines range from 8-42 inches. Gas pressure in the transmission pipelines is maintained by the one compressor station located near Kettleman City. PG&E estimates that approximately 6 additional gas-pressure limiting-stations may be constructed under the proposed action to meet increases in energy need over the 30-year Permit term.

The natural gas distribution system consists of approximately 8,326 miles of both steel and poly-vinyl chloride (PCV) pipelines that range from 0.75 inches to 8 inches in diameter. The distribution pipelines are typically buried 2–4 feet deep. Approximately 90% of the gas distribution pipelines occur in urban areas. Both the distribution and transmission pipelines were excavated in native soil and backfilled with the same native soil. However, in areas of rocky soil, imported backfill is sometimes used to offset rock damage to the pipeline and to allow for industry soil-compaction standards.

The ROW width for the existing 9,876-mile natural gas transmission and distribution system ranges from 15 to 150 feet depending on the diameter of the pipeline. The average ROW width is 150 feet for transmission pipelines and 25 feet for distribution pipelines. PG&E owns less than 1% of the linear ROWs in fee title; the remainder is in easements and in franchise. Generally, PG&E has nonexclusive easements without the right to fence the pipeline corridors. PG&E obtains exclusive easements with the right to construct security fencing for valve lots, compressor stations, and other facilities.

Pipeline Access. Under normal conditions, PG&E uses existing public and private roads to access the distribution and transmission pipeline ROWs, to the maximum extent possible. PG&E is seeking species-take coverage for their travel on public and private roads. PG&E restricts speed limits to the speed deemed safe under driving conditions. PG&E vehicles will not exceed a speed limit of 15 mph in the ROWs or on unpaved roads within natural land-cover types.

The most rural private roads may be dirt or gravel and may periodically require PG&E to conduct road repairs or maintenance. In the event that no road exists or an emergency arises, PG&E vehicles will travel off-road (cross-country) or PG&E will construct a new temporary access road. PG&E has no accurate information available to estimate either the need for construction of new temporary roads or the frequency of their off-road or cross-country travel to access ROWs. PG&E estimates that 95% of the 9,877 miles of existing natural-gas pipeline are accessible by existing roads. Using the gas-pipeline activity information from HCP Table 3-1, approximately 2,075 miles of off-road (cross-country) travel will occur each year in association with PG&E's pipeline patrols, inspections, and access to conduct O&M covered-activities

Pipeline Hydrostatic Testing.
New pipelines or valves installed in existing gas transmission or distribution pipelines are hydrostatically tested by PG&E prior to operation to ensure their integrity. Hydrostatic testing is a component of several Covered Activities, including activity G7 (mainline valve replacement), G11 (entire pipeline replacement) and the minor-construction activities G14, G15, and G16. Hydrostatic testing is typically conducted before PG&E backfills soil over excavated pipeline. Water is the most commonly used test medium, but compressed air or compressed nitrogen gas is occasionally used for testing of small-diameter pipes. Testing pressure and duration are determined by pipe size, pipe specifications, pipe wall thickness, and elevation. Prefabricated test heads are installed on the section of line to be tested. The section is then filled with water 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 is used to increase the internal pressure to the designed test pressure, typically 1.5 times the system'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. In general, about 1,000 feet of pipe is tested at one time, so between 350 and 9,500 cubic feet of water (between 0.07 and 1.96 acre-feet) could be used and expelled. Water is scarce or hard to obtain in some locations, so smaller distances may be tested so water can be reused from one test to another if the sites are adjacent.

Upon successful completion of the hydrostatic test, pressure is reduced and the water is expelled from the pipeline using air compressors and cylindrical foam pigs. PG&E discharges only clean water, and the water is not released under pressure. PG&E will expel and dispose of test water in a manner consistent with local water quality considerations, obtain any necessary water quality permits, and use its water quality BMPs when disposing of test water. PG&E may minimize habitat disturbance and soil erosion by discharging hydrostatic test water into percolation areas, into existing trenches for percolation, into existing canals, back to water trucks, or discharge water overland if suitable conditions are present. Percolation is the most common disposal method. PG& E may construct temporary settling ponds with straw bales, plastic, and silt fencing. PG&E will expel and dispose of test water in a manner consistent with covered-species considerations (i.e. water will not be released overland in areas suitable for burrowing wildlife species, will not be released into areas potentially occupied by plant covered-species, and will not be released into vernal pool areas or other sensitive habitats). Hydrostatic testing is a component of several medium- or large-disturbance Covered Activities (including Activities G7, G11, G14, G15, and G16), all of which require preconstruction surveys when the activity occurs in a natural land-cover type. PG&E's preconstruction surveys shall include all lands involved with the hydrostatic test, including the water-disposal area(s). Any temporary setting ponds, basins, percolation areas, or other water disposal areas shall not be placed inside or directly adjacent to occupied habitat for a plant covered-species. Plant covered-species occupied-habitat is defined below, in the project description section titled *HCP Conservation Strategy.*

The 9,876 miles of existing gas pipelines and valves will also be hydrostatically tested by PG&E every 7-10 years under the Federal Pipeline Integrity Act, or when conditions warrant. Over the 30-year permit term, each section of existing pipeline would be tested approximately 3 or 4 times. Hydrostatic testing of the existing of pipeline will require soil excavation to install the prefabricated test heads on sections of pipeline. The amount of temporary or permanent habitat disturbance associated with conducting the 3 or 4 hydrostatic tests on the 9,876 miles of existing pipeline was included in the HCP Table 3-1 over-all disturbance-estimates for covered-activities G7, G11, G14, and G15).

Pipeline ROW Clearing Activities. PG&E will clear pipeline ROW areas when necessary for pipeline maintenance or construction of new pipelines (Activity G16). After placing a staked engineering survey line on the ground, PG&E maintenance personnel would clear vegetation or grade the construction ROW to the extent necessary to allow safe and efficient use of construction equipment. In the event that minor clearing of privately owned commercial tree species is necessary, construction personnel move and stack the trees in accordance with the landowner's preference. Stump profiles of cleared trees would be kept as low as possible. Stumps would be removed from the ground only when required for pipeline installation. PG&E

will implement vegetation management BMPs from HCP Table 4-7, including BMP numbers 16, 17, 18, and 19 for all gas pipeline ROW-clearing actions 100 feet or more in linear length. PG&E's clearing of ROWs conform to landowner agreements. PG&E will implement the species avoidance, minimization, and conservation requirements of the HCP when clearing ROWs in the Action Area, but additional avoidance, minimization, or conservation requirements may be required by the State, Federal, or private landowners. When PG&E pipelines cross US Forest Service (USFS), Bureau of Land Management (BLM), Bureau of Reclamation (BOR), California Department of Fish and Game (CDFG), or land managed by other State, Federal, or private agencies in the Action Area, ROW clearing maybe done by PG&E under a special purpose or special use permit issued by that agency. PG&E work on federally managed lands may require a separate ESA consultation if listed species are likely to be present at the activity site.

PG&E construction personnel would appropriately dispose of debris created during the preparation of a pipeline ROW. Debris disposal generally includes chipping of woody vegetation and placement of this plant material inside the ROW. PG&E will make every effort to avoid disposing of wood chips or waste vegetation on occupied-habitat for plant covered-species, on top of burrows, dens, or other occupied-habitat for wildlife covered-species, or on habitat suitable for occupancy by a wildlife covered-species. As discussed below under Covered Activity G13, if more than 0.1 acre of wood chips and/or other vegetation are placed on occupied or suitable habitat for a covered-species, the temporary or permanent effect to the species will be quantified by PG&E in the field and mitigated as discussed below under the header "HCP Conservation Strategy"

Any disposal of solid-waste will occur only at county, State, or federally permitted landfills or disposal sites, where effects to listed species would not occur. Any contaminated or hazardous waste removed by PG&E during ROW clearing, pipeline excavations, or other Covered Activities will comply with applicable State and Federal laws, regulations, and requirements pertaining to hazardous materials and waste. PG&E would dispose of hazardous material at Class 1 and Class 2 landfills.

Vegetation Management and Access Road Maintenance on Natural Gas ROWs (Activity G13)
PG&E manages vegetation along natural gas pipeline ROWs to prevent damage to the natural gas system, facilitate inspections, and comply with all pertinent State and Federal regulations. The vegetation management program is designed to manage weeds, brush, and trees around equipment and facilities for fire hazard reduction, security, safety, and to provide foot, all terrain vehicles (ATV), or light truck access for maintenance. PG&E also clears tree canopy and brush cover obscuring the ROW in order to facilitate aerial inspection of the gas line ROW and to allow ground patrols for gas leaks. Local fire districts periodically require PG&E to abate ruderal vegetation and annual grasses when fire districts determine that a fire hazard exists. PG&E identifies areas within the ROWs requiring vegetation removal during their routine pipeline patrols. Vegetation management is usually accomplished manually. PG&E removes large diameter woody vegetation with chainsaws. Other vegetation is mechanically removed using brush hogs, hydro-axes, Brontosauruses, Slashbusters, or brush rakes, to establish a vegetation height of approximately 1 foot. ROW width is 150 feet for gas transmission lines, and 25 feet for gas distribution lines. PG&E has determined that Action G13 vegetation

management activities would typically occur in a 25-foot wide corridor of each natural gas ROW, of which 10 feet is occupied by unsurfaced access road.

Natural gas pipeline vegetation management will occur primarily in HCP land cover types dominated by trees and shrubs (Blue Oak Woodland, Blue Oak/Foothill Pine, Coastal Oak Woodland, Conifer, Montane Hardwood, Valley Oak Woodland, Woody Riparian, and Upland Scrub). Vegetation management of gas line ROWs in other land cover types is assumed to be negligible. Of the 1,550 miles of existing natural gas transmission lines and 8,326 miles of existing natural gas distribution lines, approximately 12 miles and 58 miles exist in tree and shrub dominated land-cover types, respectively. Also, PG&E estimates that approximately 150 miles of new gas pipeline extensions will be constructed as part of the proposed action (see Covered Activity G16 below), but less than two miles of these new gas lines are expected to be constructed in tree or shrub dominated land-cover types where Covered Activity G13 would be needed. Therefore, Activity G13 would occur on approximately 72 miles of existing and new gas pipeline in tree and shrub dominated areas. PG&E estimates that each of these 72 miles of gas line ROW in shrub and tree dominated areas would require vegetation management/road maintenance every 10-years, or a total of three times during the 30-year term of the proposed permit. In association with Activity G13 vegetation management, PG&E will maintain unsurfaced pipeline access roads to allow vehicular passage for routine gas line patrols. Maintenance of access roads is usually limited to blading the unsurfaced road, and may occasionally require import of fill or riprap. PG&E maintenance of unsurfaced gas-line access roads could occur in any HCP land-cover type.

PG&E estimates that each mile of G13 vegetation management-related/access-road maintenance activity would temporarily disturb 1.8 acres. Only 1.25 miles would be maintained each year, so a total of 2.25 acres would be temporarily-disturbed annually. The HCP classifies disturbances greater than 0.5 acre as "large disturbance activities", which usually require a pre-construction survey (see HCP page 4-3). However, HCP Table 4-6 indicates that Activity G13 would not have pre-activity surveys (except when wildlife designated-occupied habitat is present) because Activity G13 causes "negligible to minor habitat loss". PG&E considers Activity G13 habitat loss to be negligible or minor because pipeline access road maintenance and vegetation management inside pipeline ROWs is an ongoing activity (every ten years) and areas where Activity G13 occurs have been previously disturbed from this activity. The Service agrees that that Activity G13 would result in only minor or negligible effects to the HCP land-cover type and to the wildlife habitat present at the site. However, the Service has determined that the actions included in Activity G13, including the manual or mechanical removal of vegetation and the blading of unsurfaced roads, do have the potential to directly or indirectly take a plant covered-species if it occurs in the activity site. It is the Service's understanding that PG&E will utilize the PG&E Map Book and the CDFG's California Natural Diversity Data Base (CNDDB) to avoid occupied-habitat for plant covered-species that may be present in Activity G13 disturbance sites. An explanation of the Map Book and a definition of plant occupied-habitat are discussed below in the Opinion section titled *HCP Conservation Strategy*. In addition, HCP Table 4-7 lists *General Best Management Practices (BMPs) for PG&E Vegetation Management Activities*. It is the Service's understanding that PG&E will implement vegetation management BMP numbers 1 though 15 for all vegetation management activities, and vegetation management BMP numbers 16 through 25 as required. PG&E would dispose of any woodchips or waste vegetation material generated by Activity G13 in an appropriate manner, as discussed above

under Pipeline ROW Clearing Activities. If occupied habitat for a narrowly-endemic plant covered-species cannot be avoided under Activity G13, PG&E would first discuss the action with the Service, as described below in the Opinion section titled *Confer Process.*

PG&E estimates that a total of 2.25 acres would be temporarily disturbed from vegetation management activity G13 each year (67.5 acres over the term of the proposed Permit). Approximately 1.80 acres of the annual disturbance would be in gas transmission line ROWs, and 0.45 acre would be in gas distribution line ROWs (54 acres and 13.5 acres over 30 years, respectively).

The use of pesticides (herbicides) for vegetation management is not a covered activity under this HCP.

Patrols and Inspections of Natural Gas System (Activity G1, G2)
PG&E conducts patrols of natural gas pipelines and associated facilities. Aerial patrols of certain facilities are conducted on a weekly basis using fixed-wing aircraft or helicopters. Ground patrols of the pipelines and associated facilities are conducted on a quarterly to annual basis by driving light trucks on existing access roads and pipeline patrol roads. The purpose of these truck patrols is to observe surface conditions on and adjacent to the transmission line ROW for indications of leaks, third-party construction activity, and other factors affecting pipeline safety and operation. Gas meters are also read on these truck patrols.

PG&E patrols for gas leak detection by walking or using rubber-tired ATVs at least annually in suburban/urban areas and at least once every fifth year in rural areas. Rural areas are also patrolled for leak detection yearly by helicopter, except in the fifth year (when a foot patrol is conducted). PG&E uses either a portable hydrogen-flame ionization gas detector or a laser-methane detector to sample air above the gas line to test for leaks during walking or ATV leak patrols.

Patrols are a small-disturbance activity, and would not require pre-activity surveys. PG&E patrols approximately one-fifth (1,975 miles) of the 9,876-mile natural gas system per year. Approximately 95% of the natural gas system is accessible by existing roads or is patrolled on foot or by aircraft. The remaining 5% (493.8 miles) is accessed by off-road travel. PG&E assumed an average width of 7.5 feet (HCP Table 3-1) would be affected by vehicles during off-road travel, and that average distance of each off-road travel is 1,000-foot. Approximately 90-percent of patrols would occur on gas transmission facilities, and 100-percent of inspections would occur on gas transmission facilities.

Remedial Pipeline Maintenance (Activity G3)
PG&E corrects weather-damaged soil-erosion, line coating damage, and vandalism problems on the natural gas distribution and transmission system. PG&E estimates that 10 remedial pipeline maintenance events would occur each year. Maintenance materials used for site-specific solutions of erosion problems may include riprap, soil matting, concrete, and concrete pillow systems. In the rare event of insufficient depth of pipeline cover, concrete can be used as a cap cover. During these procedures, the pipeline remains in operation. Vandalism can affect any structures located above ground; it usually entails visual (i.e., spray paint) rather than structural

impacts. Activity G3 Remedial maintenance is a large-disturbance activity and a pre-construction survey would be conducted when Activity G3 occurs in a natural land-cover type. PG&E estimates that 0.57 acre per year will be temporarily disturbed by remedial maintenance excavation, and a 50-by-50 foot area may be permanently lost by reinforcing facilities to protect against vandalism. Eighty-percent of this disturbance is expected with gas transmission facilities, and 20-percent is expected with gas distribution facilities. Approximately 23-percent of gas transmission facilities and 90-percent of gas distribution facilities are located in urban areas. Off-road travel by light trucks is required for about 5% of PG&E remedial maintenance events, and it is assumed that a 10-by-1,000-ft area is affected on average by off road travel. If occupied habitat for a narrowly-endemic plant covered-species cannot be avoided under Activity G3, PG&E will first discuss the activity with the Service, as discussed below in the Opinion section titled *Confer Process*.

Compressor Station Operation and Maintenance (Activity G4)
The one compressor station near Kettleman City serves the gas transmission lines in the action area. PG&E conducts daily inspections and maintenance on this compressor station. Existing paved roads provide access to the compressor station. Typical maintenance tasks include overhauling compressors and engines, retrofitting emission systems, maintaining or reconstructing the cooling water tower, repairing and replacing piping, painting the station, and drilling or cleaning water well(s), which are activities that do not disturb land-cover. The Kettleman City compressor station is located within a fenced site where no natural land-cover is present. As indicated on HCP Table 3-1, Activity G4 operation and maintenance will have no effect on federally listed species.

In addition, PG&E is requesting take coverage for modifications or upgrades of the Kettleman City compressor-station equipment. Such equipment upgrades would be implemented to improve operating efficiency and reliability and to meet specific air quality standards. PG&E would upgrade the Kettleman City compressor under approved permits from the Air Resources Control Board. These permits do not have a Federal nexus and would not trigger further consultation with the Service at the time of the upgrade. The modifications or upgrades of the Kettleman City compressor station could expand the facility outside the existing footprint of the fenced site, in an area of natural vegetation. The Activity G4 potential temporary or permanent effects to natural vegetation outside the existing fence were not quantified in the HCP (Table 3-1).

Pipeline Electric Test System Installation, Operation and Maintenance (Activity G5)
PG&E installs Electric Test Systems (ETSs) 1-5 miles apart on pipelines to determine pipe corrosion, measure conductivity, and locate the pipe during future excavation. This technology avoids the need to excavate soil above the length of the pipeline to examine it for signs of corrosion. Eighty-percent of ETSs are on the gas transmission pipelines, and 20 percent are on gas distribution lines. The ETSs consists of two leads (wires) attached to the outside of the pipe with a liquid weld material; the leads are exposed at the soil surface inside a 4-foot-tall, 4-inch-diameter plastic tube. Installation of each ETS would require soil excavation to exposing a 3- to 5-foot-long section of pipeline, attaching the leads to the outside of the pipe with liquid weld, and backfilling soil to cover the pipeline. PG&E estimates that 7 pipeline ETSs will be installed per year under the proposed Permit. Each pipeline ETS installation would temporarily disturb a

10-by10-ft area (100 square ft). Pipeline ETS installations are a small-disturbance activity, typically involving 0.002 acre. HCP Table 4-6 indicates that Activity G5 would not have pre-construction surveys, except when wildlife designated-occupied habitat is present in the activity site. It is the Service's understanding that PG&E will utilize the PG&E Map Book-Process to avoid plant covered-species occupied-habitat that maybe present at ETS excavation sites. An explanation of the Map Book Process and a definition of plant covered-species occupied-habitat are discussed below in the Opinion section titled *HCP Conservation Strategy*.

Most ETS installation sites would be accessible by existing access roads. Where an ETS site is not accessible via an existing road, it would be accessed by foot or by rubber-tired ATV. The pipeline will remain in operation during the installations. Off-road travel by light trucks required for about 5% of ETS events, and it is assumed that a 10-ft-by-1,000-ft area is affected on average by each off road travel.

Pipeline Valve Inspection, Recoating and Valve Replacement (activity G6, G7)
Pipeline valves located 10-20 miles apart on the transmission and distribution pipelines regulate the flow of natural gas through the pipelines. PG&E would inspect and operate all valve sites along the gas transmission and distribution pipelines three to four times per year. Personnel in light trucks would drive to each valve site and lubricate valves as needed using a gun pump to administer either motor oil or grease. PG&E estimates that approximately 95% of the 9,876 miles of gas transmission and distribution line are accessible by existing access and pipeline patrol roads. The remaining 5% (493.8 miles) is patrolled by off-road travel in light trucks or ATVs 4 times per year in 15 areas. PG&E assumed an average width of 7.5 ft is affected by vehicles during off-road travel, and that average distance of off-road travel is 1,000 ft.

PG&E expects to recoat two pipeline valves per year over the term of the proposed Permit. These valves are located on gas transmission lines. Activity G6 pipeline valve recoating involves clearing vegetation, excavating a 50-foot-wide terraced hole around and under the existing valve, and recoating the valve with epoxy to prevent corrosion of the valve assembly. Approximately 5,000 square feet (0.11 acre) of surface would be temporarily disturbed with each recoating action (a 50-by-50-ft excavation and a 50-by-50-ft laydown area beside the valve site). Activity G6 is a medium-disturbance activity, and a pre-activity survey will be conducted when the activity occurs in a natural land-cover type. The size of the terraced hole may vary to meet Cal-OSHA requirements. The pipeline is not disturbed or opened, and remains operational during the recoating activity. Approximately 0.23 acre will be temporarily disturbed from valve recoating annually. PG&E expects most valve sites will be accessible by existing access roads, but off-road travel by light trucks is required for about 5% of events, and it is assumed that a 10-by-1,000-ft area is affected on average by off road travel.

Valves on the gas transmission and distribution pipelines occasionally malfunction or wear out, causing leaks. PG&E expects to replace five faulty valves per year, primarily on the gas transmission lines (150 valves over 30 years). Activity G7 can occur any time depending on weather and on operational restrictions related to the need to shut down the pipeline temporarily. Prior to valve replacement, a portion of the gas line must be *blown down* (i.e., natural gas is evacuated from the affected section of pipe at a control point without affecting the environment). Valve replacement is a large-disturbance activity, and a pre-activity survey would be conducted

when the replacement site is in a natural land-cover type. Valve replacement involves excavating soil over approximately 75-foot length of the pipe on either side of the valve (150 feet total), with a construction work corridor 50 to 75 feet on either side of the pipe (100–150 feet wide). Typically, the trench is 12 inches wider than the diameter of the pipe being installed. A laydown area (generally 50-by-50-ft) may be required; if so, PG&E may mow and/or grade the soil surface of a lay-down area to remove vegetation and create a flat area, if a previously created lay-down area is not already present near the activity site. PG&E estimates that 2.87 acres annually and 86 acres over the term of the Permit would be temporarily disturbed from valve replacement. Once PG&E replaces the valve, the pipeline must be hydrostatically tested as discussed above under *Pipeline Hydrostatic Testing*. Disturbance sites larger than 0.25 acre in natural vegetation are typically broadcast seeded using a weed-free commercial seed mix as described below under *General AMMs*. If occupied habitat for a narrowly-endemic plant covered-species cannot be avoided under Activity G7, PG&E will first discuss the activity with the Service as described below in the Opinion section titled *Confer Process*.

Pipeline Cathodic Protection Operation and Maintenance (activity G8)
Pitting or corrosion of underground steel pipes occurs as current generated or carried by the pipe moves into the soil. These pits can lead to weak sections of pipe that could burst from the pressurized gas. Natural gas pipelines are coated to prevent corrosion, but pipeline coatings degrade over time, and degrade faster in areas of high moisture content (e.g., resulting from precipitation or irrigation) and where pipelines are exposed to large amounts of induced AC current (typically from adjacent high-voltage electric transmission lines). To slow degradation of pipe coating, PG&E installs anode beds of zinc or magnesium bars, platinum anode rods, or ground mats in deep ground wells (more than 300 feet deep) every 10-20 miles along the 9876 miles of existing pipelines. The anode beds are located approximately 1000 feet from the pipeline to distribute current adequately.

The cathodic protection provided by the anode beds would be inspected by PG&E every 2 months by checking the electrical current at various test locations along pipelines and at the anode bed sites. PG&E accesses the pipelines and the anode bed sites by light truck. Inspections do not disturb land-cover.

As a pipeline's coating degrades over time, it requires increased cathodic protection to prevent corrosion. Increased cathodic-protection current speeds the consumption of anode beds and decreases their effectiveness. Consequently, PG&E must replace anode beds periodically, and additional anode beds may be needed. Ninety-percent of these replacements would be installed along gas transmission lines. Installation of anode beds involves drilling deep ground wells (more than 300 feet deep) to install the zinc or magnesium bars, platinum anode rods, or ground mats. Once an anode bed is installed, it is connected to the pipeline by an underground cable. Ground-surface disturbance would also occur when PG&E clears the anode bed site and when they erect additional wood poles to support electric lines for carrying power from an existing distribution line to the new anode bed.

PG&E estimates that five anode beds will be replaced per year in the action area. Cathodic protection is a large-disturbance activity, and a pre-activity survey would be conducted when Activity G8 occurs in a natural land-cover type. An approximately 30-foot-wide construction

corridor and an approximately 15-foot-wide permanent ROW are needed to place the 1000-foot long underground cable from each anode bed to the pipeline. Electricity from the distribution system is preferable to solar power for providing current to the underground cable. Where electric power is unavailable, an additional area approximately 50- by 75-foot is fenced to house a solar battery/electrical source. The pipeline continues to operate during anode bed installation or replacement. PG&E estimates that 3.4 acres will be temporarily impacted per year due to anode bed replacement, and a total of 0.45 acre will be permanently lost each year due to the newly fenced areas above each new anode bed. Disturbance sites larger than 0.25 acres in natural vegetation are typically broadcast seeded using a weed-free commercial seed mix, as described below under *General AMMs*. Off-road travel by light trucks is required for about 5% of events, and it is assumed that a 10-by-1,000-ft area is affected on average by off road travel. If occupied habitat for a narrowly-endemic plant covered-species cannot be avoided under Activity G8, PG&E will first discuss the activity with the Service as described below in the Opinion section titled *Confer Process*.

Pipeline Coating Inspection and Maintenance (Activity G10)

PG&E coats natural gas transmission pipelines to protect them from degradation and external corrosion. To determine whether the coating has maintained its integrity, every 2 months PG&E induces electrical current at various test locations on the pipeline and then measured any loss of voltage, which would indicate degradation in coating integrity. Access of the pipelines is by light truck.

When a transmission pipeline's coating has deteriorated to the point of requiring replacement, PG&E rewraps the pipe with epoxy. Pipeline coating replacement is a large-disturbance activity, and a pre-activity survey would be conducted when Activity G10 occurs in a natural land-cover type. To avoid bending or affecting the integrity of the pipe, approximately one mile of pipeline would be excavated in sections and sections are supported at intervals of (typically) 40 feet. Typically, the trench is 12 inches wider than the diameter of the pipe. The old coating is removed by PG&E by jetting, hand scraping, and/or sandblasting. The pipeline surface is then prepared for the new wrap by running a self-contained grit- or shot-blasting machine over the pipe. PG&E then applies the coating using a coating machine. The pipeline continues to operate during this activity. An approximately 100-foot-wide working corridor is needed on either side of the pipe. Each pipeline coating replacement would temporary disturb approximately 12 acres. Disturbance sites larger than 0.25 acres in natural vegetation are typically broadcast seeded using a weed-free commercial seed mix, as described below under *General AMMs*. PG&E estimates that six pipeline coatings will be replaced during the 30-year term of the proposed Permit. The total length of each pipeline coating is approximately one mile. Off-road travel would be required for about 5% of events and PG&E assumes that a 10-by-1,000-ft area is affected on average by off-road travel, and that one-mile of pipeline replacement (one event) typically involves three different locations. If occupied habitat for a narrowly-endemic plant covered-species cannot be avoided under Activity G10, PG&E will first discuss the activity with the Service, as described below in the Opinion section titled *Confer Process*.

Pipeline Lowering (Activity G9)

Gas transmission pipelines sometimes need to be lowered to increase the depth below surface and thereby improve public safety. Such need arises mostly in agricultural areas and areas of

intense land use, but may also occur in other land-cover types where pipe structures are exposed. Lowering a transmission pipeline involves trenching parallel to, and to a greater depth, than the existing pipeline. Pipeline lowering is a large-disturbance activity, and a pre-activity survey would be conducted when Activity G9 occurs in a natural land-cover type. The trench extends approximately 300–500 feet beyond both ends of the section of pipeline to be lowered. Gas pressure is reduced to the lowest possible operating pressure for safety reasons; the pipeline is then briefly removed from service. The existing pipeline is cut and moved to the lower trench section. Prefabricated bends are installed to connect the lowered section of the pipe to the remaining pipeline. PG&E may also rewrap the pipeline coating at this time.

The lowering activity requires an approximately 100- to 150-foot-wide construction corridor. PG&E estimates that approximately 18.2 acres will be temporarily impacted from each transmission pipeline lowering event, and 9 events are expected over the 30-year term of the proposed Permit. This activity can occur at any time of year, depending on operational restrictions relating to the need to shut down the pipeline temporarily. Disturbance sites larger than 0.25 acres in natural vegetation are typically broadcast seeded using a weed-free commercial seed mix, as described below under *General AMMs*. Off-road travel would be required for about 5% of events and PG&E assumes that a 10-by-1,000-ft area is affected on average by off-road travel, and that one-mile of pipeline lowering (one event) typically involves three different locations. If occupied habitat for a narrowly-endemic plant covered-species cannot be avoided under Activity G9, PG&E will first discuss the activity with the Service, as described below in the Opinion section titled *Confer Process*.

Pipeline Telecommunication Site Inspection and Maintenance (activity G12)
A Supervisory Control and Data Acquisition (SCADA) system monitors the functions of gas transmission and distribution pipelines. These remote monitoring systems transmit pipeline operational information about the system to PG&E's operations offices at the Kettleman Compressor Station. There are several SCADA sites in the action area. They are typically located at a compressor station or on a public road right-of-way. PG&E would typically conduct routine inspections of each telecommunication site at least once each month. The entire SCADA system is evaluated once per year to replace batteries, conduct minor maintenance, or make adjustments to the facilities or components. PG&E would access the SCADA sites by light truck on existing access and pipeline patrol roads, or by helicopter. PG&E may need to periodically blade the SCADA access roads to keep them passable for four-wheel-drive light trucks.

In the event of major storm damage, PG&E must reconstruct the facility or replace a component as soon as weather permits. Staging areas (100-foot by 100-foot) may be required for equipment needed for major maintenance or storm damage repairs. The staging areas would be located either next to the telecommunication site or at a distant location (for helicopter transport of workers and materials). The pipelines would continue to operate during these maintenance activities. Telecommunication site maintenance is a medium-disturbance activity, and a pre-activity survey would be conducted at sites located in a natural land-cover type. Access to the telecommunication site would be by existing roads or helicopter.

Minor Construction of New Gas Pressure-Limiting Stations (Activity G14)
Changes in population density and use of natural gas may require a thicker walled transmission pipeline. An alternative to excavating and replacing the pipeline is installing a Pressure Limiting Station (PLS) that lowers the pressure of gas in the transmission line. It is the Service's understanding that new PLS construction would occur inside existing pipeline ROWs.

Constructions of new PLSs are large-disturbance minor-construction activities; a pre-activity survey will be conducted when Activity G14 occurs in a natural land-cover type. Preconstruction surveys will include work areas and any adjacent areas that may be affected by construction activities. Construction of a PLS involves excavating a joint of pipeline. A 100-foot long construction corridor approximately 125-foot-wide and an approximately 100-by-100-foot lay-down area (i.e. equipment staging area) may be required. PG&E may mow and/or grade the soil surface of a lay-down area to remove vegetation and create a flat area, if a previously created lay-down area is not already present near the activity site. To install a PLS, natural gas is removed (blown down) from a portion of the pipeline. Once the PLS is in place, the pipeline must be hydrostatically tested as discussed above under *Pipeline Hydrostatic Testing*. A finished PLS typically encompasses a fenced area approximately 250 by 100 feet, including above ground pipe and valve structures and a small control/monitoring building (usually 100 square feet). PG&E estimates 0.52 acre of temporary disturbance and 0.57 acre of permanent loss would occur from the construction of each new PLS. Temporary disturbance sites larger than 0.25 acre in natural vegetation are typically broadcast seeded using a weed-free commercial seed mix, as described below under *General AMMs*. PG&E estimates the need for 6 gas pressure-limiting stations during the 30-year term of the proposed Permit. Off-road travel would be required for about 5% of events and PG&E assumes that a 10-by-1,000-ft area is affected on average by off-road travel, and that each new pressure limiting station (one event) typically involves three different locations. If occupied habitat for a narrowly-endemic plant covered-species cannot be avoided under Activity G14, PG&E will first discuss the activity with the Service as described below in the Opinion section titled *Confer Process*.

As discussed below in the Opinion section titled *Pre-activity Surveys – Medium/Large Disturbance Activities*, it is the Service's understanding that PG&E will confer with the Service and/or CDFG (see *Confer Process* below) prior to implementing a minor-construction covered-activity such as Activity G14, when that construction will occur in areas of natural land-cover and pre-activity surveys (conducted at the appropriate time of the year) indicated that the construction activity cannot completely avoid suitable-habitat for a wildlife covered-species or occupied habitat for a plant covered-species.. Minor-construction activities such as Activity G14 will require the Confer Process if PG&E cannot conduct pre-activity surveys at the correct time of the year to identify presence of a plant covered species with a CNDDB occurrence record within 200 meters of the activity site.

PG&E would construct new pressure limiting stations to lower the pressure of gas in an existing pipeline. A new pressure limiting station serves increased human density, which may be the result of new subdivisions or new businesses. PG&E would construct new PLSs because of a change in class-location designation. Therefore, a new PLS construction would occur only in response to existing human population densities, and it is not considered growth-inducing.

Minor Construction for Installation of New Mainline Valves (Activity G15)
Occasionally a new mainline valve is installed to regulate the flow of gas or to provide the capability of isolating portions of existing transmission or distribution pipeline. PG&E estimates that 6 valves would be installed during the term of the proposed Permit. Mainline valve installation is a medium-disturbance minor-construction activity, and a pre-construction survey would be conducted when Activity G15 occurs in a natural land-cover type. Preconstruction surveys will include work areas and any adjacent areas that may be affected by construction activities.

A new valve would be installed by excavating 75 feet of the pipeline on both sides of the new valve location, with a 100- to 150-foot-wide construction work corridor. Typically, the trench is 12 inches wider than the diameter of the pipe. A 50-by-50 foot lay down area is also required. PG&E may mow and/or grade the soil surface of the lay-down area to remove vegetation and create a flat area, if a previously created lay-down area is not already present near the activity site. Prior to installing the new valve, a portion of the pipeline must be blown down. Once the new valve is installed, the pipeline is hydrostatically tested as described above under *Pipeline Hydrostatic Testing*, and the trench is backfilled as described below. Installation of new valves can take place at any time of year, depending on weather and operational restrictions related to the need to shut down the line temporarily. PG&E estimates that 6 mainline valves would be installed over the 30-year term of the proposed Permit. Four or five of these new valves would be on transmission lines, and one or two would be on distribution lines. Each mainline valve installation would temporarily disturb 0.273 acre. Temporary disturbance sites larger than 0.25 acre in natural vegetation are typically broadcast seeded using a weed-free commercial seed mix, as described below under *General AMMs*. Off-road travel by light trucks is required for about 5% of events, and it is assumed that a 10-by-1,000-ft area is affected on average by off road travel. If occupied habitat for a narrowly-endemic plant covered-species cannot be avoided under Activity G15, PG&E will discuss the activity with the Service as discussed below in the Opinion section titled *Confer Process*.

Minor Construction for New and Replacement Pipelines (activities G11 and G16)
Installing new sections of pipeline to an existing line or replacing existing pipeline segments involves first clearing and grading the ROW as discussed above; trenching and excavating; pipe placement (including welding, inspection of welds, field coating or fiber wrapping, and backfilling); hydrostatic testing; adding corrosion protection; marking the pipeline; erosion control; cleanup and restoration. Construction for new pipeline extensions (Activity G16) and construction to replace sections of existing pipeline (Activity G11) are large-disturbance activities. Activity G16 is also a minor-construction activity. A pre-activity survey will be conducted when Activities G16 or G11 occur in a natural land-cover type. The pre-activity survey will include disturbance areas, access areas, and any adjacent areas that might be affected by construction dust, noise, vehicle traffic, ground vibration, or other construction activities, as discussed below in *Pre-activity Surveys- Medium/Large Disturbance Activities* and in *Evaluation Methods.*

In most terrains, PG&E uses trenching to install or replace pipeline, unless specific circumstances (i.e. rare open crossings) dictate construction of aboveground sections. Specialized trenching and boring methods would be used at crossings of rivers, streams,

backwaters, and washes; faults; and roads, railroads, utilities, aqueducts, and canals. These trench excavation methods are described in detail below. These crossing methods may require in-water work or work in riparian habitats. If PG&E work will occur within the waters of the United States, PG&E will contact the Army Corps of Engineers (USACE) and, if required, shall pursue a permit under Section 404 of the Clean Water Act (CWA). A PG&E Section 404 permit application may trigger further consultation with the Service and/or NOAA Fisheries at that time. In addition, Activities G11 and G16 will be conducted in accordance with the Master Streambed Alteration Agreement (Fish and Game Code Section 1600-1607) for this HCP. Fish species were not covered in the HCP because of the limited occurrence of Federal or State-listed fish in the 276,350-acre action area. If federally listed fish are present or have the potential to be present at a pipeline-crossing site, PG&E's permit application with the USACE may require a consultation with the Service and/or NOAA Fisheries under section 7 of the ESA.

Trench dewatering, if necessary for Activities G11 and G16, will be conducted by PG&E using a pump or well pointing to remove water from the trench. The water is then pumped into containment tanks and hauled away for proper disposal. PG&E will obtain water quality permits to dispose of water, as necessary.

Lengths of pipe, valves, and fittings would be transported to the ROW or work area by truck and unloaded. Sections of new pipe requiring angle joints typically would be assembled in the field using prefabricated elbow sections 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. Once the field-coating process or fiber wrapping of the weld is completed and inspected for defects, the pipeline is lowered into the trench using rubber-tire or track-mounted equipment to lower the pipeline. The diameter of the new or replacement piping ranges from 8-42 inches. Trench width would be excavated approximately 12 inches wider than the pipeline. A 100-foot wide construction work corridor will disturb a 50-foot wide area on each side of the trench.

The minimum length of pipeline replacement (Activity G11) is 40 feet (one joint of pipe), although up to one mile of pipeline (132 joints) could be replaced. Activity G11 could occur at any time of the year, depending on PG&E operational restrictions related to the need to shut down the pipeline temporarily.

The installation of new gas pipeline (Activity G16) is limited to 1 mile or less in length from the current terminus of an existing line. Multiple consecutive (end-to-end) Activity G16 pipeline extensions totaling more than one mile over the 30-year term of the proposed Permit are not covered under this Opinion. PG&E estimates that 5 new pipeline extensions (Activity G16) would be constructed each year of the proposed Permit (150 new pipeline-extensions total), and each pipeline extension is limited to one mile or less in length (HCP Table 3-1). Approximately 120 miles of all Activity G16 extensions would be gas transmission lines, and 30 miles would be gas distribution lines. New pipelines installed under Activity G16 are anticipated to serve new subdivisions and new businesses. PG&E cannot predict where the 150 new pipeline-extensions will be constructed, but future energy needs are anticipated adjacent or in close proximity to the existing San Joaquin Valley cities and in the eastern part of the Action Area along the foothills of the Sierra Nevada Mountains (M. Boland 2007 in litt). Soil excavation and construction of

Activity G16 pipeline extensions will disturb approximately 60 acres each year (1,800 acres over 30 years). Trench excavation and construction of new pipeline extensions will occur outside the existing PG&E ROWs, but will still occur inside the 276,350-acre Action Area (M. Boland 2007 *in litt)*. To estimate effects, the HCP and Opinion assumed that land-cover types at new pipeline locations will be similar to the land-cover types at existing pipelines (50% percent of existing gas transmission facilities occur within agricultural areas, 22% within urban areas, and 22% within grassland areas, and 0.8% in woodland or shrub areas (HCP Table 3-3)). Existing gas distribution facilities occur primarily within urban areas (90%), with 7% in agricultural areas and 2% in grassland areas (HCP Table 3-6).

PG&E will also establish a new ROW area for each G16 new pipeline extension. The width of the new gas pipeline ROWs would average 150 feet for gas transmission pipes, and 25 feet for gas distribution lines. Therefore, between 91 and 45.5 acres of new gasline ROW may be established in the Action Area each year (between 2,730 and 1,365 acres over 30 years). The establishment of a new pipeline ROW and the associated pipeline access road would include land clearing, grading, and vegetation removal, as discussed above and below. The amount of land clearing would depend on the land-cover type at the new pipeline. Over the 30-year Permit term, Covered Activities G1, G2, G5, G6, G7, G13, would also occur inside the new ROW area. It is the Service's understanding that species-effects resulting from the establishment and maintenance of 150 new ROW areas over the term of the Permit were quantified and analyzed in the HCP analysis of Covered Activities G1, G2, G5, G6, G7, and G13; therefore, species effects inside the new gasline ROWs are considered in this Opinion.

PG&E would install a new gas pipeline (Activity G16) to serve new subdivisions and new businesses. The new pipeline construction would occur after a need for new energy service is identified. PG&E would construct the new pipeline in advance or simultaneous to the new energy need, and the capacity of the new pipelines would not exceed the peak-need of the new subdivisions and businesses, on a sustained basis. Therefore, construction of the new pipelines would occur in response to urban development, the new pipelines would not remove an obstacle for future urban development, and their construction is not considered growth inducing.

The new or replacement pipelines would be hydrostatically tested by PG&E as discussed above under Pipeline Hydrostatic Testing. The trench is then backfilled with the excavated material as described in detail below. Identifying markers are installed over the centerline of the pipeline to show location of the pipeline, identify the owner of the pipeline, and convey emergency information.

Trenching, Excavating and Backfilling during Pipeline Minor Construction Activities. The pipeline ROW is first cleared of vegetation and graded. Typically, the area of clearing, grading, and excavation is limited to the work necessary to ensure the safe movement of construction equipment in the ROW. PG&E would employ erosion control measures, including AMM 9, during and after minor construction to preclude pipeline washout, gully development, and sedimentation of local drainages. Erosion control measures may include installation of water bars, diversion channels, terraces, ditch plugs, riprap, imprinting, and other appropriate soil stabilization practices. Grading and cut-and-fill activities would be designed to minimize effects on natural drainage and slope stability. The process of excavating the new or replacement

pipeline trench (or new valve location) varies according to soil type and terrain. PG&E uses self-propelled trenching machines or backhoes for trench excavation on moderate terrain. If rock or rocky formations are encountered, tractor-mounted mechanical rippers are used to expedite excavation. The bottom of the trench is cleared of loose rocks and, when necessary, imported material or other suitable bedding material is provided as a cushion for the new pipeline. In areas where mechanical rippers are not practical or sufficient, blasting or rock trenching equipment may be employed (then blasting mats are also used to prevent damage to adjacent structures and power and communication lines). Backhoes are used to clean the trench after ripping or blasting.

The width and depth of the trench depends on the diameter of the pipe, soil type, terrain, and minimum depth requirements. Typically, a trench is 12 inches wider than the diameter of the pipe being installed. Trenching and installation of the pipeline also requires a construction-equipment corridor, which would be up to 100-feet-wide (HCP Table 3-1). The trench must be dug deep enough to achieve adequate soil cover over the pipe, which is typically 3-4 feet for transmission lines, and typically 2-4 feet for distribution lines. The following minimum soil covers apply:

uncultivated areas: 2.5–3 feet

cultivated areas: 3–6 feet

rocky areas: 1.5–2 feet

Gas pipeline diameters range from 8 to 42 inches. Therefore, pipeline extensions in Activity G16 could excavate an approximately 3.2 to 6.5 feet of the soil profile in uncultivated natural habitats that have not been previously excavated`.

Typically, PG&E preserves topsoil by segregating and windrowing (i.e., soil is stored near the activity site, in the existing ROW). Surface rocks are set aside with the topsoil windrow. PG&E will make every attempt to cover the pipeline by placing a fine grade of soil near the pipe, to avoid large rocks from contacting the pipeline and to achieve proper soil compaction around the pipe. The windrowed topsoil and rocks are groomed over the backfilled trench, leaving a soil surface similar to the adjacent soil. If the excavated material has too much rock for placing around the pipe, a rock-free material is imported by PG&E and placed around and over the pipe to a depth of 1 foot to provide a cushion for the pipeline. Disturbance sites larger than 0.25 acre in natural vegetation are typically broadcast seeded using a weed-free commercial seed mix, as described below under *General AMMs*.

In areas where it is necessary to trench through both the topsoil and subsoil, PG&E uses a two-pass trenching process (i.e. two toning). The first pass removes topsoil, and the second pass removes subsoil. The removed soils (*spoil*) from each of the excavations are placed in separate banks. This technique allows for proper soil-profile restoration after backfilling. Such areas are restored after construction to approximate preexisting topographic contours. Surplus material is used to form an earthen crown over the trench to allow for settlement of the backfill. Excavations and trenches are compacted to specific compaction requirements at each location. PG&E's minimum compaction requirement for backfill in ROWs is generally 85%, but may vary according to industry standards.

In cultivated and improved areas and areas with thin layers of topsoil, it is sometimes necessary to remove and stockpile all topsoil from the disturbed area of the pipeline construction ROW. This stockpiled topsoil is then replaced across the ROW during cleanup activities.

In agricultural areas with drainage tile systems, any tiles that are damaged, cut, or removed during pipeline construction are repaired or replaced to the satisfaction of the landowner. During construction, temporary measures are used to ensure that drainage systems continue to function effectively.

As discussed below in the Opinion section titled *Pre-activity Surveys – Medium/Large Disturbance Activities*, it is the Service's understanding that PG&E will confer with the Service and/or CDFG (see *Confer Process* below*)* prior to implementing a minor-construction covered-activity such as Activity G16, when that construction will occur in areas of natural land-cover and pre-activity surveys (conducted at the appropriate time of the year) indicated that the construction activity cannot completely avoid suitable-habitat for a wildlife covered-species or occupied habitat for a plant covered-species.. Minor-construction activities such as Activity G16 will require the Confer Process if PG&E cannot conduct pre-activity surveys at the correct time of the year to identify presence of a plant covered species when a CNDDB occurrence record is within 200 meters of the activity site.

Pipeline excavations in narrowly-endemic plant occupied-habitat or in any critical habitat. If Activities G11 and G16 cannot avoid occupied-habitat for any "narrowly endemic plant species" or is within a Critical Habitat unit, PG&E will implement the "Confer Process" in advance of implementing the covered activity. An explanation of the "Confer Process, the definition of plant covered-species occupied-habitat, and a list of the HCP "narrowly endemic plant species" are discussed below in the Opinion section titled *HCP Conservation Strategy.*

Cleanup. The final phase of pipeline installation involves cleanup and restoration of the ROW. The presence of the pipe displaces soil, resulting in surplus soil that cannot be returned to the trench. PG&E normally distributes the surplus soil evenly over the ROW. If a property owner objects to this approach, PG&E may deposit the spoil at another location on the owner's property in keeping with the property owner's request, or at a local dumping site. PG&E would dispose of any surplus soil in a manner consistent with covered-species considerations (i.e. PG&E would avoid depositing spoil overland in areas suitable for wildlife species, in areas occupied by plant covered-species, in vernal pool areas, or in other sensitive habitats). PG&E's pre-activity surveys for Activities G11 and G16 will include any lands inside the ROW where surplus spoil would be evenly distributed, any locations on the owner's property where surplus spoil may be deposited or dumped, or any areas where imported landfill will be placed. PG&E would implement all HCP avoidance, minimization, and compensation requirements when depositing surplus spoil or imported landfill. Additional avoidance, minimization, or compensation requirements may be required by a State, Federal, or private landowner. Any PG&E off-site disposal or dumping of surplus spoil would occur only at permitted landfills or dumping sites, as discussed above under *ROW Clearing.*

When quantifying the area of temporary or permanent effects from Activities G11 and G16, PG&E's pre-construction surveys would also include any soil-disposal/soil-distribution areas that are within plant covered-species occupied-habitat or within wildlife covered-species suitable-habitat. Any unavoidable temporary or permanent effects to plant occupied-habitat or wildlife suitable habitat resulting from the disposal of spoil would be quantified by PG&E. These effects would be discussed in the annual report to the Service, and mitigated as discussed in the HCP' s Monitoring, Reporting, and Adaptive Management Program and as discussed below in *HCP Conservation Strategy.*

PG&E would restore the ROW surface by smoothing it with motor graders or disc harrows. If necessary, slopes may be stabilized using earth-filled sacks, rock riprap, or other materials. On cultivated or improved lands, PG&E takes measures to remove rocks and leave the ground surface in a condition satisfactory to landowners. When needed, PG&E installs slope breakers, diversion ditches, or other erosion controls on slopes after installation of the pipeline. These techniques stabilize the soil and channel runoff away from disturbed areas. The surface of the backfilled trench site is groomed, as discussed above under *Trenching, Excavating and Backfilling during Pipeline Minor Construction Activities.* After cleanup and stabilization, disturbance sites larger than 0.25 acre in natural vegetation are typically broadcast seeded using a weed-free commercial seed mix by PG&E, as described below under General AMMs. PG&E completes restoration and revegetation of the construction area to the satisfaction of the landowner. If the new or replacement pipeline crosses US Forest Service (USFS), Bureau of Land Management (BLM), Bureau of Reclamation (BOR), California Department of Fish and Game (CDFG), or land managed by other State, Federal, or private agencies in the Action Area, pipeline construction and revegetation maybe done by PG&E under a special purpose or special use permit issued by that agency. PG&E actions on federally-managed lands may require a separate ESA consultation if listed species are likely to be present at the activity site.

New Pipeline (Activity G16) Crossings Construction. PG&E identified three types of new pipeline crossings that could be constructed over the term of the proposed Permit. Pipeline crossing actions frequently require work within the high-water mark (including in-water work and work in riparian habitats), as discussed below.

- River, Stream, Backwater, and Wash Crossings. River crossing methods vary according to specific river characteristics, such as width, depth, flow, and riverbed geology. All new pipeline-crossing construction will be conducted in accordance with permits issued by USACE. Pipelines that cross major streams and rivers are coated with concrete to provide negative buoyancy and protection from erosion. PG&E may install temporary vehicle crossings for construction traffic only if an existing crossing, such as a bridge, is not available in the vicinity. Temporary vehicle crossings will consist of clean rock fill, culvert bridges, flexi-float, or portable bridges.

- Aqueduct and Canal Crossings. The construction method used for crossing aqueducts and canals is determined by the specific circumstances of each crossing. In most cases, boring is appropriate. Where required or necessary, an aerial suspension system is constructed for the pipeline.

- Fault Crossings. Where geologic studies show a fault or high likelihood of ground rupture, PG&E would design a pipeline crossing which avoids overstressing the pipe in the event of differential movement. The specific design would vary, depending on the type of fault and the likelihood, amount, and consequences of expected fault displacement. Fault crossings could include widening and deepening the pipeline trench to accommodate the anticipated fault displacements, and completely suspending the pipeline in granular bedding material to minimize the resistance of the trench backfill to displacement of the pipe. The pipe is expected to remain fixed relative to movement of the trench as fault displacement takes place. If the axial component of the fault displacement is of concern, using minimum soil and loose, granular backfill over a few hundred feet on each side of the location of displacement may minimize axial restraint.

- Road, Railroad, and Utility Crossings. The open-trench method would be used when crossing roads with light traffic and where permitted by local authorities or owners of private roads. A temporary road detour to the shoulder of the road, or a construction bridge consisting of plating, would be provided for thoroughfares that are trenched. Underground utilities are generally crossed under by boring or by manually exposing the pipe or cable.

Boring, microtunneling, and open trenching are construction methods PG&E typically uses in for pipeline crossings. Three boring methods are used: jack and bore, directional bore, and microtunneling. The method used would be determined by the crossing type, soil type, terrain, and type of facility being installed.

- Jack and Bore. This boring method (also referred to as dry bore) is often used by PG&E to cross major highway systems (all Federal and State highways) and railroads, as well as places where open cuts are prohibited. Each side of the crossing is excavated to accommodate a boring auger. Sacrificial pipe, the same size as the pipe being installed, is typically used as a sleeve for the boring auger. This sleeve is pushed through the soil under the crossing as the auger drills through the soil. The permanent gas pipe is then pushed through, attached to the sacrificial pipe. The pipe is cut in short lengths to accommodate the limited excavation area, then welded to the inserted piece ahead of it and jacked in. If casing pipe is necessary, the same method is used. The casing pipe, sized larger than the carrier pipe, is installed as a sleeve for the boring auger. The gas pipe is then installed through the casing. Cased crossings have vent pipes and cathodic protection, and are appropriately marked.

- Directional Bore. PG&E can bore longer distances using this method than using the jack and bore method. Directional boring is most often used to cross large waterways. No initial excavation is necessary; the tunnel is bored from surface to surface. A registered engineer determines the pipe's maximum angle of deflection. A boring machine is set up on one side of the waterway crossing at the appropriate location. The auger drills at a predetermined angle from the surface elevation toward the crossing; the angle is prescribed to attain the correct depth below the feature being crossed. During boring, a mud solution, typically bentonite, is pumped into the tunnel to maintain its shape and integrity. This solution also reduces friction during installation of the pipeline. The pipeline is pulled through the tunnel by the boring machine. The mud solution is pumped into a truck as the pipeline displaces it.

Once the pipeline is installed, both ends are excavated and cut off at the appropriate depth to match the rest of the pipeline. The mud solution is hauled off-site and disposed of appropriately, as discussed above under *Pipeline ROW Clearing Activities.*

- Microtunnel. This method often is used in extremely wet conditions where it is necessary to control the amount of soil being removed as the boring head progresses. Each side of the crossing is excavated to accommodate the boring equipment (a jetting head and suction equipment). The jetting head is attached to the pipe being installed. The jetting head contains multiple high-pressure water jets. Water forced through these jets dislodges the soil as the head is pushed, and the pipe is installed behind it. Suction equipment controls the amount of soil being removed to accommodate the forward progress of the jetting head and pipeline. Only the amount of soil displaced by the pipeline is removed. Water used during this process will be captured and disposed of according to regulatory requirements and local water quality considerations, as discussed above under *Pipeline Hydrostatic Testing.* PG&E will obtain necessary water quality permits, and use its water quality BMPs when disposing of water to avoid direct or indirect effects to Covered Species.

- Open-Trench Waterway Crossings. If the open-trench technique were used by PG&E for river crossings, a trench would be opened in the streambed using backhoes, backhoes on barges, clamshells, or draglines, depending on the streamflow characteristics. Flow is maintained at all water crossings during construction. At large rivers, spoil removed from the trench would be stockpiled out of the water or on the downstream side of the trench. The pipeline is placed at least 6 feet below scour depth. A plug of unexcavated soils is left at each bank of the stream or river crossing to preserve the integrity of the streambank. These plugs are not removed until necessary for installation of the pipe. The entire length of pipe for the crossing is assembled as a unit, tested, then placed in the trench. After installation, the trench and the stream bank are backfilled, stabilized, and restored to approximate preconstruction contours.

PG&E expects to install one replacement pipeline (Activity G11) and five new pipelines (Activity G16) each year, (30 replacement and 150 new pipelines over the term of the 30-year Permit, respectively). Each new or replacement pipeline length is limited to one mile, and each one mile of Activity G11 or G16 pipeline work would disturb a 100-foot wide corridor along the pipeline, totaling 12.12 acres of land-cover disturbance per Activity G11 or G16 event. In total, the clearing, grading, trenching, excavating, and crossing techniques used to install new or replacement pipeline would disturb 72.7 acres of land-cover per year, or 2,182 acres over the 30-year term of the proposed Permit. PG&E expects most pipeline-construction sites will be accessible by existing access roads, but off-road travel by light trucks may be required for about 5% of events, and it is assumed that a 10-ft-by-1,000-ft area is temporarily affected on average by off road travel.

Electrical System Covered Activities. PG&E's electrical system consists of a transmission system and a distribution system. The high-voltage transmission lines transport power from electrical generation plants to switching stations or substations, which transform the electricity down to 21,000 or 12,000 volts for the distribution system. The distribution lines then carry the lower voltage power to industries, businesses, and homes. The distribution lines are installed

either underground or on the overhead wooden poles typically found along highways and streets. There are approximately 15 poles per mile of distribution lines. Transformers mounted on the wooden poles further reduce the voltage for normal household use. There are approximately 4,588 miles of high-voltage transmission lines, 89 switching and substations, and approximately 17,713 miles of distribution lines are presently in the action area.

The 4,588 miles of transmission lines in the action area operate at 500,000, 230,000, 115,000, 70,000 or 60,000 volts. An additional 60 miles of transmission lines/transmission line supports may be constructed under the proposed action to provide electricity to new subdivisions and new businesses over the 30-year Permit term (see Activity E13). The 500,000 and 230,000 transmission voltages are carried by conductors (wires) supported on steel-lattice towers or tubular steel poles. Transmission voltages (115,000, 70,000 or 60,000 volts) are carried by conductors (wires) supported by steel towers, tubular steel poles, or wood poles. The in-line spacing of these transmission line support-structures varies. Insulators are positioned between transmission-line support-structures and the conductors (wires) to support and to isolate energized conductors from grounding. Insulators for transmission voltages are primarily ceramic; however, non-ceramic insulators, made of fiberglass rods and rubber shrouds, are also used. PG&E washes the ceramic insulators periodically to reduce the risk of electric faults caused by conductive airborne particles that settle on insulators, providing an electrical path across the insulators. Non-ceramic insulators tend to perform better in areas prone to airborne particle contamination. The height of conductors (wires) above the ground also varies according to topography and the design of the transmission system. Generally, conductors (wires) on 500,000 and 230,000-volt transmission-lines maintain a minimum of 30 feet above the ground. ROWs under the 4,588 miles of transmission lines vary in width depending on the system voltage, number of lines per ROW, terrain, and other factors. The average ROW width under transmission lines is 250-feet. The transmission line ROWs generally include a wire zone and a border zone. The wire zone is the width of the area directly beneath the transmission wires plus 10 feet on either side. The border zone extends from the wire zone to the edge of the ROW. Transmission line ROWs generally occur within easements that PG&E negotiated with private landowners or the holders of public lands. PG&E owns less than 1% of their ROWs in fee title; the remainder is in easements.

The 89 switching and substations are typically located close to residential, commercial, or industrial development and encompass from a q0.25-acre to 0.5-acre maximum. Substation sites are graded, paved, or surfaced, and fenced for safety and security reasons. PG&E estimates that 30 substations may each be expanded up to 0.5 acre under the proposed action to allow for additional transformers, new distribution-line outlets, and new fencing over the 30-year Permit term (see Activity E14).

The electrical distribution system provides the links between the transmission system and most PG&E customers. The distribution system includes primary and secondary distribution lines delivering electricity and distribution transformers that reduce voltage from distribution to utilization levels. Approximately 17,713 mapped miles of primary and secondary distribution lines are within the action area. PG&E estimates that an additional 900 miles of distribution lines may be constructed under the proposed action to provide electricity to new subdivisions and new businesses over the 30-year Permit term (see Activity E11). The p*rimary distribution* lines

carry three-phase AC power in the 2,000-volt to 50,000-volt range to street rail and bus systems, as well as industrial and commercial customers. *Secondary distribution* lines serve most residential customers with 120/240 volt, single-phase, three-wire service, which provides electric power for most appliances. Secondary distribution transformers can further reduce voltage to the required secondary voltage at or near a customer's service connection. Primary and secondary distribution conductors (wires) are supported on wood or tubular steel poles. The height of distribution conductors (wires) above the ground varies according to topography. The ROW widths for the distribution lines vary according to the system voltage, terrain, and other factors. The average ROW width under distribution lines is 25 feet (HCP Table 1-1). The distribution system also includes components that regulate system voltage or protect the system from power irregularities. For example, circuit breakers disconnect major feeder lines when a system fault or overload occurs, and surge arresters divert high-voltage surges caused by lightning.

Access. As in the natural gas system, PG&E would access their electrical system ROWs and facilities by using existing public and private existing roads to the maximum extent possible. PG& E is seeking coverage for use of public and private roads. However, because the length of the existing electric facilities (22,301 miles) is greater than that of the existing gas facilities (9,880 miles), and these electrical facilities occur more frequently in remote areas, additional cross-country travel or construction of new temporary access roads may be necessary to access the existing electrical system. No accurate information is available to estimate either the need for construction of new temporary roads or the frequency of off-road or cross-country travel for the electrical Covered Activities.

PG&E estimates that approximately 5% of the 166,123 annual electrical-O&M events (about 8,306 events per year) would require access by cross-country travel or the construction of new temporary access roads. In addition, approximately 10% of the 32-annual Activity E12 and E13 minor-construction events (3 or 4 times per year) would require access by cross-country travel or construction of new temporary access roads.

PG&E estimates that the average length of each cross-county travel event (or each new temporary access road) would be approximately 1,000-feet. However, the estimated length of each cross-country travel/temporary access road for the 225-annual Activity-E9 events (line reconductoring) is approximately 2 miles (10,560 feet). In total, approximately 2,020 miles of cross-country travel/temporary access-road construction may occur each year (approximately 60,630 miles over the 30-year Permit term) as PG&E accesses their electrical facilities in the San Joaquin Valley.

Clearing - Electric ROWs. PG&E would clear electric ROWs when necessary for electrical system maintenance or minor construction as described above for clearing gas pipeline ROWS. Wood chips, vegetation and debris will be disposed of as described above for clearing pipeline ROWs. Use of off-site landfills, dumps, or disposal sites will be as described above for pipeline ROWs. PG&E's clearing of ROWs conform to landowner agreements. PG&E will implement the species avoidance, minimization and conservation requirements of the HCP when clearing ROWs in the Action Area, but additional avoidance, minimization, or conservation requirements may be required by the State, Federal, or private landowners. When PG&E pipelines cross US Forest Service (USFS), Bureau of Land Management (BLM), Bureau of Reclamation (BOR),

California Department of Fish and Game (CDFG), or land managed by other State, Federal, or private agencies in the Action Area, ROW clearing maybe done by PG&E under a special purpose or special use permit issued by that agency. PG&E actions on federally managed lands may require a separate ESA consultation if listed species are likely to be present at the activity site.

PG&E would use their *Best Management Practices (BMPS) for Mechanical Clearing of Electric Transmission and Distribution ROWs* (HCP Table 4-8) and their *General Best Management Practices (BMP) for PG&E Vegetation Management Activities* (HCP Table 4-7 and Table 2a below) during ROW clearing activities. BMP-1 in HCP Table 4-8 requires "all vegetation cut from the area shall be removed and mulched to depth not greater than 12 inches". Likewise, BMP-2 states "vegetation that is mowed shall be mulched to a depth not greater than 18 inches". It is the Service's understanding that PG&E implement BMPs 16-18 from Table 2a (HCP Table 4-7) to avoid conducting mulching activities in 1) habitat occupied by plant covered-species, 2) within designated Critical Habitat, or 3) in wildlife covered-species suitable-habitat. If mulching inadvertently occurs inside areas occupied by a narrowly-endemic plant covered-species, PG&E shall discuss the loss of habitat for that plant species with the Service using the *Confer Process,* explained below. Any temporary or permanent effects to wildlife covered-species suitable-habitat will be quantified by PG&E and compensated as discussed below under *Compensation Approach*

Vegetation Management and Access Road Maintenance on the Electrical System (Activity E10)
Public and private existing roads are used to access the electrical facility ROWs to the maximum extent possible. Electrical facilities frequently occur in remote areas. PG&E vehicles would travel cross-country or PG&E may infrequently construct new temporary access roads when no existing road is available to access the ROW. In association with ROW vegetation management, PG&E will maintain unsurfaced access roads to permit vehicular passage. Maintenance of unsurfaced access roads is usually limited to blading the road and may occasionally require import of fill or riprap. In total, approximately 2,020 miles of cross-country travel/temporary access-road construction may occur each year (approximately 60,630 miles over the 30-year Permit term) to access electrical facilities. PG&E maintenance of unsurfaced access-roads could occur in any HCP land-cover type.

Activity E10a - Routine Vegetation Maintenance on Distribution and Transmission Lines.
PG&E would perform approximately 373 routine vegetation management actions under overhead distribution and transmission wires each year. Approximately 280 of these actions would be under electric distribution lines, and 93 would be under transmission lines. Activity E10a would occur primarily in tree-dominated HCP land-cover types (Blue Oak Woodland, Blue Oak/Foothill Pine, Coastal Oak Woodland, Conifer, Montane Hardwood, Valley Oak Woodland, Woody Riparian, and Upland Scrub), but could occur in other HCP land-cover types. PG&E estimates that 20% of ROWs in these HCP land-cover types would require pruning each year. Pruning or trimming is repeated at a 3-year interval. Routine vegetation management actions maintain compliance with Public Resource Code Section 4293, NERC standard FAC-03, and CPUC General Order 95, Rule 35. These regulations identify, by voltage, specific clearance distances that must be maintained between vegetation and energized conductors (wires). Activity E10a includes an annual patrol of all overhead transmission and distribution facilities, trimming or removal of tree branches that will not remain in compliance until the next year's patrol, and trimming or removal of hazard trees as defined in the Public Resource Code. The

area of pruning or trimming is based on width and length of different line types in woody land cover. Clearance distances around conductors range from 4 feet to no less than 10 feet. PG&E returns regularly to prune vegetation in the same sites, which maintains vegetation in the site in the existing condition. PG&E considers this vegetation disturbance to be diffuse and of low intensity. Hazard tree removals for routine maintenance generally involve individual trees or small groups of trees encompassing less than 0.1 acre per event on an annual basis. Hazard tree removal is based on height and life span of dominant tree species. The HCP assumes that no more than 25% of the existing-canopy dominant trees will ever be identified as hazardous during their lifetime. Stump profiles of any cleared trees would be kept as low as possible. Stumps and tree roots are not removed from the ground. Because Activity E10a does not disturb land-cover, PG&E typically would not conduct pre-activity surveys, except in areas of HCP Appendix I wildlife designated-occupied habitat (HCP Table 4-6). PG&E vegetation management crews will use the vegetation management BMPs identified on HCP Table 4-7 and HCP Table 4-8 while conducting Activity E10a. PG&E will also use the Map Book and the subsequent GIS/SAP system to avoid occupied habitat for plant-covered species while accessing Activity E10a work sites. An explanation of the Map Book and a definition of plant covered-species occupied-habitat are discussed below in the Opinion section titled *HCP Conservation Strategy*. About 95% of the electrical system length is accessible from existing roads, and for the remaining 5%, it is assumed that a 10-ft-wide corridor is crossed by trucks once every 3 years. PG&E estimates that approximately 616 acres would be crossed by access trucks to implement Activity E10a each year (18,480 acres over 30 years).

Activity E10b - Pole Vegetation Clearing. PG&E would perform approximately 100,000 routine vegetation clearings around poles and towers each year in compliance with Public Resource Code Section 4292. Activity E10b would occur in all HCP natural land-cover types. Activity E10b pole clearing would not occur in State Responsibility Areas where local fire departments provide fie protection. Public Resource Code Section 4292 requires that poles with nonexempt equipment (e.g., switches, lightening arrestors) be maintained clear of all woody or herbaceous vegetation that could propagate a fire for a radial distance of 10 feet from the pole/tower; all dead limbs and foliage in that cylinder must be cleared to the height of the conductor (wire). Approximately 0.009 acre (392 square-feet) of vegetation capable of propagating a fire is cleared around the base of each pole. In some cases, due to vegetation regrowth, it is necessary to clear a pole more than once during a season. The annual clearing of vegetation around each pole maintains the existing vegetation clear-zone, and does not effect the habitat-baseline existing at each pole site. Therefore, PG&E would typically not conduct pre-activity surveys for Activity E10b, except in areas with HCP Appendix I wildlife designated-occupied habitat (HCP Table 4-6). PG&E vegetation management crews use the vegetation management BMPs from HCP Table 4-7 and HCP Table 4-8 in the course of their fieldwork for Activity E10b. About 95% of the pole/tower system length is accessible from existing roads, and for the remaining 5%, it is assumed that a 10-ft-wide corridor (0.023 acre) is crossed by trucks. PG&E estimates that approximately 2,252 acres would be crossed by access-trucks annually to maintain pole and tower clear-zones.

Activity E10c - Tree Removal Projects. When appropriate, considering tree species, growth rates, site conditions, and landowner permission, PG&E hand-crews remove select trees at overhead distribution and transmission facilities in conjunction with routine maintenance. The

HCP states that tree removals for this category generally are intended to minimize fire hazards and include removing more than 0.1 acre of trees (HCP page 2-24). Activity E10c tree-removal projects are medium disturbance activities. Tree removals have a potential to affect wildlife and plant covered-species occupying the tree-removal site. HCP Table 4-6 indicates that PG&E would not conduct pre-activity surveys of Activity E10c sites, even when activities are to occur in wildlife designated occupied habitat. Instead, PG&E vegetation management crews would use the vegetation management BMPs identified in Table 2a (HCP Table 4-7) and HCP Table 4-8 in the course of their fieldwork, including Activity E10c. It is the Service's understanding that PG&E will use the vegetation-management BMPs from HCP Table 4-7 Table 4-8 to avoid effects to plant covered-species occupied-habitat. A definition of plant covered-species occupied-habitat is presented below in the Opinion section titled *HCP Conservation Strategy*. As discussed above under *Clearing-Electrical ROWs*, PG&E will avoid conducting the BMP-1 and BMP-2 mulching activities (HCP Table 4-8) that may deposit mulch or wood-chips in plant covered-species occupied-habitat. If occupied habitat for a narrowly-endemic plant covered-species cannot be avoided under Activity E10c, PG&E will first discuss the activity with the Service, as explained below in the Opinion section titled *Confer Process*.

PG&E would perform approximately 30 tree removal projects each year in the action area. The HCP assumes that approximately 10 percent of the existing vegetation would be disturbed at each site, and calculates that each tree-removal action would temporarily disturbing 0.1 acre at a worksite. . The HCP estimates that a total of 3 acres in the action area would be temporarily disturbed each year from Activity E10c tree removal actions. Off road travel by light trucks would be required for about 5% of tree removal projects, and it is assumed that a 10-ft-by-1,000-ft area is affected on average for each off road travel.

Activity E10d – Transmission ROW Vegetation Maintenance. PG&E manages incompatible vegetation inside transmission line ROWs with an Integrated Vegetation Management (IVM) program. The long-term goal of the IVM program is to convert tall-growing plant communities inside a transmission ROW to low-growing plant communities. PG&E accomplishes such conversions by selectively removing incompatible 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 ROW and suppress the growth of the tall-growing vegetation, thereby reducing the need for future treatments. It is the Service's understanding that Activity E10d vegetation-maintenance would primarily occur in HCP land cover types dominated by trees and shrubs (Blue Oak Woodland, Blue Oak/Foothill Pine, Coastal Oak Woodland, Conifer, Montane Hardwood, Valley Oak Woodland, Woody Riparian, and Upland Scrub), and is not expected to occur in Grassland or Wetland cover-types. Of the 4,588 miles of existing electric transmission lines, approximately 281 miles are in tree and shrub dominated land-cover types. In addition, approximately 60 miles of new electric transmission lines will be constructed as part of the proposed action (see Covered Activity E13 below). Approximately 3.7 miles of the new electric transmission lines expansions are expected to be constructed (and new ROWs maintained) in tree or shrub dominated land-cover types where Activity E10d would occur.

A hand crew of PG&E personnel (typically contractors) would first clear a transmission ROW of incompatible woody vegetation by manual or mechanical methods. It is the Service's

understanding that PG&E would remove large diameter woody vegetation with chainsaws, and other vegetation would be removed using cutters, mowers, brush hogs, hydro-axes, Brontosauruses, Slashbusters, brush rakes, or hand tools. Generally, remaining vegetation is less than one foot in height. After the initial clearing, PG&E would monitor the transmission ROW during the annual inspection (Activity E2) for resprouting and reinvasion by incompatible plant species. When resprouting or reinvasion occurs, PG&E would selectively remove incompatible plant species and manage the ROW vegetation to achieve the desired zoned outcome, using the same equipment and methods. The average ROW width under transmission lines is 250 feet (HCP Table 1-1). The wire zone, which comprises the ROW area directly beneath the transmission wires plus 10 feet on either side, is managed only for low-growing shrub-forb-grass plant communities (early successional), usually to establish a vegetation height of 1 foot. The border zone, which extends from the wire zone to the edge of the ROW, is managed for taller shrubs and brush communities (transition communities). Vegetation may reach a height around 10-feet, depending on site specifics. Tree species are removed from wire zones and border zones. Approximately 50 percent of the vegetation existing in the activity site would be disturbed. Each E10d action would disturb approximately 2.12 acres (i.e. a 369-foot length of the average-width transmission-ROW)

Activity E10d is a large-disturbance activity. It has the potential to permanently affect plant covered-species occupying IVM activity sites, and has the potential to temporarily affect wildlife habitat in IVM activity sites. HCP Table 4-6 indicates that PG&E would not conduct pre-activity surveys of Activity E10d sites, even when activities are to occur in wildlife designated-occupied habitat. Instead, PG&E vegetation management crews will implement the *General Best Management Practices for PG&E Vegetation Management Activities* (Table 1 or HCP Table 4-7) and the *Best Management Practices for Mechanical Clearing of Electric Transmission and Distribution Right of Ways* (HCP Table 4-8) in the course of their work, including Activity E10d. Vegetation management BMPs 12 through 18 from HCP Table 4-7 and other avoidance measures will occur with all E10d actions. These BMPs and avoidance measures include:

- Prior to any ROW clearing project or any enhancement project, qualified PG&E vegetation management professionals shall check the most recent edition of the CNDDB for records of plant and animal covered-species inside the E10d activity site (wire zone, border zone, and in the IVM access roads or access areas). If covered-species records are identified, the vegetation management professional will contact the HCP Administrator for biological support.
- Any locations identified through the CNDDB search shall be flagged and appropriate avoidance measures shall be put in place. It is the Service's understanding that if a plant covered-species occupies the work site or access area, a qualified biologist will stake and flag exclusion zones of 100 feet around the occurrence-polygon boundary prior to IVM activities. Work crew tailboard sessions shall be held before work begins.
- Sensitive habitats such as meadows, riparian areas, serpentine outcrops, and vernal pools shall be flagged, and appropriate avoidance measures shall be put in place. Work crew tailboard sessions shall be held before work begins.

As discussed above under *Clearing-Electrical ROWs*, PG&E will avoid occupied-habitat for plant-covered species while conducting BMP-1 and BMP-2 mulching-activities (HCP Table 4-8). If any occupied habitat for a narrowly-endemic plant covered-species cannot be avoided under Activity E10d, PG&E will discuss the activity with the Service prior to commencing, as explained below in the Opinion section titled *Confer Process*.

The use of herbicides and pesticides is not a covered activity under this HCP.

PG&E would conduct 30 transmission-line ROW vegetation management actions each year, temporarily disturbing approximately 64 acres/year (1,908 acres over the term of the proposed Permit). Off road travel by light trucks for Activity E10d would be required for about 5% of transmission line IVM events, and it is assumed that a 10-ft-by-1,000-ft area is affected on average for each off road travel.

Patrols and Inspection of Electrical System (Activity E1, E2)
PG&E personnel conduct ground patrols of the transmission lines and associated facilities on a quarterly to 18-month cycle, using either light trucks or ATVs on existing access and existing ROW patrol roads. Electrical distribution lines are typically patrolled for electric maintenance issues (not including vegetation issues) every 3 years. Vegetation management personnel conduct annual patrols of all transmission and distribution lines using vehicles and ground patrols. Electric meters are read during routine ground patrols. PG&E conducts aerial patrols of certain transmission lines, distribution lines, and associated facilities on both a scheduled and as-needed basis (emergency patrols) using helicopters. When power outages and CPUC Reportable Incidents occur because of weather, accidents, equipment failure, or other reasons, PG&E inspects transmission and distribution lines to determine the location and probable cause of the outage. PG&E accesses lines by existing roads or cross-country in vehicles or on foot. Patrols of electrical facilities do not disturb land-cover, and pre-activity surveys will not be conducted.

PG&E routinely inspects tower footings and poles to verify stability, structural integrity, and condition of equipment (e.g., fuses, breakers, relays, cutouts, switches, transformers, paint). PG&E accesses footings and poles by vehicles using existing roads or cross-country in vehicles or on foot. PG&E conducts routine inspections of telecommunication attachments on electrical system towers monthly unless problems are identified at specific sites. Access is by light truck on existing access and power-line right-of-way roads, or by helicopter. Inspections of tower footings and poles do not disturb land-cover, and pre-activity surveys will not be conducted.

PG&E conducts regular inspections of underground distribution facilities, instrumentation and control, and support systems. All above ground components are inspected at least annually for corrosion, equipment misalignment, loose fittings, or other common mechanical problems, and the underground portion of the lines are inspected at vault locations on an annual basis. Inspections of underground facilities are performed using existing roads, off-road using rubber-tired vehicles, or on foot, and do not disturb land-cover.

All 89 switching and substations are inspected monthly. Equipment operation is verified and safety inspections conducted. All substations are accessed by existing roads in vehicles. PG&E staff periodically conduct land surveys of facilities and facility ROWs. Access is by light truck

on existing roads and may include cross-country or pedestrian travel of survey areas. Inspections of switching and substations and land surveys do not disturb land-cover, and pre-activity surveys will not be conducted.

Disturbance from patrols and inspections of the electrical system (Activity E1 and E2) consists of off-road travel by light trucks, ATVs, or on foot. Approximately 95% of system length is accessible by existing roads or is patrolled on foot or by helicopter. It is assumed that an average width of 5 ft is disturbed by vehicles during off-road travel, and that 33.3% of distribution lines and 87.5% of transmission lines are patrolled per year.

Electrical Insulator Washing (Activity E3)
PG&E periodically washes ceramic insulators on electric power lines to prevent faults. PG&E personnel wash insulators from existing roads using a truck- or trailer-mounted spray system, or by helicopter. Distilled water, typically from local sources, is used to wash the insulators; dry washing, using ground corn hulls, is also done. Washing is typically carried out while the power lines are operating. PG&E estimates that two insulators washing activities occur each year. PG&E activities involving water use and disposal are conducted in compliance with current regulatory requirements. PG&E will obtain any necessary water quality permits, when conducting Activity E3 in Wetland or Riparian land-cover types. Activity E3 would not disturb land-cover because insulators are washed from existing roadways by a truck- or trailer-mounted spray system, or by helicopter. Activity E3 would not have a pre-activity survey, except when HCP Appendix I wildlife designated-occupied habitat is present in the activity site (HCP Table 4-6).

Electric Substation Maintenance (Activity E4)
Typical major maintenance tasks at the 89 switching and substations include transformer, switch, fuse, cutout, meter, and insulator repair and replacement. Work occurs inside existing fences and does not disturb land surfaces. No pre-activity survey would be conducted inside the existing fences. Switching and substations are accessed by using existing roads. PG&E estimates that one substation maintenance event would occur each year

Occasionally, maintenance of substation systems requires minor construction. Load demands may require modifications of station equipment or installation of new facilities. These construction activities could require use of station property or adjacent property for construction staging, materials storage, permanent facilities, or land management. If construction staging, materials storage, or construction of permanent facilities, or any land-management will occur outside of the existing substation fencing, PG&E shall conduct a pre-activity survey on that area, as described below under Activity E14.

Electrical System Outage Repair (Activity E5)
Outages are typically caused by weather, equipment failure, accidents, fire, or bird electrocution. PG&E estimates that 4,000 outage repairs will occur in the action area each year. When an outage is reported, PG&E patrols the line until the cause of the outage is determined. Access to the line is primarily on existing roads, although some off-road access with rubber-tired vehicles is expected. Depending on the cause of the outage, repair may entail anything from re-closing a switch to replacing a transformer or pole as discussed below. PG&E estimates that each outage

repair would temporarily disturb 0.115 acre, or a total of 45.92 acres temporarily disturbed per year (13,776 acres disturbed over the Permit term). Electrical system outage repair is a medium disturbance; however, pre-activity surveys cannot be done prior to these emergency activities. Off-road travel by light trucks may be required for about 5% of outage events, and it is assumed that a 10-foot-by-1,000-foot area is affected on average.

Trans System Repair and Facility Installations, including Shoo-Flies (activity E7)
Poles, towers and associated equipment (e.g., anchors, cross arms, insulators, wires, cables, guys, switches) need to be replaced or repaired by PG&E when they fail or become unsafe. Installation of a temporary support system (shoo-fly) would be required for these actions, or for new additions to existing transmission line facilities (Activity E13) or for tap lines from the old facilities. Shoo-flies consist of a number of poles and anchors supporting conductors (wires) to bypass the facilities needing repairs or upgrades. In some cases, existing conductors can be removed from the old poles or structures and reattached to the shoo-fly structures. In most cases, this can be accomplished with one to two poles for every circuit attached to the structure being shoo-flied. For example, one double-circuit 115,000-volt tower (6 wires attached) would require a minimum of four poles installed. Shoo-fly supports are removed when complete. PG&E estimates that they will require use of shoo-flies 100 times each year. The work area required for each shoo-fly is typically 25 by 100 foot (0.06 acre), with a total of 5.74 acres temporarily disturbed each year. Covered Activities requiring shoo-flies include Activities E6, E8 (small disturbance activities), and E9 (large disturbance activity), which are discussed below. Off-road travel by light trucks may be required for about 5% of shoo-flies, and it is assumed that each off-road travel affects a 10-foot-by-1,000-foot area. Shoo-flies are a small-disturbance activity and a pre-activity survey would not be conducted for Activity E7 except when wildlife designated-occupied habitat is present in the activity site (HCP Table 4-6). PG&E will use the Map Book Process for Small Disturbance Activities to avoid occupied habitat for narrowly-endemic plant-covered species at Activity E7 sites. An explanation of the Map Book Process For Small Disturbance Activities, and a definition of plant covered-species occupied-habitat are discussed below in the Opinion section titled *HCP Conservation Strategy*.

Electrical System Tower Replacement or Repair (activity E6)
Transmission tower replacement or repair typically involves strengthening the tower foundations, strengthening the tower superstructures, or raising the tower. PG&E estimates that they would replace or repair 360 towers each year in the action area.

To strengthen tower foundations, PG&E personnel break away concrete from the existing tower footings to expose the steel reinforcements. PG&E pours a new/replacement concrete footing, called a grade beam, between each existing footing. Tower superstructures are typically strengthened by replacement, modification, or addition of pieces of steel lattice, as determined by engineering analysis specific to each tower. Tower telecommunications attachments are typically made by clamping apparatus and cables directly to the tower superstructure.

PG&E raises towers by adding vertical leg extensions to the base of the tower using the existing footings or foundations, or by adding extensions just below the tower cross arms at the "cage" of a tower. Adding vertical leg extensions requires lifting the tower. PG&E personnel drive a tower lifter beneath the tower, and clamp its four arms to the tower legs. The legs are then

unbolted from the tower footings, the tower is lifted, and leg extensions are installed. However, a tower lifter can be used only on level ground. Where a tower lifter cannot be used, PG&E uses a crane to hoist the tower. Temporary wood pole support(s) (shoo-fly) are constructed adjacent to the tower to support the conductors (wires) while the crane lifts the tower. The tower leg extensions are then installed, the conductors reattached to the tower, and the temporary wood pole supports are removed. The second method for raising towers entails installing the extension at the tower cage and using a crane to hoist the tower. The tower cage is near the top of the tower, just below the cross arms. PG&E first grades an area of about 25 by 40 feet immediately adjacent to the tower to serve as a level crane pad (if an existing pad is not already present at the tower site). PG&E constructs temporary wood pole supports adjacent to the tower to support the conductors (wires) while the crane lifts the tower. The tower extension is then installed, the conductors replaced, and the temporary wood pole supports removed. Other minor tower repairs include accessing facilities to replace fuses, breakers, relays, cutouts, switches, transformers, and paint.

PG&E estimates that each tower repair would temporarily disturb a 10-by-40 feet area from the crane footprint and a 25-by-100 work area, or approximately 0.08 acre. PG&E estimates that tower repair or replacements would temporarily disturb 28.93 acres per year. Off-road travel by light trucks may be required for about 5% of tower repairs, and it is assumed that each off-road travel effects a 10-foot-by-1,000-foot area. Activity E6 is a small-disturbance activity and a pre-activity survey would not be conducted for Activity E6, except when HCP Appendix I wildlife designated-occupied habitat is present in the activity site (HCP Table 4-6). PG&E will use the Map Book Process For Small Disturbance Activities to avoid occupied habitat for narrowly endemic plant-covered species at Activity E6 sites. An explanation of the Map Book Process For Small Disturbance Activities and a definition of plant covered-species occupied-habitat are discussed below in the Opinion section titled *HCP Conservation Strategy.*

Electrical System Pole and Equipment Replacement and Repair (activity E8)
Poles and equipment (e.g., cross arms, insulators, pins, transformers, wires, cables, guys, anchors, switches, fuses, paint) must be replaced or repaired when they fail, become unsafe, or are identified for replacement as part of PG&E's Migratory Bird Protection Program. PG&E estimates that 60,000 pole replacements or repairs would occur each year in the action area. Replacement and repair of equipment on the pole is typically performed with the pole in place, using a line truck.

When pole replacement is warranted, the new pole is constructed adjacent to the existing pole to minimize ground disturbance. The new pole would be placed in the 10-foot radius vegetation "clear-zone" already existing around the old pole (see Activity 10Eb). To replace a pole, the line is de-energized. The new pole is framed (i.e., cross arms, pins, insulators, grounds, bonding, markers, and any equipment are installed) before being set. PG&E would excavate pole holes and any necessary anchor holes using a machine auger and line truck. When poles are installed, they are installed with an auger drill slightly larger than the pole; very little ground disturbance is needed. The width and depth of the hole depends on the size of the pole, soil type, span, and wind loading. Typically, minimum pole setting depths range from 4 to 14 feet. After the new pole is set, the conductors are moved to the new pole. PG&E may leave the butt of the old pole in place to minimize the amount of ground disturbance. PG&E's general practice is to leave the

butt of the old pole in place in grassland areas that contain a high density of burrows. The burrowing species will vary by region and could include common species like ground squirrel burrows, or covered species like western burrowing owl or blunt nosed leopard lizard. In some instances, such as burrow presence, a PG&E estimator may call for a biologist. If the old pole is removed, PG&E typically uses a boom truck to wiggle and pull the pole out of the ground. Occasionally PG&E may excavate a 5x5 area surrounding the pole to average depth of 8 feet; the soil is set aside, the old pole is removed, and the soil is returned to the hole.

PG&E estimates that each of the 60,000 annual pole and equipment replacement or repairs would temporarily disturb a 20-by-70 area (1,400 square-feet, or 0.032 acre) adjacent to the existing pole. Approximately 392 square-feet (0.009 acre) of that disturbance area would be inside the "vegetation clear-zone" surrounding the old pole, which has little habitat value. Therefore, the 60,000 replacements and repairs would temporarily disturb 1,920 acres each year (57,600 acres in the 30-year Permit term). Off-road travel by light trucks may be required for about 5% of pole repairs (3,000 per year), and it is assumed that each off-road travel affects a 10-ft-by-1,000-foot area (660-acres).

Electrical System Pole and Equipment Replacement and Repair (Activity E8) is a HCP "small disturbance" activity. Table 4-6 indicates that Activity E8 typically would not have pre-construction surveys, except when HCP Appendix I wildlife designated-occupied habitat is present. It is the Service's understanding that PG&E will utilize the PG&E Map Book-Process for Small Disturbance Activities to avoid or minimize effects to occupied-habitat of any narrowly-endemic plant covered-species that maybe present at Activity E8 pole replacement sites. An explanation of the Map Book Process for Small Disturbance Activities and a definition of plant covered-species occupied-habitat are discussed below in the Opinion section titled *HCP Conservation Strategy*.

Electric Line Reconductoring (activity E9)

New conductors (wires) are typically installed in 2-mile sections by temporarily splicing them to the ends of the existing conductors and pulling them through travelers (pulleys) attached to the arms of the towers or pole cross arms. Travelers are installed at each tower or pole using a boom truck. Where a boom truck cannot be used, a winch is used to install the travelers. In some limited cases, the conductors would be installed by helicopter. PG&E estimates that 225 electric line reconductoring actions would occur each year in the action area.

This reconductoring is conducted with a tension site and a pull site for each 2-mile section. At the pull sites, a truck- or trailer-mounted bull-wheel puller, a small truck- or trailer-mounted crane, and rewinders with collapsible reels are used to pull the conductors through the travelers. Truck-mounted tensioners, small cranes, conductor reel trailers, and conductor reels are used to tension the conductors. Approximately 1/3 of the reconductoring actions would require 200-ft-by-300-ft tension and pull sites, and 2/3 of the reconductorings would require 50-ft-by-150-ft sites. Historical pull and tension sites would be utilized where possible.

Before pulling the conductor, shoo-fly structures are installed at road crossings and other locations (where necessary) to prevent conductors from contacting existing electric or

communication facilities or passing vehicles. These temporary shoo-fly structures consist of wood poles as discussed above, and occasionally, a support net stretched beneath the conductors.

After the conductors (wires) are pulled into place, they are tensioned by pulling them to a predetermined sag and tension. The new conductors are then permanently attached to the insulators and existing conductors.

PG&E estimates that preparing reconductoring tension and pull sites would temporarily disturb approximately 0.574 acre for each reconductoring action, or 129.15 acres total each year. Electric line reconductoring is a large-disturbance activity, and a pre-activity survey will be conducted when Activity E9 occurs in a natural land-cover type. If occupied habitat for a narrowly-endemic plant covered-species cannot be avoided under Activity E9, PG&E will discuss the activity with the Service prior to commencing, as explained below in the Opinion section titled *Confer Process*. After the activity is complete, disturbance sites larger than 0.25 acre in natural vegetation are typically broad-cast seeded using a weed-free commercial seed mix, as described below under *General AMMs*. PG&E may require off-road travel to approximately 5% of the 225 annual reconductoring events (approximately 13 events), and it is assumed that a 10-ft-by-2-mi area would be affected on average during each off-road travel event, or 16 acres annually.

Wood Pole Test and Treat Remedial Maintenance (Activity E11)
PG&E evaluates all wood transmission poles that are 10 or more years old to determine if they are suitable candidates for replacement, trussing, stubbing, or fiber wrapping. Transmission line segments are identified for testing based on age and condition. PG&E estimates 60,000 poles would be tested and treated each year in the action area.

Twenty inches of soil are excavated around the pole and a minimum of three 9/16-inch holes are bored at 45° angles to the axis of the pole. Each successive boring is 120° to the right and 12 inches above the previous bore. The shell thickness and circumference of the pole is used to determine if the pole is a candidate for replacement or trussing. After a review of all information, PG&E staff determines if the pole will be replaced, stubbed, or trussed. Stubbing and trussing entail driving or setting a short steel truss or wood pole into the ground and attaching it to the existing pole to provide the support originally afforded by the pole butt. Wrapping entails fiber wrapping the pole at or below ground level with a material impregnated with preservatives to retard external deterioration of the pole. Fiber wrapping is performed on all poles that are not candidates for trussing or replacement. This work would affect less than 10 square feet (0.001 acre) adjacent to the existing pole, and a pre-activity survey would not be conducted. Approximately 60 acres would be temporarily disturbed each year from pole testing and treating. About 95% of transmission system poles are accessible from existing roads, and for remaining 5% it is assumed that a 10-by-1,000-foot wide corridor is crossed by light trucks.

Activity E11 is a HCP small-disturbance activity. Pre-activity surveys typically would not be conducted for Activity E11, except when wildlife designated-occupied habitat is present in the activity site (HCP Table 4-6). PG&E will use the Map Book Process for Small Activities to avoid effects to occupied habitat for narrowly-endemic plant-covered species during Activity E11. An explanation of the Map Book Process for Small Activities and a definition of plant

covered-species occupied-habitat are discussed below in the Opinion section titled *HCP Conservation Strategy.*

Minor Construction to Extend Wood Pole Distribution-Lines (Activity E12)
To provide additional service to new customers or to replace facilities, extension of some existing distribution lines may be necessary. PG&E estimates that 30 distribution line extensions supported by new wood poles (or direct-embedded steel or self-supporting tubular steel poles) would be constructed each year (approximately 900 new distribution lines over 30 years). Construction of new distribution-line extensions will occur outside the existing PG&E ROWs, but will still occur inside the 276,350-acre Action Area (M. Boland 2007 *in litt).* PG&E cannot predict where the 900 new distribution-line extensions will be constructed, but future energy needs are anticipated adjacent to or in close proximity to the existing San Joaquin Valley cities and in the eastern part of the Action Area along the foothills of the Sierra Nevada Mountains (M. Boland 2007 *in litt).* To estimate species effects, the HCP assumed that land-cover types at new distribution-line locations will be similar to the land-cover types at existing distribution lines (41% percent within agricultural fields, 32% within urban and disturbed areas, 21% within Grassland land-cover, 5.6% in woodland or shrub land-cover and 1.2% in wetland land-cover (HCP Table 3-5)).

The construction of new electric distribution lines (Activity E12) is limited to 1 mile or less in length from the current terminus of an existing line. Multiple consecutive (end-to-end) pipeline extensions totaling more than one mile are not covered under this Opinion. The HCP's Monitoring, Reporting and Adaptive Management Program will track the location of Activity E12 line extensions over the 30-year Permit-term in relation to the existing electric distribution and transmission facility lines to assure that multiple consecutive extensions do not exceed one mile in length.

Once the centerline for the new distribution line is surveyed and staked, the pole sites, pull and tension sites, access roads, and lay-down areas would be established. Each one-mile line extension would require approximately 15 new poles (each pole installation temporarily disturbing an area 39 by 39 feet), new pull sites and tension sites (each approximately 61 by 61 feet), a lay-down area (approximately 71 by 71 feet), and other relocation activities (0.16 acre). PG&E may mow and/or grade the soil surface of a lay-down area to remove vegetation and create a flat area, if a previously created lay-down area is not already present near the activity site. Access to each new/replacement distribution line would also require construction of a new 10-foot-wide unsurfaced access road. PG&E would excavate pole holes and any necessary anchor holes using a machine auger and line truck. The width and depth of the hole depends on the size of the pole, soil type, span, and wind loading. Typically, minimum pole setting depths range from 4 to 14 feet. The new poles would be framed (cross arms, pins, insulators, grounds, bonding, markers, and any equipment are installed) and any anchors and guys installed before the pole is set. After setting the poles, conductors (wires) would be strung using the pull and tension sites, as described previously.

PG&E estimates that each Activity E12 distribution-line extension would temporarily disturb 0.98 acre, and the associated road construction would permanently remove (hardscape) 0.121 acre (29.4 acres of temporary disturbance and 3.6 acres of permanent loss each year). Over the

term of the 30-year Permit, Activity E12 electric distribution-line extensions are expected to temporarily disturb 882 acres of land cover, and permanently remove (hardscape) 109 acres due to road construction. Off-road travel would be required at about 10% of the events, and it is assumed that a 10-ft-by-1,000-ft area would be affected on average for each off road travel.

Construction of each Activity E12 distribution line extension is a minor-construction large-disturbance activity, and a pre-construction survey would be conducted when Activity E12 occurs in a natural land-cover type. The pre-activity survey will include soil-disturbance areas, and any adjacent areas that might be affected by construction dust, noise, vehicle traffic, ground vibration, or other construction activities. Minor-construction activity E12 will require the Confer Process if PG&E cannot conduct pre-activity surveys at the correct time of the year to identify presence of a plant covered species when suitable habitat is present and the activity occurs within the known range of a covered plant species. .

PG&E will also establish new ROW areas under each Activity E12 electric distribution line extension. The average width of the electric distribution ROW is 25 to 50 feet. Therefore, approximately 91 to 182 acres of new ROW area will be established in the Action Area per year (2,730 to 5,455 acres over 30 years) due to Activity E12. Establishment of new ROWs would include the ROW clearing and vegetation removal activities discussed above. Over the 30-year contract term, Covered Activities E1, E2, E3, E5, E7, E8, E9, E10a, E10b, E10c, and E11 would also occur inside the new ROW areas. It is the Service's understand that effects of future Covered Activities inside the new ROW areas were included in the HCP analysis of Covered Activities E1, E2, E3, E5, E7, E8, E9, E10a,E10b,E10c, and E11, therefore, species effects inside the new electric distribution-line ROWs are considered in this Opinion.

Approximately 28-percent of the Activity E12 new distribution lines and new ROWs will be constructed in natural land-cover. After the new Activity E12 distribution lines poles are installed, PG&E will remove all existing vegetation for a radial distance of 10-feet from the base of each new pole (314.2 square-feet or 0.007 acre cleared around each pole). Following this initial vegetation removal, the annual implementation of Activity E10b will maintain the vegetation-clear zone around the base of each pole indefinitely, so long as the new line remains operational. Each new mile of distribution line is supported by approximately 15 new poles, so approximately 4,712 square-feet (0.11 acre) of existing vegetation and habitat would be cleared for each mile of new electric distribution-line. Approximately 30 miles of new distribution-line extensions will be constructed each year, and 28% (8.4 miles) are expected to be constructed in natural vegetation. Therefore, the long-term loss of natural land-cover due to Activity E12 is approximately 0.92 acres per year, or 27.7 acres over 30 years. These acres of long-term habitat loss were not included in HCP Table 3-1 under activity E12 or E10b, but are analyzed here in this Opinion.

Activity E12 is a "minor construction" activity that will extend electric distribution lines beyond PG&E's existing right-of-way. However, as discussed below in the Opinion section titled *Confer Process*, PG&E will confer with the Service before implementing Activity E12 only when that construction cannot avoid 1) HCP Appendix I wildlife designated-occupied habitat area, 2) designated Critical Habitat, or 3) occupied habitat for a narrowly endemic plant species.

PG&E would construct new electric distribution-lines to serve new subdivisions and new businesses. The new lines would be constructed after a need for new energy service is identified. PG&E would not construct new lines in advance of the new energy need, and the capacity of the new lines would not exceed the peak-need of the new subdivisions and businesses, on a sustained basis. Therefore, the new lines would be constructed in response to urban development, would not remove an obstacle for future development, and are not considered growth-inducing.

Minor Construction to Extend Tower Transmission-Lines (activity E13)
To provide additional service to new customers or to replace facilities, extension of some existing transmission lines may be necessary. PG&E estimates that 2 transmission line extensions supported by either new steel-lattice towers or new tubular steel poles would be constructed each year (60 over 30 years). Construction of new transmission-line extensions will occur outside the existing PG&E ROWs, but will still occur inside the 276,350-acre Action Area (M. Boland 2007 *in litt).* PG&E cannot predict where the 60 new transmission-line extensions will be constructed, but future energy needs are anticipated adjacent or in close proximity to the existing San Joaquin Valley cities and in the eastern part of the Action Area along the foothills of the Sierra Nevada Mountains (M. Boland 2007 *in litt).* To estimate species effects, the HCP assumed that land-cover types at new transmission-line locations will be similar to the land-cover types at existing transmission lines (47% percent within agricultural fields, 33.5% within Grassland land-cover, 12.5% within Urban and disturbed areas, 6.1% in Woodland or Shrub land-cover and 0.7% in Wetland land-cover (HCP Table 3-4)). In total, approximately 40% of the new transmission lines are expected to occur in natural land-cover.

Each of the 60 new electric transmission line extensions is limited to 1 mile or less in length from the current terminus of an existing line. Multiple consecutive (end-to-end) extensions with a total length exceeding 1 mile are not covered under this Opinion. The HCP's Monitoring, Reporting and Adaptive Management Program will track the location of Activity E13 line extensions over the 30-year Permit-term in relation to existing transmission and distribution facility lines to assure that multiple consecutive extensions do not exceed one mile in length.

Each new transmission line length would require approximately 5 towers or tubular steel poles per mile (each tower work site would be approximately 25 by 100 feet); a pull and a tension site (average size 50 by 150 feet each); and a lay-down area (approximately 100 by 100 feet). PG&E would survey and stake a centerline for the new transmission line ROW. The tower sites, pull sites, access roads, and lay-down areas would be cleared and graded as discussed above under the header *Clearing - Electric ROWs.* . In the event that minor clearing of privately owned commercial tree species is necessary, the trees are moved and stacked in accordance with the landowner's preference. Stump profiles are left as low as required for safe work practices and access. Stumps may be removed where appropriate. PG&E would pour permanent concrete footings for each new tower. PG&E would use a crane or helicopter to erect each tower, depending on tower type. After new towers are erected, conductors (wires) would be strung from the pull and tension sites, as described previously under Activity E9. Debris generated during clearing of the construction ROW is disposed of as discussed above under the natural gas header: *ROW Clearing-Activities.* After construction is complete, disturbance sites larger than 0.25 acre in natural vegetation are typically broad-cast seeded using a weed-free commercial seed mix, as described below under *General AMMs*

PG&E estimates that construction of each Activity E13 new transmission line would temporarily disturb 0.86 acre and permanently remove (hardscape) 0.2 acre. Over 30-year Permit term, Activity E13 construction would temporarily disturb 52 acres and permanently remove (hardscape) 12 acres. PG&E will also establish a ROW area under each Activity E13 electric transmission line extension. The average width of the electric transmission ROW is 200-feet to 250-feet wide (HCP Table 1-1). Therefore, approximately 24 acres of new ROW area will be established for each transmission line extension (48.5 acres per year). Approximately 1,455 acres of new transmission ROW could be added to the Action Area during 30-year Permit term. Establishment of new ROWs would include the clearing and vegetation removal discussed above under *Clearing - Electric ROWs.* Over the 30-year contract term, Covered Activities E1, E2, E3, E5, E9, E10a,E10b,E10c, and E10d,would also occur inside the new ROW areas. It is the Service's understanding that effects of future Covered Activities inside the new ROW areas were included in the HCP analysis of Covered Activities E1, E2, E3, E5, E9, E10a,E10b,E10c, and E10d, therefore, species effects inside the new electric distribution-line ROWs were considered in this Opinion.

Transmission line extensions are a minor-construction large-disturbance activity, and pre-activity surveys would be conducted when Activity E13 occurs in a natural land-cover type. The pre-activity survey will include disturbance areas, access areas, and any adjacent areas that might be affected by construction dust, noise, vehicle traffic, ground vibration, or other construction activities.

Activity E13 is a "minor construction" activity that will extend electric transmission lines beyond PG&E's existing right-of-way. As discussed below under *Confer Process,* PG&E will confer with the Service before implementing Activity E13 when that construction will occur in areas of natural land-cover and a covered species effect cannot be avoided. As discussed below in the Opinion section titled *Pre-activity Surveys – Medium/Large Disturbance Activities*, it is the Service's understanding that PG&E will confer with the Service and/or CDFG (see *Confer Process* below*)* prior to implementing a minor-construction covered-activity E13 when that construction will occur in areas of natural land-cover and pre-activity surveys (conducted at the appropriate time of the year) indicated that the construction activity cannot completely avoid suitable-habitat for a wildlife covered-species or occupied habitat for a plant covered-species.. Minor-construction activities such as Activity E13 will also require the Confer Process if the activity site is within the range of a plant covered-species, suitable natural habitat for the species is present at the activity site, and PG&E cannot conduct pre-activity surveys at the correct time of the year for that plant covered species.
PG&E would construct new electric transmission-lines to serve new subdivisions and new businesses. The new lines would be constructed after a need for new energy service is identified. PG&E would not construct new lines in advance of the new energy need, and the capacity of the new lines would not exceed the peak-need of the new subdivisions and businesses, on a sustained basis. Therefore, the new lines would be constructed in response to urban development, would not remove an obstacle for future development, and are not considered growth-inducing.

Substation Expansion Minor Construction (Activity E14)
PG&E might expand one electric substation per year (30 substation expansions over the term of the Permit). Substations are typically constructed close to residential, commercial, or industrial development. Substation sites are graded, paved, or surfaced, and the area fenced for safety and security reasons. This Opinion includes a substation expansion of up to 0.5 acres in area. This additional area may be required for new transformers, fencing, or new distribution line outlets. The expansion area may also be used for setbacks, landscaping, and access. PG&E estimates that each substation expansion would permanently remove (hardscape) 0.25 to 0.5 acres of land-cover per year, or 7.5 to 15 acres of land-cover over 30 years. Existing roads would be used to access substation construction sites.

Substation expansion is a medium-disturbance, minor-construction activity, and a pre-construction survey would be conducted if Activity E14 occurs in a natural land-cover type. As discussed below under *Confer Process,* PG&E would confer with the Service before implementing Activity E14 (or any medium or large disturbance activity) if 1) Appendix I wildlife designated-occupied habitat is present and cannot be avoided, 2) occupied habitat for a narrowly endemic plant species is present and cannot be entirely avoided, or 3) designated critical habitat is present. . In the Confer Process, PG&E and the Service will discuss avoidance of Appendix I wildlife designated-occupied habitat, avoidance of occupied-habitat for the narrowly endemic plant species, avoidance of designated critical habitat, and AMMs for suitable wildlife habitat at the Activity E14 site.

PG&E would expand a substation station when there is a need for more efficient equipment or a new energy service is identified. Therefore, the expansion would occur primarily for facility efficiency or in response to urban development, would not remove an obstacle for future development, and is not considered growth-inducing.

Minor Construction of Electric Underground Lines (activity E15).
Underground line construction is almost exclusively done in urban settings. The installation of new underground electric line extensions is limited to 1 mile or less in length from the current terminus of an existing line. Multiple consecutive (end-to-end) extensions with a total length exceeding 1 mile are not covered under this Opinion. PG&E estimates that three underground lines would be installed during the term of the Permit. For both transmission and distribution underground-lines, PG&E would install additional underground conductor cable using a cut-and-fill construction method (open trenching) to lay the underground powerline, to install conduit duct banks, and to install access vaults. PG&E's cut-and-fill method preserves topsoil by segregating and windrowing (i.e., soil is stored near the site). If PG&E's soil test results show no hazardous material is present, the soil will be used to backfill the trench. If hazardous material were present, PG&E would haul the soil material off-site and disposed of appropriately, as discussed above under *Pipeline ROW Clearing Activities.* Surface rocks, where present and useful for reclamation, are set aside. Areas are graded and restored after construction to approximate preexisting topographic contours when possible. PG&E's grading and cut-and-fill activities are designed to minimize effects on natural drainage and slope stability. On steep terrain where the ROW must be graded at two elevations (i.e. *two-toning*), PG&E restores such areas after construction to approximate preexisting topographic contours.

PG&E underground electric construction is typically for 12,000-volt distribution lines, however for this construction activity, specifications for an 115,000-volt transmission line were considered typical. These dimensions vary with the volt capacity of the line and are frequently less than those for an 115,000-volt line. Typically, a construction zone width of 65 feet is required to allow for the trench excavation and construction of the duct bank; however, this width varies. The project length would vary based on the length of the line. The typical trench dimensions for installation of a single circuit measures approximately 3 feet wide by 5 feet deep; however, trench depths vary depending on soil stability and presence of existing substructures. Construction of electric underground lines is a large-disturbance and a pre-activity survey will be conducted. Dewatering, if necessary, is conducted using a pump or well-pointing to remove water from the trench. The water is then pumped into containment tanks and hauled away for proper disposal, as discussed above under *Pipeline ROW Clearing Activities.*

As the trench for the underground conductor cable is completed, PG&E would install a cable conduit, reinforcement bar, ground wire and a concrete conduit encasement duct-bank. The duct bank typically consists of polyvinyl chloride (PVC) conduits that contain the underground cables. Once the PVC conduits are installed, thermal-select or controlled backfill is imported, placed, and compacted. A road base backfill or slurry concrete cap may be installed.

Vaults are installed at intervals that vary with the volt capacity of the new line. Vaults are constructed of prefabricated, steel-reinforced concrete that are typically about 20 feet long, 10 feet wide, and 8 feet deep. The total excavation footprint for a vault is typically about 22 feet long by 12 feet wide by 10 feet deep. The vaults are used initially to pull the cables through the conduits and to splice cables together. During operation, vaults provide access to the underground cables for maintenance inspections and repairs

After the conduit duck-bank is installed and the trench is backfilled, cables are installed in the duct banks. Each cable segment is pulled into the duct bank, spliced at each of the vaults along the route, and terminated at the bus structures at switchyards. To pull the cable through the duct bank, a cable reel is placed at one end of the new underground line and a pulling rig is placed at the other. With a fish line, a larger wire rope is pulled into the duct. The wire rope is attached to cable pulling eyes for pulling. To ease pulling tensions, a lubricant is applied to the cable as it enters the duct bank. Cables are spliced together at all vaults after they are completely pulled through the ducts. A splice trailer is positioned directly above the vault manhole openings for each access. At each end, cables will rise out of the ground on a transition pole and terminate at a bus structure in the switchyards.

Activity E15 is a large disturbance activity. Because underground electric line construction is an infrequent activity and is almost exclusively done in urban areas, this activity is not expected to directly impact natural land-cover types or any habitat for the Covered Species. PG&E will utilize the PG&E Map Book, the subsequent GIS/SAP system, and other sources of information to verify that no natural land-cover or covered-species habitat is present at a proposed Activity E15 site.

PG&E would construct underground electric lines to serve new home, new businesses, or in response to either an agency or a community request to place an existing line underground.

PG&E would not construct new lines in advance of the new energy need, and the capacity of the new lines would not exceed the peak-need of the new homes or businesses, on a sustained basis. Therefore, construction of a new underground line would occur only in response to urban development or a community priority and is not considered growth-inducing.

Other Covered Activities

Maintenance on Compensation Lands

Although PG&E will avoid and minimize effects to Covered Species to the maximum extent practicable, some take is likely to result from Covered Activities. The HCP document identifies multiple ways that PG&E can achieve its compensation objectives. PG&E has estimated that the proposed action will require approximately 1,400 acres, which will compensate for species effects resulting from HCP Covered Activities over the 30-year contract term. In the course of purchasing compensation lands, placing conservation easements on PG&E lands, or purchasing conservation easements, PG&E may have an ongoing obligation to maintain these parcels. In the course of conducting standard maintenance and monitoring of these lands (i.e., fencing, surveying, conducting biological surveys, conducting habitat enhancements, and driving on these lands) there is the remote possibility that take of a covered species could occur. The effect of these compensation land activities and the potential for take are covered by this Opinion, including those management activities carried out by any third-party land manager with whom PG&E may contract to perform those activities on PG&E's behalf.

Third Party Covered Activities

PG&E intends to contract with independent contractors, or third parities, to conduct Covered Activities in natural vegetation areas. These contractors could carry out any of the HCP Covered Activities, although the largest Covered Activities would typically be conducted with PG&E oversight. Since PG&E is the Permit holder, they remain ultimately responsible for activities carried out by third parties.

The area subject to the PG&E San Joaquin Valley O&M HCP is the 276,350-acre area defined in this Opinion under the header *Action Area.* Activities occurring outside the defined 276,350-acre Action Area, but still inside the larger 12.1-million-acre HCP Planning-Area are not covered by the proposed Permit. The proposed Permit will not cover third parties working outside the defined Action Area or third parties conducting activities which are not described in this Opinion.

The activities of PG&E's third-parties will be covered by the proposed Permit if the third party has executed a contract with PG&E which contains enforceable provisions committing the third party to comply with all provisions of the Final HCP, this Opinion and ITS, the Permit, and CDFG's permits for the HCP. All contracts will carry specific to what this Opinion, the section 10 Permit, and the CDFG permits dictate.

Third parties that elect not to comply with any requirement of the HCP, the Opinion, the Permit, and the CDFG permits will not conduct covered-activities inside the 276,350-acre action area,

unless they have previously consulted with the Service and have obtained a separate ESA permit for their activities.

PG&E will maintain records of all third-party contractors conducting covered-activities in the action area, the status of whether and how each third party is covered by the proposed Permit, or if the contractor has an independent ESA permit to implement a covered-activity. The annual report prepared by PG&E for the Service will include a list of contractors and a list of the covered activities each contractor performed.

HCP Biological Goals

The principal biological goal for the proposed HCP is to contribute to the conservation of the natural communities in the Action Area and their associated Covered Species. This goal is the rational behind the HCP minimization and compensation strategies.

The proposed HCP identifies 5 broad natural communities to be conserved in the Action Area: Wetlands (includes seasonal wetland, permanent freshwater wetland, and open water); Woodlands (includes blue oak, blue oak/foothill, coastal oak, conifer, montane hardwood, and valley oak); Grassland; Woody Riparian, and Upland Scrub. A list of Covered Species associated with each of the 5 natural community types is presented in HCP Table 4-1. The other land-cover types discussed in the HCP analysis (agricultural crop fields, urban, other disturbed lands) provide little or no habitat for the HCP Covered Species (HCP Table 3-10). The proposed HCP will conserve these 5 natural communities by implementing the following three objectives for each natural-community type:

1. Acquire, protect, manage, and maintain lands for the benefit of Covered Species to achieve compensation for Covered-Activity effects.

2. Locate compensation lands close to where the effect occurred (i.e. the north, central, or south San Joaquin Valley).

3. Purchase or dedicate land near other preserved areas to maximize the conservation values of the land and assist in meeting land protection goals of existing species recovery plans.

HCP Conservation Strategy.

The HCP's conservation strategy utilizes three mechanisms to avoid, minimize, or compensate for Covered Activity impacts on habitat and species:

- General Avoidance and Minimization Measures (AMMs),
- Pre-Activity Surveys to trigger Additional-AMMs, and
- Compensation for unavoidable impacts.

The implementation of this three-pronged approach is expected to result in long-term benefits to a wide range of species in the action area. The General AMMs and Additional-AMMs are described in HCP Table 4-2.

For the purposes of the HCP Conservation Strategy, an area of known "**occupied plant habitat**" is defined as an area of natural land-cover that is within the boundary (polygon) of a California Natural Diversity Data Base (CNDDB) specific-occurrence (i.e. CNDDB accuracy classes 1 and 2), or is within a CNDDB non-specific occurrences mapped as bounded features (i.e. CNDDB accuracy class 3), and that occurrence is also classified by the CNDDB as "presumed extant". Many annual plant covered-species endemic to the San Joaquin Valley do not flower every year, but remain viable in the soil seed-bank until rainfall and other environmental conditions allow individuals to germinate and flower (see *Species-by-Species Evaluations* below). Plant "occupied habitat" includes both "standing" individuals (present above ground) and the viable individuals within the soil seed-bank. Therefore, PG&E shall consider the entire area within the boundary of an extant CNDDB polygon (accuracy classes 1,2,or 3) to be occupied plant-habitat, even if there are few or no standing-individuals visible inside the polygon-boundary at the time of the pre-activity survey. PG&E shall apply AMMs to the entire area within the boundaries of the plant-occurrence polygon mapped by the CNDDB (accuracy classes 1, 2, or 3), even when plants are not visible in all areas of the mapped polygon.

General AMMs

The avoidance and minimization of effects are the highest priority in the HCP conservation strategy and will be implemented to the fullest extent practicable before PG&E undertakes compensation. The 30 (AMMs) are intended to avoid and minimize effects on Covered Species and ensure that PG&E consistently implements measures when activities are conducted in sensitive areas.

PG&E will implement eleven general AMMs (AMMs 1-11) on all Covered Activities, as appropriate. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acres with a non-native commercial seed-mix) within 100-feet of the CNDDB polygon-boundaries of a plant covered-species extant-occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals of the plant covered-species in subsequent seasons, possibly extirpating the plant covered-species from the disturbance site.

In place of the AMMs, PG&E vegetation management crews will implement vegetation management BMPs (HCP Tables 4-7 and 4-8), as appropriate, at the vegetation management covered activities.

Table 1. HCP Avoidance and Minimization Measures (AMMs).

Number	Avoidance and Minimization Measure
AMM 1	Employees and contractors performing O&M activities will receive ongoing environmental education. Training will include review of environmental laws and guidelines that must be followed by all personnel to reduce or avoid effects on covered species during O&M activities.
AMM 2	Vehicles and equipment will be parked on pavement, existing roads, and previously disturbed areas to the extent practicable.
AMM 3	The development of new access and ROW roads by PG&E will be minimized, and clearing vegetation and blading for temporary vehicle access will be avoided to the extent practicable.

AMM 4	Vehicles will not exceed a speed limit of 15 mph in the ROWs or on unpaved roads within sensitive land-cover types.
AMM 5	Trash dumping, firearms, open fires (such as barbecues) not required by the O&M activity, hunting, and pets (except for safety in remote locations) will be prohibited in all covered-activity work sites.
AMM 6	No vehicles will be refueled within 100 feet of a wetland, stream, or other waterway unless a bermed and lined refueling area is constructed.
AMM 7	During any reconstruction of existing overhead electric facilities in areas with a high risk of wildlife electrocution (e.g., nut/fruit orchards, riparian corridors, areas along canal or creek banks, PG&E's raptor concentration zone [RCZ]), PG&E will use insulated jumper wires and bird/animal guards for equipment insulator bushings or will construct lines to conform to the latest revision of PG&E's Bird and Wildlife Protection Standards.
AMM 8	During fire season in designated State Responsibility Areas (SRAs), all motorized equipment will have federal or state approved spark arrestors; a backpack pump filled with water and a shovel will be carried on all vehicles; and fire-resistant mats and/or windscreens will be used when welding. In addition, during fire "red flag" conditions as determined by California Department of Forestry (CDF), welding will be curtailed, each fuel truck will carry a large fire extinguisher with a minimum rating of 40 B:C, and all equipment parking and storage areas will be cleared of all flammable materials.
AMM 9	Erosion control measures will be implemented where necessary to reduce erosion and sedimentation in wetlands, waters of the United States, and waters of the state, and habitat occupied by covered animal and plant species when O&M activities are the source of potential erosion problems
AMM 10	If an activity disturbs more than 0.25 acre in a grassland, and the landowner approves or it is within PG&E rights and standard practices, the area should be returned to pre-existing conditions and broadcast-seeded using a commercial seed mix. Seed mixtures/straw used for erosion control on projects of all sizes within grasslands will be certified weed-free. PG&E shall not broadcast-seed (or apply in other manner) any commercial seed or seed-mix to disturbance sites within other natural land-cover types, within any vernal pool community, or within occupied habitat for any plant covered-species.
AMM 11	When routine O&M activities are conducted in an area of potential VELB habitat, a qualified individual will survey for the presence of elderberry plants within a minimum of 20 feet from the worksite. If elderberry plants have one or more stems measuring 1 inch or more in diameter at ground level are present, the qualified individual will flag those areas to avoid or minimize potential impacts on elderberry plants. If impacts (pruning/trimming, removal, ground disturbance or damage) are unavoidable or occur, then additional measures identified in the VELB conservation plan and compliance brochure will be implemented. The VELB compliance brochure must be carried in all vehicles performing O&M activities within the potential range of VELB.
AMM 12	If a covered plant species is present, a qualified biologist will stake and flag exclusion zones of 100 feet around plant occupied habitat (both the standing individuals and the seed bank individuals) of the covered species prior to O&M activities*. (Note: AMM 11 addresses elderberry plants and valley elderberry longhorn beetle.)
AMM 13	If a covered annual plant species is present, O&M activities will occur after plant senescence and prior to the first significant rain to the extent practicable.
AMM 14	If a covered plant species is present, the upper 4 inches of topsoil will be stockpiled separately during excavations. When this topsoil is replaced, compaction will be minimized to the extent consistent with utility standards. (This measure will be used as an AMM for narrow endemic plants only after approval by USFWS and DFG during the *Confer Process.*)

AMM 15	If vernal pools are present, a qualified biologist will stake and flag an exclusion zone prior to O&M activities. The exclusion zone will encompass 250 feet .* Work will be avoided after the first significant rain until June 1, or until pools remain dry for 72 hours.
AMM 16	If suitable habitat for giant garter snake or California red-legged frog is present and protocol-level surveys have not been conducted, a qualified biologist will stake and flag an exclusion zone of 250 feet around the habitat prior to O&M activities.* Work will be avoided within this zone from October 1 to May 1 for giant garter snake and from the first significant rain to May 1 for California red-legged frog.
AMM 17	If suitable habitat for covered amphibians and reptiles is present and protocol-level surveys have not been conducted, a qualified biologist will conduct preconstruction surveys prior to O&M activities involving excavation. If necessary, barrier fencing will be constructed around the worksite to prevent reentry by the covered amphibians and reptiles. A qualified biologist will stake and flag an exclusion zone of 50 feet around the potentially occupied habitat.* No monofilament plastic will be used for erosion control in the vicinity of listed amphibians and reptiles. Barrier fencing will be removed upon completion of work. Crews will also inspect trenches left open for more than 24 hours for trapped amphibians and reptiles. A qualified biologist will be contacted before trapped amphibians or reptiles (excluding blunt nosed leopard lizard and limestone salamander) are moved to nearby suitable habitat.
AMM 18	If western burrowing owls are present at the site, a qualified biologist will work with O&M staff to determine whether an exclusion zone of 160 feet during the non-nesting season and 250 feet during the nesting season can be established. If it cannot, an experienced burrowing owl biologist will develop a site-specific plan (i.e., a plan that considers the type and extent of the proposed activity, the duration and timing of the activity, the sensitivity and habituation of the owls, and the dissimilarity of the proposed activity with background activities) to minimize the potential to affect the reproductive success of the owls.
AMM 19	If a Swainson's hawk nest or white-tailed kite nest is known to be within 0.25 mile of a planned worksite, a qualified biologist will evaluate the effects of the planned O&M activity. If the biologist determines that the activity would disrupt nesting, a buffer and limited operation period (LOP) during the nesting season (March 15–June 30) will be implemented. Evaluations will be performed in consultation with the local DFG representative.
AMM 20	PG&E staff shall avoid occupied or potentially occupied burrows identified by a qualified biologist within two core-areas for San Joaquin antelope squirrel and giant kangaroo rat identified by DFG. If occupied or potentially occupied burrows in the core areas cannot be avoided, a qualified PG&E biologist shall stake and flag a work-exclusion zone of at least 30 feet* and remain on-sight as a biological monitor, or the biologist shall stake and flag a work exclusion zone of 50 feet around active burrows prior to covered activities at the job site. If work must proceed in the exclusion zone, PG&E will pursue techniques to minimize direct mortality including using approved biologists to trap and hold the species in captivity, and excavating and closing burrows. The approved biologist will hold an ESA Section 10(a)(1)(A) permit for the species. The approved biologist will release the mammals as soon as possible when the work is complete. If active (occupied or potentially occupied) burrows for San Joaquin antelope squirrel or giant or Tipton kangaroo rat are present outside the two core areas identified by DFG, a qualified biologist will stake and flag an exclusion zone of 30 feet and remain on-site as a biological monitor, or the biologist shall stake and flag a work exclusion zone of 50 feet around the burrows prior to O&M activities on the job site.
AMM 21	If San Joaquin kit fox dens are present, their disturbance and destruction will be avoided where possible. However, if dens are located within the proposed work area and cannot be avoided during construction, qualified biologists will determine if the dens are occupied. If unoccupied, the qualified biologist will remove these dens by hand excavating them in accordance with USFWS procedures (U.S. Fish and Wildlife Service 1999). Exclusion zones will be implemented following USFWS procedures (U.S. Fish and Wildlife Service 1999) or the latest USFWS procedures. The radius of these zones will follow current standards or will be as follows:

	Potential Den—50 feet; Known Den—100 feet; Natal or Pupping Den—to be determined on a case-by-case basis in coordination with USFWS and DFG. Pipes will be capped and exit ramps will also be installed in these areas to avoid direct mortality.
AMM 22	All vegetation management activities will implement the nest protection program to avoid and minimize effects on Swainson's hawk, white-tailed kite, golden eagle, bald eagle, and other nesting birds. Additionally, trained pre-inspectors will use current data from DFG and CNDDB and professional judgment to determine whether active Swainson's hawk, golden eagle, or bald eagle nests are located near proposed work. If pre-inspectors identify an active nest near a proposed work area, they will prescribe measures to avoid nest abandonment and other adverse effects to these species, including working the line another time of year, maintaining a 500-foot setback, or if the line is in need of emergency pruning, contacting HCP Administrator.
AMM 23	If medium or large disturbance covered activities take place within 0.5 miles of an active breeding colony of tricolored blackbirds or bank swallows or a small disturbance covered activities take place within 350 feet of an active breeding colony of these species a qualified biologist will evaluate the site prior to work during the breeding season (April 1-July 31). If an active colony of either species could be disrupted by the covered activity, the biologist will stake and flag an exclusion zone of at least 350 feet around the colony prior to O&M activities at the site. This exclusion zone will be established in the field based on site conditions, the covered activity, and professional judgment by a qualified PG&E biologist and will be greater than the minimum distance. Work will not occur in this exclusion zone during April 1–July 31.*
AMM 24	If activities take place in blunt-nosed leopard lizard within the range of the species and outside the road shoulder, PG&E staff will identify if burrows are present and if work can avoid burrows. If work cannot avoid the burrows, a qualified biologist will evaluate the site for occupancy and stake and flag an exclusion zone of 50 feet around the burrows prior to O&M activities at the job site.*
AMM 25	If activities take place in designated occupied habitat[1] of Buena Vista Lake shrew, a qualified biologist will stake and flag an exclusion zone of 100 feet* around all suitable habitat, and PG&E staff will minimize the use of mechanical equipment and the area of ground disturbance.
AMM 26	If activities take place in designated occupied habitat[1] of the riparian brush rabbit, a qualified biologist will stake and flag an exclusion zone of 100 feet* around all suitable habitat, and PG&E staff will minimize the use of mechanical equipment and the area of ground disturbance. Work will be avoided during the reproductive period (January 1 to May 31).
AMM 27	If activities take place in designated occupied habitat[1] of the riparian woodrat, a qualified biologist will stake and flag an exclusion zone of the maximum practicable distance up to 100 feet around all suitable habitat, and PG&E staff will minimize the use of mechanical equipment and the area of ground disturbance.
AMM 28	If activities take place in designated occupied habitat[1] of the limestone salamander, a qualified biologist will stake and flag an exclusion zone of the maximum practicable distance up to 100 feet around all suitable habitat, and PG&E staff will minimize the use of mechanical equipment and minimize the area of ground disturbance.
AMM 29	No herbicide will be applied within 100 feet of exclusion zones, except when applied to cut stumps or frilled stems or injected into stems.
AMM 30	Trees being felled in the vicinity of an exclusion zone will be directionally felled away from the zone, where possible. If this is not feasible, the tree will be removed in sections.

[1] Designated occupied habitat is defined in the HCP as all land within 2 miles of a CNDDB occurrence polygon, and suitable habitat within 5 miles of a CNDDB occurrence polygon. The boundaries of each designated occupied habitat is defined in the HCP and mapped in HCP Appendix I.

* If an exclusion zone cannot extend the specified distance from the habitat, the biologist will stake and flag a restricted activity zone of the maximum practicable distance from the exclusion zone around the habitat. This exclusion zone distance is a guideline that may be modified by a qualified biologist, based on site-specific conditions (including habituation by the species to background disturbance levels). Measures are practicable where physically possible and not conflicting with other regulatory obligations or safety considerations; O&M activities will be prohibited or greatly restricted within restricted activity zones. However, vehicle operation on existing roads and foot travel will be permitted. A qualified biologist will monitor O&M activities near flagged exclusion and restricted activity zones. Within 60 days after O&M activities have been completed at a given worksite, all staking and flagging will be removed.

Note: When working in areas of natural vegetation (i.e. a natural land-cover type), these avoidance and minimization measures (AMMs) will be implemented where practicable. Measures are practicable where physically possible and not conflicting with other regulatory obligations or safety considerations. Avoidance is always preferable to minimization, and full avoidance is required for fully protected species. AMMs 1–11 will be implemented for all covered activities. AMMs 12–21 will be implemented as needed when the need to minimize or avoid effects on a species is identified during pre-construction surveys for activities disturbing >0.1 acre. AMMs 22–30 will be implemented as needed to minimize or avoid effects on species as identified by surveys for small-, medium-, and large-disturbance activities.

As discussed in Chapter 2 of the November 2006 final EIS/EIR, all of PG&E's activities will also include general BMPs to protect biological resources, such as:

- using the smallest possible work footprint;
- minimizing ground disturbance in all areas, and particularly in sensitive areas such as riparian habitats;
- keeping vehicles on existing roads as much as possible;
- maintaining clean worksites;
- implementing measures to control and minimize the spread of noxious weeds, such as requiring appropriate footwear, ensuring that seeds are removed from clothing, and inspecting and cleaning vehicles; and
- using exclusion fencing or flagging to alert crews to the presence of sensitive habitats and to serve as protection.

PG&E also has an extensive program to protect birds, including but not limited to migratory birds and raptors, described in detail in Appendix E of the HCP. Additional measures that may be implemented if they are needed include:

- requiring crews to stay within a designated work area, and/or
- keeping the removal of vegetation to the minimum required to ensure safety and meet CPUC standards.

As discussed in Chapter 2 of the November 2006 final EIS/EIR, BMPs for the protection of surface waters (including water bodies with defined bed/banks as well as vernal pools and swales) are described in PG&E's Draft Water Quality Construction Best Management Practices (BMP) Manual and Spill Prevention Control and Countermeasures (SPCC) Manual. The manual

includes a wide variety of measures (34 total, with additional site-specific measures to be created if a need is identified) that are implemented based on site conditions and the nature of the activity. Commonly used examples include the following:

- During the rainy season (October 1–May 1 in most of California, and August 1–May 30 in the State's desert regions) limit the extent of soil disturbance to the acreage that can be protected before a forecasted rain event.
- Whenever possible, minimize disturbed areas by locating temporary roadways to avoid stands of trees and shrubs, and follow existing contours to reduce cutting and filling.
- Stockpiles should be covered, stabilized, or protected with a perimeter sediment barrier (berms, silt fences, fiber rolls, sand/gravel bags, or straw bale barriers) before the onset of precipitation.
- Do not apply asphalt, concrete paving, seal coat, tack coat, slurry seal or fog seal if rain is expected during the application or curing period.
- Do not wash residue or particulate matter into a storm drain inlet or watercourse.
- When using storm drain inlet protection, remove the sediment behind the barrier when it reaches 1/3 the height of the barrier. Removed sediment should be incorporated in the project or disposed of at a PG&E-approved disposal site.

In addition, where appropriate, disturbed areas within grassland land-cover type are typically reseeded following the completion of work for erosion control, as discussed under General AMM 10. As discussed in Chapter 2 of the November 2006 final EIS/EIR, PG&E activities requiring the use or disposal of water are conducted in compliance with current regulatory requirements. These include the Federal Clean Water Act; California's Porter-Cologne Water Quality Control Act and requirements of the State Water Resources Control Board and Regional Water Quality Control Boards; and local (county and/or city) regulations and policies. Under Section 402 of the Federal Clean Water Act and the National Pollutant Discharge Elimination System (NPDES) permitting process, all Covered Activities that disturb more than 1 acre of land are required to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP). A copy of the SWPPP must be posted at the project site, and a notice of intent to discharge storm water must be filed with the Regional Water Quality Control Board with jurisdiction over the work site. Because these are Federal provisions, they apply to all PG&E projects meeting the acreage criterion.

Table 2a. General Best Management Practices (BMPs) for Vegetation Management Covered Activities (from HCP Table 4-7)

The following BMPs shall be implemented for all vegetation management covered-activities (Activities G13, E10c and E10d.

1. PG&E Employees and Vegetation Management (VM) contractors performing VM activities shall receive ongoing environmental orientation. Orientation shall include review of environmental laws and guidelines that must be followed by all PG&E employees and VM Contractor personnel to reduce or avoid effects on covered species during VM activities.
2. Notify Federal and State land managers of pending work, and schedule annual meetings with these land managers, as requested. Notify local agency land managers of pending work as requested, or as sensitive issues arise.

3. Vehicles and equipment shall be parked on pavement, existing roads, and previously disturbed areas to the extent practicable.
4. Vehicles shall not exceed a speed limit of 15 mph on low-use unpaved roads such as agricultural field roads, transmission ROW roads, or non-system numbered USFS roads with locked gates. Travel on high-use unpaved roads such as USFS logging roads shall be as slow as local traffic conditions allow.
5. No vehicles or equipment shall be refueled within 100 feet of a stream with a defined stream channel or bank, a wetland, or a pond unless a bermed and lined refueling area is constructed. Any vehicles driven and/or operated within or adjacent to streams shall be checked and maintained daily to prevent leaks of materials that, if introduced to the water, could be deleterious to aquatic life.
6. Hunting, firearms, open fires (such as barbecues) not required by the VM activity, and pets (except for safety in remote locations) shall be prohibited in VM work activity sites. All trash, food items, and human-generated debris shall be properly contained and/or removed from the site.
7. All roads, fences, and structures damaged as a result of vegetation management operations shall be repaired. All gates shall be left open if found open or locked if found locked.
8. Contractor shall have a working cell phone or radio on the job site at all times capable of communicating with PG&E. If reception is not available at the job site, the closest area of reception shall be identified and all employees familiarized with that location.
9. All equipment shall be permitted by the Air Resources Board as required.
10. During fire season in designated State Responsibility Areas (SRAs), motorized equipment shall have Federal or State approved spark arrestors; all vehicles shall be equipped with fire fighting tools as appropriate and in accordance with all applicable laws, rules, regulations, orders, and ordinances.
11. Contractor shall be responsible for checking daily Project Activity Level (PAL is a measure of fire weather conditions and, at certain levels, restricts activities otherwise permitted) during fire season when working on USFS property.
12. When routine VM activities are conducted in an area of valley elderberry longhorn-beetle (VELB) habitat, a qualified individual shall survey for the presence of elderberry plants within a minimum of 20 feet from the worksite within the utility easement, ROW, franchise, or license, and shall note in VM Work Request documents to avoid or minimize impacts on elderberry plants. If elderberry plants have one or more stems 1 inch or more in diameter at ground level, additional measures identified in PG&E's VELB conservation plan shall be implemented (see HCP Appendix D). Otherwise, no additional minimization, avoidance, or protective measures are required.
13. All PG&E employees and contractors shall follow the VM Migratory Bird Process when applicable to VM activities to comply with Migratory Bird Treaty Act.
14. If cultural resources are found (i.e., old bottles, cans, buildings), they shall be left in place and undisturbed.
15. VM shall verify that the environmental screening process was followed prior to conducting VM activities associated with capital jobs and other non-VM work.

In addition to BMPS 1–15, BMPS 16–20 shall be applied to all distribution removal projects more than 100 feet in linear length and to electric transmission ROW clearing project activities including manual, mechanical, cultural, chemical, and biological techniques.

16. Prior to any ROW clearing project or any enhancement project, the California Natural Diversity Database (CNDDB) shall be checked for any records of threatened, endangered, or sensitive species.
17. Any locations identified through the CNDDB search shall be flagged and appropriate avoidance measures shall be put in place. Work crew Tailboard training sessions shall be held before work begins.
18. Sensitive habitats such as meadows, riparian areas, and serpentine outcrops shall be flagged, and appropriate avoidance measures shall be put in place. Work crew Tailboard training sessions shall be held before work begins.

19. All existing roads shall be kept open and erosion control measures reinstalled after the project is completed or during inclement weather.

In addition to BMPs 1–15, BMPs 20–25 shall be implemented for all VM activities that occur within a wetland, a pond, or a stream with a defined stream channel or banks.

20. Vegetation removal shall be completed without the use of self-propelled mechanical equipment (i.e. Hydro-ax, Brontosaurus, Slashbuster, etc.).
21. The disturbance or removal of vegetation within the work area shall not exceed the minimum necessary to complete operations, subject to other public and health and safety directives governing the safe operations and maintenance of electric and gas facilities. Precautions shall be taken to avoid damage to non-target vegetation.
22. Cleared or trimmed vegetation and woody debris shall be disposed of in a legal manner. All cleared vegetation and debris shall be removed from the wetland, pond, or stream with a defined stream channel or bank corridor and placed or secured where they cannot reenter the watercourse.
23. Vegetation that at mature height does not pose a threat to the conductors shall not be removed except as required for compliance with CPRC 4292.
24. Vehicle access to streams and wetlands shall be limited to existing roads and crossings.
25. When practical, maintenance activities within the project area shall be completed when the area is dry or during periods of minimum flow.

Table 2b. Best Management Practices (BMPs) for Mechanical Clearing of Electric Transmission and Distribution Rights of Way (ROWs) (from HCP Table 4-8)

1. Contractor shall clear all vegetation 10 feet around and under all towers/poles and guy wires. Only manual clearing work can occur within the above-mentioned 10 feet. ***No mechanical equipment shall be used within10 feet of the above-mentioned structures***. All vegetation cut under and within 10 feet of the towers shall be removed from the area and mulched to a depth not greater than 12 inches.

2. Vegetation that is mowed shall be mulched to a depth not greater than 18 inches.

3. Trees greater than 12" diameter at breast height (dbh) shall be hand-felled and then the top and limbs removed and the bole decked on the side of the right-of-way.

4. Contractor shall flag all guy wires 200 feet in advance of working an area using brightly colored flagging (a minimum of three flags per wire).

5. Contractor shall have a water source containing a minimum of 300 gallons of water and 250 feet of 1-inch hose on site at all times during operation. The water source must be either self-propelled or always attached to a vehicle capable of moving it to where it is needed. Where access/terrain allows contractor's water source must always be within 500 feet of the mowing/cutting operation. Excess water shall be disposed of in accordance with all laws and regulations.

6. Each mower shall have a minimum 10-lb. Class A,B,C fire extinguisher mounted in the cab.

7. Contractor must stay on site ½ hour after mowing operations end for the day to ensure fire safety. When extreme fire levels are reached, the following extra precautions must be implemented immediately: a. An additional support person shall be dedicated to follow the mower with an Indian Back Pump and McLeod. Mowing hours will be reduced to the hours of 5:00 a.m. through 12:30 p.m. b. The use of a humidity meter shall occur. A reading of less than (<) 20% humidity shall stop the mowing operation for the day. Readings shall be taken every 3 hours during operation.

8. Watercourse protection zones will be marked by the PG&E representative in charge with brightly colored flagging prior to the start of any mowing/timber operation. Water classes are defined by the California Forest Practice Rules: 14 CR 916.5.

Watercourse	Class I	Class II	Class III
Characteristics or Key Indicator Beneficial Use	1) Domestic supplies, including springs, on site and/or within 100 feet downstream of the operations area and/or 2) Fish always or seasonally present on site; includes habitat to sustain fish migration and spawning.	1) Fish always or seasonally present off site within 1,000 feet downstream and/or 2) Aquatic habitat for non-fish aquatic species 3) Excludes Class III waters that are tributary to Class I waters	No aquatic life present, watercourse showing evidence of being capable of sediment transport to Class I and II waters under normal high water flow conditions after completion of timber operations.

9. The following watercourse protection zone clearances must be maintained to the maximum extent possible:

a. Class I & II watercourses with a slope < 30% No heavy equip. within 50 feet

b. Class I & II watercourses with a slope > 30% No heavy equip. within 75 feet

c. Class III watercourse No heavy equip. within 25 feet

No mowing shall be allowed within above distances. Trees within the buffer shall be removed manually. Brush and other small vegetation shall be left for a shade canopy on the watercourse. The actual width of the watercourse protection zone may vary based on a PG&E representative's judgment in the field. All impaired watercourses and their protection zone clearances shall be identified before the project begins.

Disturbance Categories for Covered Activities,

Covered Activities may result in one of four disturbance categories, based on the acres of land-cover disturbance that results from implementing an activity.

Small Disturbance. Covered Activities that typically disturb less than 0.1 acre of land-cover per event are small-disturbances. HCP Table 3-1 indicates Covered Activities G5, G6,E6, E7, E8, and E11 are the small land-cover disturbance activities. Small disturbance activities, when they occur in natural-land cover, were considered by the HCP to have a very low potential for effects or very limited effects. PG&E implements small-disturbance covered-activities frequently (approximately 120,470 times) each year (HCP Table 3-1). PG&E will apply the General AMMs at all small-disturbance activity sites. However, it would be cost-prohibitive for PG&E to conduct pre-activity surveys and apply the Additional-AMMs at these numerous small activity sites. PG&E believes that conducting pre-activity surveys for applying Additional-AMMs at small activity sites would be relatively ineffective at reducing take. Therefore, PG&E will not conduct pre-activity surveys or apply Additional-AMMs at the majority of the small-disturbance activity sites, except as discussed below under *Pre-activity Surveys-Small Disturbance Activities.* When no pre-activity survey is conducted at a small-disturbance activity site located in natural land-cover, PG&E will compensate for effects based on an estimate of take, as discussed below under *Compensation Approach.*.

Medium and Large Disturbance Activities. Medium disturbances results from Covered Activities that typically disturb more than 0.1 acre and less than 0.5 acre. Large disturbances

result from activities that typically disturb 0.5 acre or more. The HCP considered medium and large disturbances to have a potential for greater effects. HCP Tables 3-1 and 4-6 indicate which Covered Activities are medium and large disturbance activities. PG&E will conduct pre-activity species-surveys at all medium and large disturbance activities, and apply Additional-AMMs as discussed below under *Pre-Activity Surveys-Medium and Large Disturbance*. PG&E's pre-activity surveys will identify which Additional-AMMs will be required, and will also quantify the amount of temporary and permanent effects to land-cover habitat, as discussed below.

Other Disturbance. The HCP classified "other disturbances" as those that do not result in a loss or disturbance of land-cover habitat, but still have potential to cause other forms of take, particularly in the absence of AMMs. For example, pruning trees or other vegetation away from wires or structures could destroy a nest of a covered bird species. Vehicles driving on roadways to work sites or during inspections or patrols have the potential to strike some covered wildlife species. Off-road travel by rubber-tired vehicles could run over individuals of covered plant species, covered wildlife species, or affect burrowing wildlife covered-species. The HCP considered disturbances attributable to these activities not sufficiently intense or concentrated spatially to cause habitat loss, and were included in the "other disturbance" category. In some cases (e.g., pruning and clearing vegetation), these PG&E activities recur annually or at other regular intervals in the same location, and thus maintain the baseline conditions of the existing vegetation and wildlife habitat. Covered Activities that do not disturb natural land-cover (i.e. result only in the "other disturbances") are Activities G1, G2, G4, E1, E2, E3, and E4, E10a and E10b.

In addition to less-intensive disturbances, the "other disturbance" category also included all soil-disturbing covered-activities in agricultural fields, other than the placement of permanent structures. Because agricultural fields support little natural vegetation, and are regularly disturbed by agricultural practices, the habitat provided in agricultural fields is not substantially altered by covered activities. Similarly, all covered activity disturbances in urban or developed/disturbed land-cover types were included in the "other disturbance category" because the covered-species habitat value of urban or developed/disturbed land-cover types is minimal, and would not be altered by the Covered Activity. As discussed below, PG&E will not conduct pre-construction surveys for covered-activities that cause only "other disturbances" or do not disturb a natural-community land-cover type.

The HCP quantified acres of "other disturbances" for each HCP Covered Activity (HCP Tables 3-1). The other-disturbances are further discussed in HCP Tables 3-2, 3-7, 3-8, 3-9, 3-11, and 3-12. Because the HCP Conservation Strategy includes permanent compensation for temporary land-disturbances, the HCP concluded that possible direct and indirect species-effects resulting from these other-disturbances will be sufficiently compensated for by the HCP Conservation Strategy.

Pre-Activity Surveys

Pre-activity Surveys – Small Disturbance Activities.

Covered Activities G5, G6,E6, E7, E8, and E11 each disturb less and 0.1 acre, and are the small ground-disturbing activities. As discussed above, PG&E will implement over 120,000 small-disturbance activities each year of the Permit term. Many of the wildlife Covered Species and

some plant Covered Species would not be substantially affected by these widely dispersed small-disturbances. However, certain Covered Species with small populations and limited distributions could be significantly affected by a small disturbance in their occupied habitat. The HCP developed a screening process to systematically identify these "susceptible" Covered Species for which the application of Additional-AMMs is warranted at small-disturbance activity sites. This screening process is summarized in HCP Figure 4-1. The screening process also considered the difference in potential effect from small disturbances of land-cover (Activities G5, G6, E6, E8, and E11), and small-disturbance tree-trimming vegetation-management actions (Activities E10a and E10b).

The "susceptible" wildlife covered-species are listed in HCP Tables 4-3 and 4-4, and include those species with HCP Appendix I wildlife "designated-occupied habitat" (limestone salamander, Buena Vista Lake shrew, riparian woodrat, and riparian brush rabbit). The susceptible wildlife species also include Swainson's hawk, white-tailed kite, golden eagle, and bald eagle which could be affected by "other disturbance" from vegetation-management activities (i.e. Activities E10a and E10b) that may affect trees used by these species. If an active nest for these species is located near any covered-activity site, PG&E will implement AMM 22 and their Bird Protection Program (HCP Appendix E).

The "susceptible" plant covered species are those species defined as "narrowly endemic" by PG&E. PG&E defines the **narrowly-endemic plant covered-species** as the federally- and State-listed plant covered-species and the16 plant covered-species currently known from less than 10 locations and that could be biologically sensitive to small-disturbance activities (see HCP page 5-35). These 34 narrowly endemic plant species are: large-flowered fiddleneck (*Amsinckia grandiflora*), Bakersfield smallscale (*Atriplex tularensis*), Mariposa pussypaws (*Calyptridium pulchellum*), tree-anemone (*Carpenteria californica*), succulent owl's clover (*Castilleja campestris ssp. succulenta*), California jewelflower (*Caulanthus californicus*), Hoover's spurge (*Chamaesyce hooveri*), Merced clarkia (*Clarkia lingulata*), Springville clarkia (*Clarkia springvillensis*), Vasek's clarkia (*Clarkia tembloriensis* ssp. *calientensis*), palmate-bracted bird's beak (*Cordylanthus palmatus*), Kern mallow (*Eremalche kernensis)*, Congdon's woolly sunflower (*Eriophyllum congdonii),* Delta button celery (*Eryngium racemosum*), striped adobe lily (*Fritillaria striata),* Bogg's lake hedge-hyssop (*Gratiola heterosepala*), pale-yellow layia (*Layia heterotricha*), Comanche Point layia (*Layia leucopappa*), Panoche peppergrass (*Lepidium jaredii* ssp. *album*), Congdon's lewisia (*Lewisia congdonii*), Mariposa lupine (*Lupinus citrinus* var. *deflexus*), showy madia (*Madia radiata*), Hall's bush mallow (*Malacothamnus hallii),* San Joaquin woollythreads (*Monolopia [Lembertia] congdonii)*, pincushion navarretia (*Navarretia myersii* ssp. *myersii*), Colusa grass (*Neostapfia colusana*), Bakersfield cactus (*Opuntia basilaris* var. *treleasei*), San Joaquin Valley Orcutt grass (*Orcuttia inaequalis)*, hairy Orcutt grass (*Orcuttia pilosa)*, Hartweg's golden sunburst (*Pseudobahia bahiifolia),* San Joaquin adobe sunburst (*Pseudobahia peirsonii),* Keck's checkerbloom (*Sidalcea keckii*), Green's tuctoria (*Tuctoria greenei*), and King's gold (*Twisselmannia californica*).

The "other" plant covered-species, the eight plant covered species that are not defined by PG&E as "narrowly endemic" are: lesser saltscale (*Atriplex minuscula*), big tarplant (*Blepharizonia plumose* ssp. *plumosa*), slough thistle (*Cirsium crassicaule*), Mariposa clarkia (*Clarkia biloba*

ssp. *australis),* hispid bird's-beak (*Cordylanthus mollis* ssp. *hispidus),* legenere (*Legenere limosa*), Mason's lilaeopsis (*Lilaeopsis masonii*), and oil neststraw (*Stylocline citroleum*).

PG&E has developed a **Map Book Process** for applying Additional-AMMS at small disturbance activities sites (and at vegetation management activities G13, E10c and E10d sites). The Map Book Process is intended to avoid effects when susceptible wildlife species or narrowly-endemic plant species are present. PG&E expects to initiate the Map Book Process on or before approval of the HCP. PG&E will establish the Map Book by first determining where PG&E facility lines occur: 1) inside HCP Appendix I designated-occupied wildlife habitat for limestone salamander, Buena Vista Lake shrew, riparian woodrat, and riparian brush rabbit; 2) within 100 meters of CNDDB known-occurrences of bank swallow and tri-colored blackbird colonies; and 3) inside occupied-habitat for narrowly endemic plant species. PG&E has plotted the facilities and species/habitat polygons on high quality aerial photographs. This collection of high-quality annotated aerial photographs is the "Map Book" that PG&E will use to identify where covered activities may occur in such areas.

To establish the Map Book, qualified PG&E biologists will review these high-quality annotated aerial-photos to rule out ground surveys at locations where the CNDDB has included a PG&E facility within the boundary of a species occurrence-polygon but natural land-cover is not present where the covered-activity will occur (i.e. the activity site is a road, canal, or other developed or disturbed lands without natural vegetation). PG&E biologists will use their professional judgment and consider the year and month of the aerial photo flight, scale of the flight, and photo resolution. During this preliminary aerial photo review, the qualified PG&E biologist will also consult the full CNDDB occurrence-report to help inform their decision about the field survey in such areas.

In addition, potential covered-activity sites (facilities and ROWs) inside Appendix I wildlife designated-occupied habitat areas, but immediately adjacent to a paved road, may be of limited value to riparian brush rabbit, Buena vista lake shrew, riparian woodrat, and limestone salamander and may not be "habitat suitable for occupancy" for that species. As discussed in HCP Chapter 4, *Apply AMMs in All Designated-Occupied Habitat,* PG&E biologists intend to identify the suitable-habitat areas inside the boundaries of the Appendix I designated-occupied habitat areas. This Map Book one-time aerial photo review will help inform PG&E of areas within the designated-occupied habitat boundary that have habitat suitable for occupancy by the species. The Map Book one-time field-survey will be conducted wherever PG&E facilities cross a CNDDB occurrence for riparian brush rabbit, Buena Vista lake shrew, riparian woodrat, or limestone salamander, and that CNDDB occurrence is "presumed extant". Where a qualified PG&E biologist determines that a facility location inside a CNDDB occurrence-polygon or inside a wildlife "designated-occupied habitat" does not require an initial field survey, that site will not be included in the initial Map Book, so that site will not have AMMs prescribed using the Map Book Process for small-disturbance activities.

After completing the aerial photo review (to eliminate some facility segments), PG&E will field-survey pipeline and electric-line segments where they cross 1) suitable habitat areas inside the Appendix I designated-occupied wildlife habitat for limestone salamander, Buena Vista Lake shrew, riparian woodrat, and riparian brush rabbit; 2) within 100 meters of known CNDDB

wildlife occurrences of bank swallow and tri-colored blackbird colonies; and 3) occupied-habitat for narrowly endemic plant species (as occupied plant habitat is defined above in *HCP Conservation Strategy*). Surveys in Appendix I designated-occupied wildlife habitat will determine if covered-activity work sites have habitat suitable for occupancy by that species. For narrowly-endemic plants, the survey will be conducted during the appropriate seasonal window (generally following HCP Table 4-10) to maximize the potential to detect any presence of the species within PG&E rights-of-way at covered-activity work sites. PG&E will use standard survey methods recommended by the Service or CDFG to conduct the one-time Map Book survey of these areas. Information collected during the plant and wildlife surveys will be recorded using a GPS unit and entered into the Map Book, and the information will be used for future small-disturbance activities in the surveyed areas. PG&E may post sensitive-resource markers on facilities such as poles, towers, or pipelines to help field crews identify boundaries of suitable or occupied species habitat or other sensitive areas.

The Map Book survey data will provide useful information on when and where AMMs should be applied for small activities, when and where AMMs should be applied for Activities G13, E10c, E10d. When future small activities are scheduled in an area that contains suitable habitat for the wildlife species described above or narrowly-endemic plant occupied-habitat, PG&E will employ appropriate AMMs from HCP Table 4-2, to avoid and minimize species effects in these areas.

PG&E intends to replace the paper Map Book with an electronic GIS database within four years of approval of the HCP. This GIS database will include all information available from the most recent edition of the CNDDB as well as information from PG&E company files of all past PG&E biological survey results and reports (where available) and information from all other biological databases that are readily available to the public. PG&E will integrate this GIS database with its activity scheduling software (SAP Work Management Tool) within four years of approval of this HCP to improve the efficiency by which it can identify the need to prescribe site-specific AMMs at the six small-disturbance activities (discussed above) and for vegetation management activities G13, E10c and E10d. Until this integrated GIS/SAP tool is ready beginning in mid-2009, PG&E will use the paper Map Book.

If ground disturbance in suitable habitat for riparian brush rabbit, riparian woodrat, Buena Vista lake shrew, limestone salamander, or in occupied habitat for a narrowly endemic plants cannot be avoided by a small-disturbance covered activity, PG&E shall first confer with Service before implementing the activity, as described below under *Confer Process.*

Pre-activity Surveys – Medium/Large Disturbance Activities.
Medium-disturbance activities affect more than 0.1 acre of land-cover and large-disturbance activities affect more than 0.5 acre of land-cover. The HCP treats medium and large disturbance activities the same. In general, most medium/large activities occur less frequently than small-disturbance activities, and many have more lead-time for planning and preparation. The HCP described 17 medium/large activities. Three of the 17 medium/large activities are vegetation-management actions (G13, E10c, and E10d). These three activities have the potential to affect plant occupied-habitat and bird nesting or roosting sites. PG&E's process for avoiding, and minimizing species effects at G13, E10c, and E10d sites was discussed above under the headers

Covered Activities.
PG&E will conduct pre-activity site-surveys for 14 medium/large disturbance activities when they occur in a natural-community land-cover type. Ten of these medium/large disturbance activities will occur on existing PG&E facilities inside existing ROWs (i.e. Activities G3, G7, G8, G9, G10, G11, G12, G14, G15, E9and E14), and three these medium/large disturbances are "minor construction" activities which will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries (i.e. Activities G16, E12, and E13).

Prior to implementing any medium or large covered-activity, PG&E will assure the activity site is located inside the 276,350-acre Action Area (as defined above in this Opinion under the header *Action Area),* and assure the activity would not cumulatively extend a gas or electric line more than one mile in length relative to 2007 existing transmission and distribution line locations. PG&E biologists would first determine if a proposed activity site is located in a natural-community land-cover type. Covered Activities which disturb soil (land cover), but occur entirely inside a non-natural HCP land-cover types (i.e. Urban, Other Developed/Disturbed Land, or Agricultural-Field land-cover) are expected to cause only "other disturbances", and would not have further data-review and would not have a field survey prior to PG&E implementing the activity. These activities would implement only the general AMMs (AMMs 1-11) as appropriate for the activity. Activity E15 (new underground electric lines) is the only ground-disturbing Covered Activity that will always occur in a non-natural land cover (i.e. Urban or Other Developed/Disturbed). PG&E shall develop and implement a training program to educate PG&E field staff on kit fox use of Urban land-cover, Other Disturbed and Developed (ODD) land-cover, and other land-covers in western Kern, western Kings, or western Fresno counties where pre-construction surveys are not conducted. If PG&E staff working in Urban or ODD land-cover in western Kern, western Kings, or western Fresno counties observe a burrow with signs of potential kit fox use, then covered-activities near the burrow site shall stop, and PG&E field staff shall immediately contact a PG&E biologist or the PG&E HCP Administrator. A PG&E biologist shall stake or flag AMM 21 work exclusion -zones or other AMM 21 elements, as required.

If permitted activities cannot completely avoid a kit fox active-den in Urban or ODD land-cover in western Kern, western Kings, or western Fresno counties, PG&E shall provide compensation for the loss of that active den. Appropriate compensation for the loss of kit fox dens in Urban or ODD land cover will be determined on a case-by-case basis between PG&E and the Wildlife Agencies using the Confer Process. PG&E shall annually contact the Endangered Species Recovery Program (ESRP) at California State University Stanislaus to acquire current information on the locations of kit fox dens in the Bakersfield area. The Permittee shall contact the city of Bakersfield planning department and/or the Kern County planning department annually to obtain the current information on kit fox den locations and other biological information monitored under the Metro Bakersfield HCP.

PG&E biologists will design pre-activity surveys for all medium/large activities occurring in natural land cover on existing facilities or within existing ROWs, and for each "minor construction" activity which will extend existing pipelines, electric lines, or other facilities beyond the existing ROW boundaries (i.e. Activities G16, E12, and E13). The PG&E biologists will first review the distribution range and habitats of all the Covered Species to determine which

species could be present. This would include a query the California Natural Diversity Database (CNDDB) and the CNDDB QuickViewer to review extant and extirpated CNDDB occurrence records near the activity site and within the 9 USGS quadrangle sheets surrounding the activity site. PG&E biologists and staff will consider CNDDB records of all accuracy classes when they design pre-activity surveys for the medium and large disturbance covered-activities. As new electronic copies of the CNDDB are released by the CDFG over the term of the permit, PG&E will install the updated database in their GIS/SAP system as often as practicable. PG&E biologists will consider all information available from the CNDDB, as well as information from PG&E company files of past biological survey results or reports (where available), and other reasonably available data sources. Biologists will also review appropriate GIS layers (such as those discussed in HCP Appendix A and other GIS layers), and other sources of information to determine if sensitive habitats such as meadows, riparian areas, and serpentine outcrops, vernal pools, designated Critical Habitat or Core Areas could be present at these proposed activity sites. The integrated GIS/SAP tool will be ready beginning in 2009. Because the initial Map Book Process will eliminate several CNDDB records from inclusion in the GIS/SAP, will have just a one-time survey for species and habitat, and was designed for use at the small-disturbance covered-activity sites, PG&E biologists shall not rely solely on the GIS/SAP tool to plan the pre-activity surveys for medium- or large-disturbance covered-activities .

Using the results of their data-review, PG&E biologists will design and schedule a pre-activity biological survey of the activity-site, based on the ranges and habitat requirements of the wildlife and plant covered-species that may be present. As discussed below in *Evaluation Methods,* a pre-activity survey will include all disturbance areas, access areas, and any adjacent areas that might be affected by construction dust, noise, vehicle traffic, ground vibration, or other construction activities.

The pre-activity surveys for wildlife covered-species (with the exception of nesting avian species, California tiger salamander, blunt-nosed leopard lizard and the vernal-pool shrimp species) can, for the most part, be conducted year-round. In most instances PG&E will conduct wildlife surveys within 30 days prior to the disturbance activity. The timing of wildlife surveys will generally follow the requirements outlined in HCP Table 4-9. Additional survey requirements for valley elderberry longhorn-beetle are described in HCP Appendix D.

PG&E will follow the general guidelines in HCP Table 4-10 to schedule surveys for plant covered-species at the appropriate times of the year, when the target plant-species is present and identifiable. PG&E biologists will use HCP Table 4-10 as guidance, but will also consider site-specific characteristics such as elevation, latitude in the San Joaquin Valley, rainfall and weather conditions of that particular growing season when scheduling plant surveys. Field surveys for plant covered-species will be conducted by a qualified botanist in accordance with the most recent guidelines on the Service's Sacramento Fish and Wildlife Office webpage. These include general guidelines (USFWS 1996b, Cypher 2002c) and specific guidelines for San Joaquin wooly-threads (Cypher 2002d), Kern mallow (Cypher 2002b), California jewelflower (Cypher 2002e, and Bakersfield cactus (Cypher 2002f). When a covered plant species is found, the occupied habitat will be mapped by PG&E using a GPS unit. With the landowner's permission, PG&E shall submit a 1:24,000 scale map of the occurrence and/or their GPS data to the CNDDB.

If minor construction or other medium and large ground-disturbing activities cannot avoid occupied habitat for narrowly endemic plants, PG&E will confer with the Service prior to beginning the activity, as described below under *Confer Process.*

However, not all scheduling of medium/large activities (i.e. activities G6,G7, G8, G9, G10, G11, G12, G14, G15, E9 and E14) at existing facilities is predictable, and PG&E may not be able to perform all plant surveys for these medium/large activities during the appropriate survey-period. In situations where survey scheduling is not possible during an appropriate plant-species survey-period, and 1), a CNDDB plant occurrence record is within 300 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E shall assume that the entire area of the disturbance is occupied by that species, and is adversely affected PG&E will provide plant compensation for the entire disturbance area. If the pre-activity surveys cannot be conducted at the appropriate time of year for a plant-species, PG&E will confer with the Service and CDFG, using the *Confer Process* discussed below.

In addition, even when the plant covered-species is not flowering, PG&E biologists will use the maps and aerial photographs available on the CNDDB to stake and flag appropriate exclusion zones around the boundary of the plant species occupied-habitat (i.e. the polygon or mapped bounded feature) for both annual or perennial plant species prior to beginning land-disturbance for the covered-activity. As discussed above under *HCP Conservation Strategy*, this Opinion defines plant "occupied habitat" to include the locations of CNDDB plant occurrences with 1) a CNDDB presence (PRESENCE_CODE) of "presumed extant" and, 2) a CNDDB accuracy classes (ACC_CLASS) of 1, 2, or 3. If the pre-activity surveys cannot be conducted at the appropriate time of year PG&E will confer with the Service and CDFG, using the *Confer Process* discussed below.

However, it is the Service's understanding that the minor construction-activities (i.e. Activities G14, G15, G16, E12, E13, E14, and E15) are done in response to a growing energy need, and therefore, are more predicable than the other ground-disturbing covered-activities. Therefore, most pre-construction surveys for activities for Activities G14, G15, G16, E12, E13, E14, and E15 within areas of natural-habitat will typically be scheduled with adequate time to allow for thorough plant and wildlife surveys. The wildlife and plant pre-activity surveys will include all areas where direct effects could occur, including likely vehicle access areas, the footprint of the construction area and associated work areas, including any lay-down areas, disposal areas (including debris, soil, water or waste disposal), or adjacent areas that may be affected by construction dust, noise, ground vibration, vehicle movements in the ROW, or implementation of erosion control.

All pre-activity field surveys at medium/large activity sites will be sufficient to:

- Document the HCP land-cover type(s) present in the activity site, and determine the percentage that is suitable for occupancy by each wildlife covered-species.

- Document the percentage of the activity site that is occupied by each plant covered species.

- Identify which Additional-AMMs (from Table 1) and BMPs (from Table 2a and Table 2b), if any, will be implemented.

- Quantify the area of suitable wildlife-habitat that will be temporarily disturbed and/or permanently lost.

- Quantify the area of plant occupied-habitat that will be temporarily disturbed and/or permanently lost due to direct impacts or from changes in soil structure, fertility, soil water holding capacity, soil fertility, hydrological integrity with the surrounding landscape, loss of cryptogamic crusts or changes to other plant microhabitat features.

Qualified PG&E biologists and botanists would survey each proposed medium/large work-area and record pertinent information (data) on a standard data sheet (HCP Figure 4-4). The pre-activity surveys will determine a work site's land-cover type, the area suitable for each wildlife covered-species, and the area of the work site that is occupied by plant covered-species. The PG&E biologist would either enter the survey results into the PG&E GIS database, or submit the results to the HCP Administrator. If AMMs are prescribed for the medium or large activity site, the SAP activity scheduling software (SAP Work Management Tool) would print those AMMs on the work crews' shop papers or work orders (once the interactive GIS/SAP is operational). Vegetation Management crews will implement the appropriate BMPs (Table 2a and HCP Table 4-8).

These pre-activity surveys will collect information on the land-cover type and the percentage of that land-cover suitable for occupancy by each wildlife covered species. This information will allow PG&E staff to use acquired information on the "suitability percentage" in PG&E's subsequent planning of covered activities and their early acquisition of compensation lands.

As discussed below under *Confer Process*, PG&E will confer with the Service before implementing minor-construction covered-activities G14, G16, and E13 that extend existing pipelines, electric lines, or other facilities beyond existing PG&E ROW boundaries when that minor construction will occur in areas of natural vegetation, and PG&E's pre-activity survey indicated that suitable habitat for wildlife covered-species or occupied habitat for plant covered-species cannot be entirely avoided by the activity.

PG&E will adopt internal practices as necessary to ensure the efficient and effective implementation of appropriate AMMs. As new species and habitat information is available over the 30-year term of the Permit, PG&E will enter this information in their GIS database to inform crews of where to apply AMMs, may conduct specialize trainings or additional work-crew tailboard trainings; may post sensitive-resource markers on facilities such as poles, towers, or pipelines to help field crews identify boundaries of sensitive areas; or may employ additional seasonal work restrictions. As new electronic copies of the CNDDB are released by the CDFG, PG&E will install the updated database in their GIS database/SAP system.

Additional Pre-Activity Surveys.
If a PG&E pre-activity survey identifies the need for species-specific Additional-AMMs (AMMs 12–22), and these measures were not implemented during the pre-activity survey, then a qualified biologist may need to conduct additional pre-activity surveys, stake and flag exclusion zones, implement other Additional-AMMs as necessary, and/or monitor the covered-activity construction. Activity surveys and construction monitoring will be conducted when a work site is identified as having a high potential for species occupancy. An on-site biological monitor will always be required in instances where there is a known presence of a covered species at the worksite and where direct mortality may occur despite implementation of the AMMs.

All vegetation management activities will implement AMM 22 for nest protection of covered raptors (Swainson's hawk, white-tailed kite, golden eagle, bald eagle) and other nesting birds. AMM 22 includes PG&E's recently adopted nest-protection program (see HCP Appendix E).

Confer Process
Under four circumstances PG&E will confer with Service and/or CDFG prior to implementing certain covered activities. These circumstances include:

1. PG&E will confer with the Service and/or CDFG prior to implementing minor-construction covered-activities G14, G16, and E13 that extend facilities into areas beyond PG&E's existing rights-of-way in areas of natural vegetation, and pre-activity surveys conducted at the appropriate time of year indicate that wildlife covered species suitable habitat or plant covered species occupied habitat cannot be avoided. If the pre-activity surveys cannot be conducted at the appropriate time of year, PG&E will confer with the Service and CDFG.

Where PG&E conducts pre-activity surveys and determines that covered wildlife species suitable habitat and plant covered species occupied habitat is not present or can be avoided, PG&E will provide Service and CDFG copies of the pre-activity surveys and will confer with Service and CDFG only upon request.

When the Confer Process is necessary, PG&E will contact Service and CDFG and provide activity information as soon as reasonably practical, and the parties expect this will occur 3 months before the activity occurs. PG&E will provide Service and CDFG with activity location information, appropriate maps, and other site-specific information for the activity in advance of the discussion.

PG&E, Service and CDFG will meet by phone or in person as soon as practical, ordinarily within one week of the Service receiving activity information, to discuss likely impacts, species effects, implementation of AMMs to avoid and minimize species effects, and reach agreement in advance about which AMMs are appropriate for each such activity.

2. PG&E will confer with the Service prior to implementing any "minor construction" covered-activity or other medium or large covered-activities within designated critical habitat. When the Confer Process is necessary, PG&E will contact Service and CDFG

and provide activity information as soon as reasonably practical, and the parties expect this will occur 3 months before the activity occurs. PG&E will provide the Service with location information, appropriate maps, and other site-specific information for the activity in advance of the discussion. PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

3. PG&E will confer with the Service and/or CDFG when a "minor construction" covered activity (including E12) or other small, medium, or large ground-disturbing activities cannot avoid occupied-habitat for a narrowly-endemic plant species, and soil disturbance will occur inside or within 100-feet of the boundary/polygon of the plant's occupied-habitat. Plant "occupied habitat" is defined above in the Opinion section *HCP Conservation Strategy.* PG&E will determine whether such activities are likely to result in plant occupied-habitat disturbance based on pre-activity surveys of medium or large disturbance sites, or from the initial one-time surveys to establish the Map Book Process, described above for the small disturbance sites.

Before implementing a medium or large covered activity that may affect narrowly endemic plant occupied-habitat, PG&E will contact Service and CDFG and provide:

(a) The results of the pre-activity survey that detected the plant species;
(b) A description of the planned covered-activity and a map;
(c) A description of the plant AMMs that PG&E proposes to use (AMMs 12-14);
(d) PG&E's assessment of whether direct and indirect effects to the narrowly endemic plant species will be avoided as a result of the AMMs;
(e) If there will be unavoidable direct or indirect effects to a narrowly endemic plant, PG&E's assessment of whether the resulting effect will be temporary or permanent; and
(f) For any unavoidable impacts, PG&E's proposed compensatory mitigation approach, as outlined below in *Compensation.* The HCP's compensation ratios will be applied: 3:1 for permanent loss of plant occupied-habitat, and 0.5:1 for temporary loss of plant occupied-habitat.

PG&E and Service and CDFG shall, as soon as reasonably practicable, confer to determine which AMMs should be used, whether unavoidable impacts, if any, will be temporary or permanent, and what compensatory mitigation is appropriate. For purposes of effects to narrowly endemic plant occupied-habitat, an impact shall be regarded as permanent if the disturbance site and species cannot be restored to pre-impact conditions within one year. If Service and CDFG determine that any impact caused by the covered activity is permanent, PG&E shall not thereafter be required to provide any additional compensatory mitigation for covered activities for within the boundaries of that impacted area, for the term of the permit.

4) PG&E will confer with the Service and/or CDFG when a medium or large covered-activity will affect suitable riparian brush rabbit, riparian woodrat, Buena Vista lake

shrew, or limestone salamander habitat inside the Appendix I wildlife designated-occupied habitat areas.

Before implementing a medium or large covered activity that will affect designated-occupied habitat for riparian brush rabbit, riparian woodrat, Buena Vista lake shrew, or limestone salamander, PG&E will contact Service and CDFG and provide:

(a) The results of the survey that detected the species or its suitable habitat;
(b) A description of the planned covered activity and a map;
(c) A description of the AMMs that PG&E proposes to use;
(d) An assessment of whether the resulting effect will be temporary or permanent; and
(e) For any unavoidable impacts, a proposed compensatory mitigation approach, as outlined later in this chapter under *Compensation.* The HCP's compensation ratios will be applied: 3:1 for permanent loss of habitat, and 0.5:1 for temporary loss of habitat.

Emergency activities, by definition, are exempt from this Confer Process, though if an emergency activity causes effects to one of these species, PG&E would need to confer regarding appropriate compensation, as outlined under *Compensation.*

Data Management and Archiving.
PG&E would conduct pre-activity surveys as discussed above, ensure that the survey data is complete and accurate, and then enter and archive survey information into a database as described in Chapter 4 of the HCP. Upon completion of each activity, the PG&E supervisor/crew foreman or biologist will enter additional notes regarding the AMM implementation into the database.

PG&E will design a database that tracks all Covered Activities and can be queried to determine:
(1) the overall number and percentage of activities for which AMMs were required and implemented,
(2) the number and percentage of all jobs for which required AMMs were implemented for each activity type,
(3) the reason measures are or are not being implemented as indicated in the *Notes* section of the database, and
(4) the number of projects where Covered Species were identified on or near a worksite and AMMs implemented at those worksites.

PG&E will implement several measures to ensure that information in the database is complete and accurate. A trained person performing data entry, who works under the direction of the HCP Administrator, will review all submitted survey data forms to ensure that data forms are complete and legible. Following data entry, the trained staff person will check that data were accurately entered for all species and all sites surveyed. As required by the HCP, the database will include the following attributes to control data quality:

(1) look-up tables with pull-down lists will be used for fields requiring unique values (e.g., species name),

(2) numeric values (e.g., habitat acreage) will be tested against preset maximum and minimum-values to ensure that data are within valid ranges; and,
(3) survey results cannot be finalized if mandatory data (e.g., date) are missing.

PG&E will monitor the adequacy and accuracy of the gathering and the reporting of all collected data by developing a Quality Management Plan, as detailed in Chapter 6 of the HCP document. This plan will be prepared by the end of the first year of HCP implementation and will be approved by the Service and CDFG. The Service and CDFG staff are entitled to inspect PG&E's work areas and PG&E training records.

HCP Monitoring.
PG&E will monitor several key elements of the HCP conservation strategy including implementation of the AMMs, effects and the extent of habitat losses for Covered Species, compliance with compensation requirements, and the effectiveness of the compensation, as detailed in Chapter 6 of the HCP document.

PG&E HCP Administrator will use the database information to: 1) check accuracy of the data entered, 2) identify any problems with implementation of the AMMs, 3) monitor temporary and permanent effects requiring compensation, 4) verify the calculated the area of temporary and permanent habitat loss through random assessments and audits, 5) verify assumptions made in the HCP document about the percentage of each natural vegetation cover type that provides suitable habitat for each species, 6) track compliance with required compensation, 7) recommend modifications to the HCP implementation process, 8) recommend modifications to existing AMMs, or recommend new AMMS to reduce habitat disturbance and take of Covered Species.

The HCP administrator will also use data collected during the previous year to report the area of temporary and permanent habitat loss attributable to effects based on the size of the work area (determined during pre-activity surveys) and the percentage of that area providing suitable habitat for each species. This habitat loss will be calculated for all sites at which pre-activity surveys were conducted and the acres affected will be summed.

Compensation Approach
To offset effects that cannot be avoided or minimized, PG&E will fund the acquisition, enhancement, and maintenance of compensation habitat to conserve and promote contribute to the welfare of sensitive species within the action area.

Compensation will be based on both documented (medium/large activities) and estimated habitat losses (small activities). An estimate of habitat effects expected over the term of the proposed Permit is needed to allow the Service and CDFG to issue permits at this time for a known quantity of habitat disturbance or loss. The estimates of habitat disturbance, loss, and species effects presented in this Opinion will also be used by PG&E to provide compensation in advance of Covered Activities and impacts. Once pre-activity surveys have been conducted, and the work is complete, compensation amounts will be adjusted up or down to reflect the true size and nature of the impacts. Compensation will occur by means of several mechanisms described below.

Information collected in surveys of sites larger than 0.1 acre will be used to estimate suitable habitat losses resulting from activities that affect less than 0.1 acre and for which no pre-activity surveys would be conducted. These small disturbances sites will be assumed to support Covered Species in the same proportion as medium and large sites which had pre-activity surveys, when in fact the areas of small disturbance probably do not support Covered Species habitat to the same extent as the medium and large areas. In this manner, estimates of habitat losses and the required compensation for small disturbances will be conservative.

For the first five years and possibly for the entire Permit duration, PG&E will work with the Center for Natural Lands Management (CNLM) to identify and purchase compensation lands. CNLM will manage these compensation parcels in perpetuity

Compensation Ratios.
All permanent losses of suitable wildlife-habitat will be compensated at a 3:1 ratio. All permanent losses of occupied plant-habitat will be compensated for at a 3:1 ratio. If PG&E determines that minor construction or other medium and large ground-disturbing activities cannot avoid occupied-habitat for a narrowly endemic plant and soil disturbance must occur inside the boundary/polygon of the occupied-habitat, then PG&E will confer with the Service as described above under *Confer Process.* The Confer Process will assess whether the resulting plant-species effect will be temporary or permanent; and discuss a proposed compensation approach

As discussed in above and in Chapter 3 of the HCP document, the vast majority (greater than 95%) of individual Covered Activities that occur each year result in very small (<0.1 acre) temporary-disturbances dispersed over a very large geographic area. Because of the small size of the majority of the individual activities, the habitat will continue to be usable by most wildlife species immediately after the activity is completed (i.e., the habitat will still support most breeding, foraging, sheltering, dispersal, and colonization opportunities). Some species with large home ranges (e.g., raptors and kit fox) would rarely be affected by the disturbance of very small amounts of habitat within their home ranges. In addition, Covered Activities causing temporary disturbance are of short duration (several hours to several days). Most activities result in disturbance that recovers rapidly (1 to 3 years) because the vast majority of these temporary disturbances will occur in areas that were previously disturbed (i.e. existing right-of-ways) or are in land-cover types that recover relatively quickly (i.e., annual grassland). PG&E is also providing permanent habitat protection at the ratio of 0.5:1 to offset effects of temporary disturbance, including making compensation purchases in advance of project effects. Perpetual protection and management of habitats on conservation lands will ensure that there is a net increase in the habitat value of those lands and a net benefit to wildlife. Over time, this increase in habitat value will greatly exceed the effects of temporary habitat losses for wildlife species. Temporary disturbances at small activity sites will be assumed to support Covered Species in the same proportion as temporary disturbances at the medium and large disturbance sites which had pre-activity surveys, when in fact the areas of small disturbance probably do not provide Covered Species habitat to the same extent as the medium and large activity sites. For these reasons, the temporary disturbances of suitable wildlife habitat are considered to have a very low potential for wildlife species effects, therefore, temporary disturbances will be compensated at a 0.5:1 ratio.

Covered-activity impacts to vernal pools could include effects to the physical and/or biological component of the vernal pool ecosystem. Previously undisturbed vernal pool areas could be excavated from the minor-construction-activities (G14, G15, G16, E12, E13, E14, and E15) and from the deeper ground-disturbing covered activities at existing facilities (G8, G9, G10, G11). These eleven activities could result in a permanent loss of vernal pool habitat because they would damage the restrictive soil layer underlying the pool and the adjacent lands, and permanently change watershed contiguity patterns within the pool and the surrounding vernal-pool landscape. If any part of a vernal pool is impacted, then the entire area of the pool is considered directly affected. All direct and indirect effects to vernal pool habitat from covered-activities G14, G15, G16, E12, E13, E14, E15, G8, G9, G10, and G11 will be compensated at the 3:1 ratio. Where the reach of the indirect effects cannot be determined definitively, PG&E shall consider all areas within 250 feet of an impacted vernal pool to be indirectly affected. Likewise, ground disturbance within 250 feet of a vernal pool could permanently affect the hydrology of the pool. Therefore, any soil disturbance from activities G14, G15, G16, E12, E13, E14, E15, G8, G9, G10, and G11 within either the wetted perimeter of a vernal pool or within 250 of a vernal pool will be compensated at the 3:1 ratio. In the event the covered-activity reoccurs at the same site and the direct and indirect effects to both the wetted-area of the pool and the surrounding vernal pool landscape are not larger than the effect already mitigated at that site, then PG&E will not be required to provide additional mitigation; i.e. the total vernal pool mitigation shall not exceed 3:1 at any one pool.

The other covered-activities that excavate, trench, drill or disturb soil layers (i.e. G3, G5, G6, G7, ,G12,G13, E5, E6, E7, E8, E9, E10c, E10b, E10d, or E11) are smaller and will occur on existing PG&E facilities. The vernal pool landscape at existing facilities has been excavated or disturbed previously, so some damage to the restrictive layer may have occurred prior to implementation of the covered activity. Therefore, the quality of vernal pool habitat at the existing facilities may not be substantially changed by implementing additional O&M activities at those facilities. If the Service, CDFG, and PG&E biologist determine that additional soil disturbance from covered-activities G3, G5, G6, G7, ,G12,G13, E5, E6, E7, E8, E9, E10c, E10b, E10d, or E11 occurring within 250-feet of a vernal pool could not change the existing habitat quality of that vernal pool, then the area of indirect effect may be compensated using the 0.5:1 ratio. In the event the covered-activity reoccurs at the same site within three years and the direct and indirect effects from the subsequent covered-activity are the same, no additional mitigation will be provided in that three-year period. The total mitigation over the term of the permit shall not exceed 3:1 at any one vernal pool. Any soil disturbance from covered-activities G3, G5, G6, G7, ,G12,G13, E5, E6, E7, E8, E9, E10c, E10b, E10d, or E11 which occurs inside the wetted perimeter of a vernal pool or swale shall be compensated at the HCP's 3:1 ratio for wetland effects.

PG&E will also use the methodology described above to quantify any direct and indirect effects to occupied habitat for the vernal-pool plant covered-species (i.e. Hoover's spurge (*Chamaesyce hooveri*), legenere (*Legenere limosa*), succulent owl's clover (*Castilleja campestris ssp. succulenta*), pincushion navarretia (*Navarretia myersii ssp. myersii*), Colusa grass(*Neostapfia colusana*), San Joaquin Valley Orcutt grass(*Orcuttia inaequalis*), hairy Orcutt grass(*Orcuttia pilosa*), Greene's tuctoria (*Tuctoria greenei*) and Boggs's Lake hedge-hyssop (*Gratiola*

heterosepala). The amount and type of compensation provided for the vernal-pool plant covered-species shall be the same as that provided for the vernal-pool shrimp covered-species – each acre of vernal pool habitat compensated at 3:1 ratio will include a minimum of 2 acres of vernal pool preservation and up to 1 acre of created vernal pool. The affected vernal-pool plant covered-species shall occupy the vernal pool(s) selected for preservation. The information will be captured in PG&E's GIS system. In the event the covered activities reoccur at the same vernal pool plant site within 3 years and the direct and indirect effects from the subsequent covered activities are no larger that the effects already mitigated, no additional mitigation will be required. The total vernal pool plant mitigation will not exceed 3:1 at any one vernal pool.

Compensation for vernal pool impacts will entail permanent preservation of vernal pools and the creation of vernal pools. As discussed on HCP page 4-14, each acre of wetland habitat compensated at 3:1 ratio will include a minimum of 2 acres of vernal pool preservation and up to 1 acre of created vernal pool. At least one of the three vernal-pool shrimp covered-species (vernal pool fairy shrimp, vernal pool tadpole shrimp, or midvalley fairy shrimp) shall occupy the vernal pools selected for preservation. If a vernal pool plant covered-specie is affected, the vernal pool area preserved for compensation shall be occupied by that plant covered species. Compensation for vernal pool impacts will occur off site, at existing Service-approved mitigation banks.

Quantity of Compensation.
Temporary effects will be mitigated at a ratio of 0.5:1 and permanent effects will be mitigated at a ratio of 3:1. Loss of wetlands, including vernal pools, will be compensated at the ratios discussed above under *Compensation Ratios* using existing mitigation banks. Based on the estimated area of habitat disturbance per year (HCP Table 3-1) and the methodology for calculating effects described below in the Opinion section titled *Evaluation Methods*, PG&E will fund the acquisition, enhancement, and maintenance of approximately 43 acres of compensation lands each year of the Permit. PG&E will provide a total of approximately 1,350 acres of compensation over the 30-year term of the proposed Permit. PG&E will provide approximately 225 acres of compensation in the first 5 years of effects to ensure that compensation stays ahead of impacts.

Vernal pool effects and compensation were estimated separately in the HCP. Vernal pool impacts are most likely in counties with the greatest density of vernal pools. Estimates of direct temporary and permanent vernal pool habitat impacts were summed from HCP Table 3-9 to arrive at an estimated annual direct impact of 0.577 acre per year. The HCP defined direct vernal-pool effects as those occurring within the wetted perimeter of a vernal pool. In addition to the direct effects, indirect effects will occur from the covered activities. Vernal pool habitat indirectly affected would include all habitat supported by upland areas and all habitat otherwise damaged by effects to the watershed, introduced species, human intrusion, or pollution caused by a covered activity. Where the reach of these indirect effects cannot be determined definitively, the Service considers all area within 250 feet of a vernal pool to be indirectly affected. If any habitat within a vernal pool complex is impacted, then all remaining habitat within the complex should be considered indirectly affected (see Service 1996). Examples of potential indirect effects from PG&E Covered Activities include possible disruption of hydrological integrity within a vernal pool, disruption of hydrological integrity within the associated upland habitat, or

disruption of hydrological integrity within the vernal pool complex. Other potential indirect effects to vernal pool habitat could result from dust generated during covered activities and subsequently deposited within vernal pools adjacent to work sites. Water and habitat quality could be reduced by a variety of indirect effects associated with Covered Activities. Covered Activities also have the potential to spread invasive weeds that could reduce habitat quality within vernal pools or their associated uplands. As discussed on page 4-21 of the HCP, PG&E estimated that an area one-half times size of the direct vernal pool impacts may experience indirect effects to the surrounding vernal-pool landscape. Therefore, PG&E multiplied the estimated annual direct vernal pool impact (0.577 acre) by 1.5 to estimate an annual indirect vernal pool impact of 0.29 acres. The combined direct and indirect vernal-pool impact is 0.8655 acre annually (25.9 acres over 30 years).

To estimate the quantity of compensation required for project effects to vernal pool habitat, PG&E applied the 3:1 compensation ratio to the annual direct vernal pool effects (0.577 acre) and applied the 0.5:1 compensation ratio to the annual indirect vernal pool effects (0.29 acres). PG&E estimates they will provide approximately 1.875 acres of vernal pool compensation annually, or 56.26 acres over the 30-year permit term. After the first five years of the project, the amount of compensation will be adjusted (either up or down) based on the actual vernal pool habitat effects documented from the completed Covered Activities. PG&E will provide compensation based on actual effects to vernal pool habitat, but the compensation acreage will always be in place before vernal pool impacts occur.

The actual direct and indirect effects to vernal pools will be quantified in the field by PG&E during the pre-activity surveys for medium and large Covered Activities, and estimated for the small-disturbance Covered-Activities. During the pre-activity survey, a qualified biologist will determine if vernal pools or their associated swales and uplands are present in the activity site or in the access area. If vernal pools are present, the biologist will recommend specific avoidance and minimization measures, as discussed in HCP Table 4-9. If a medium or large activity cannot avoid a vernal pool or cannot avoid lands within 250-feet of any vernal pool, then PG&E will quantify the actual direct and indirect vernal pool impacts using the methodology excerpted from the Service's Programmatic Formal Endangered Species Consultation To The Sacramento District Of The USACE For Projects With Relatively Small Effects On Listed Vernal Pool Crustaceans (Service 1996) as presented in the Permit. If any part of a vernal pool is impacted, then the entire area of the pool is considered directly affected. A qualified PG&E biologist will use GPS or other appropriate methods to accurately determine the entire area of the pool, defining the perimeter of the pool using Army Corps of Engineer guidelines. Actual indirect effects to vernal pool habitat will also be calculated during pre-construction surveys following the methodology excerpted from Service 1996. Vernal pool habitat indirectly affected include all habitat supported by impacted upland areas and swales and all habitat otherwise damaged by loss of watershed, loss of hydrological integrity, human intrusion, introduced species and pollution caused by the covered activity. Where the reach of these indirect effects cannot be determined definitively, all areas within 250 feet of the vernal pool shall be considered indirectly affected. Likewise, any ground-disturbing Covered Activities occurring within 250 feet of a vernal pool will indirectly affect the vernal pool. If any habitat within a vernal pool complex is disturbed or destroyed, then all remaining habitat within the complex may be indirectly affected.

PG&E will seldom conduct protocol-level surveys for the vernal-pool shrimp covered-species prior to conducting Covered Activities in a vernal pool or in adjacent upland areas surrounding a vernal pool. Where protocol-level surveys are not conducted to determine presence of shrimp covered-species, PG&E will consider the vernal pool to be occupied by all three vernal-pool shrimp covered-species (vernal pool fairy shrimp, vernal pool tadpole shrimp, Midvalley fairy shrimp). When PG&E does not conduct protocol-level surveys for shrimp covered-species during their pre-construction survey, PG&E will consider 100% of the total area of a vernal pool impact (i.e. the sum of the direct and indirect effects) to be occupied by all three shrimp species. PG&E will conduct pre-activity surveys for vernal-pool plant covered-species when an activity site occurs within vernal pool habitat and is within one mile of any CNDDB occurrence for a vernal pool plant species or is otherwise within the known range of a vernal-pool plant species. PG&E will strive to conduct surveys for vernal pool plant covered-species at the appropriate time of the year (HCP Table 4-10). If plant surveys cannot be conducted at the appropriate time of the year, PG&E shall assume the vernal pool is occupied by a vernal pool plant species if any CNDDB occurrence for the plant is within 250 meters of the vernal pool activity site.

PG&E will compensate direct and indirect effects to vernal pools and adjacent vernal-pool landscape as explained above under *Compensation Ratios.*

Compensation for temporary losses of valley elderberry longhorn beetle habitat from routine operations and maintenance activities - both in the Action Area and system-wide - is described in and satisfied by the *Valley Elderberry Longhorn Beetle Conservation Program* (Appendix D)

Because this compensation program includes permanent compensation for temporary effects, possible effects from "other disturbance" (i.e. disturbance which does not disturb land-cover such as tree trimming or off-road travel) will be sufficiently compensated for by the program.

Compensation Land Attributes

The 43-acres of annual compensation represent the minimum acreage of land that would have to be provided to meet the compensation needed in each HCP land cover type. It is unlikely PG&E can acquire parcels of land with exactly the compensation acreages needed for each land-cover type, and thus some additional land would need to be acquired annually. The 43-acre total assumes that the acreages of compensation lands acquired within each land-cover type will support multiple covered-species (see *Suites of Coexisting Wildlife Species* below). HCP Table 4-11 shows the sum of temporary and permanent estimated compensation acres of each HCP land-cover type needed for each wildlife covered-species, based on the covered-activity information, regional distribution of PG&E facilities, expected ground-disturbance in land-cover type disturbances, species ranges in the San Joaquin Valley, and percent of habitat each land-cover type the HCP determined suitable for occupancy by the each covered-species that are affected. PG&E will provide a total of approximately 1,350-acres of compensation over the 30-year term of the proposed Permit. PG&E will provide approximately 225-acres of compensation in the first 5 years of effects to ensure that compensation stays ahead of impacts. Compensation lands in each land-cover type will be selected to satisfy habitat requirements of the affected covered species. However, several general attributes that affect the condition and management of most habitats: 1) larger contiguous areas of habitat are preferable to an equal acreage of smaller discontinuous areas; 2) compensation habitat should be surrounded by compatible land

uses; 3) compensation lands should be integrated with other related conservation efforts; and 4) compensation habitat that is "in kind" and close to the affected disturbance site is preferable to more distant habitat or different (out of kind) habitat types. Numerous other species attributes (e.g., specialized foraging or reproductive requirements) determine if suitable wildlife habitat for a particular species is present. HCP Chapter 4 describes the attributes of the four main land-cover types where compensation lands will be acquired [Grassland, Oak Woodland, Upland Scrub, and Riparian &Wetland (including permanent freshwater wetlands, vernal pool, and other seasonal wetlands]. Additional attributes of HCP compensation lands are discussed below under *Location of Compensation* and under *Compensation Type*. Habitat requirements needed for each affected wildlife covered-species are discussed in HCP Chapter 5 and below in the *Species by Species Evaluations* portion of this Opinion. Compensation lands for affected plant covered-species will include occupied habitat, or will other wise benefit the affected plant species, as discussed below under *Five Mechanisms for Compensation.* Monitoring of compensation lands and monitoring the amount of compensation required are discussed below under *Monitoring* and *Reporting*.

The compensation lands are expected to provide a greater area of wildlife habitat than the habitat lost from Covered Activities. First, PG&E is providing permanent compensation for temporary-disturbance habitat effects. Second, the area of the compensation lands will be substantially more than the maximum area of habitat in a disturbed state because grassland effects often recover within several years. Third, although the effects of a small activity on an individual wildlife species may be disproportionately less severe than the effects of a larger activity (e.g., an activity resulting in effects >0.1 acre), the compensation for all effects will be provided on a per-acre basis. For example, activities causing habitat loss of less than 0.1 acre usually affect an insignificant proportion of the home range of species such as Swainson's hawk or San Joaquin kit fox, and thus probably have no effect on these wildlife species. Nevertheless, these small acreages will be mitigated.

Timing of Compensation.
Compensation will be proposed in 5-year increments by PG&E for approval by the Service and CDFG. The purchase of compensation lands in advance of project effects also serves to ensure that benefits accrue to the species before the effects occur. As Covered Activities occur over the 5-year period subsequent to advanced compensation, any surpluses and deficits that arise will be addressed by adjusting the compensation requirement during the subsequent 5-year compensation period. Toward the end of the 5-year period, the amount of advance compensation will decline. If it appears that the required amount of compensation will exceed the amount remaining in that 5-year increment, PG&E will either purchase the next 5-year increment early, or purchase sufficient compensation so that project compensation stays ahead of impacts. By providing compensation in 5-year increments and purchasing additional compensation lands early if it appears that they will run out of excess compensation, PG&E's compensation actions will occur ahead of the actual project impacts throughout the term of the Permit.

Compensation for plant covered species will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

PG&E will provide an annual report to the Service, which describes their anticipated actions to acquire additional lands in advance of impacts, as discussed below under *Reporting*. Efforts to acquire compensation for years 5 through 10 of the Permit will begin 1 year in advance of the anticipated use of remaining compensation, and compensation will always stay ahead of impacts.

Location of Compensation.
Compensation areas will be regionally located in the north San Joaquin Valley (San Joaquin Stanislaus, and Mariposa Counties), central San Joaquin Valley (Merced, Madera, and Fresno Counties), or south San Joaquin Valley (Kings, Kern and Tulare Counties) so that compensation occurs near the area of the disturbance. The HCP estimated that the total compensation requirements over 30 years would include approximately 1,300 acres of grassland, 30 acres of threatened and endangered plant habitat, and 56 acres of wetlands. Based on the HCP impact analysis it was estimated that 27% of the total compensation requirement would occur in the northern region, 38% in the central region, and 35% in the southern region. The compensation requirements were based on the estimate of the type and amount of land-cover disturbed within each region over the next 30 years.

In the first 5 years, 58.64 acres, 74.02 acres, and 89.13 acres of compensation will be purchased in the north, central, and south San Joaquin Valley regions, respectively. HCP Tables 4-11, 4-12 and 4-13 provide a summary of effects, the estimate of regional compensation, and the target species the regional compensation addresses. It is unlikely that parcels of land can be acquired with exactly these acreages for each land-cover type, and thus some additional land would need to be acquired. After the first 5 years of the project, the regional distribution of compensation lands and the species it addresses will be adjusted (either up or down) based on the actual habitat effects documented from pre-activity surveys and accounting results.

Because 26%, 59%, and 14% of wetlands are distributed in the north, central, and south San Joaquin Valley regions, respectively, vernal pool compensation will likely be acquired in 1.01-, 2.3-, and 0.55-acre increments in each region, respectively. It is unlikely that parcels of land can be acquired with exactly these acreages, and thus some additional land would need to be acquired.

Compensation lands for effects to plant-species will be located in areas that include occupied habitat for that plant-species, or directly benefits that plant species.

Compensation Type
Compensation will be based on the acres of suitable wildlife-habitat affected and acres of occupied plant-habitat affected. Compensation lands will demonstrate habitat characteristics similar to those disturbed by the Covered Activities. Depending on the species and habitat requiring compensation, compensation sites will have occupied habitat (e.g. a direct or indirect effect on a specific plant population will require compensation to include occupied habitat), or suitable habitat (e.g., the temporary disturbance of San Joaquin kit fox suitable habitat will require compensation to include suitable San Joaquin kit fox habitat). The Service refers to this type of compensation as "in-kind compensation".

Suites of Coexisting Wildlife Species.
Most land-cover types support multiple co-existing Covered Species (HCP Tables 3-10, 4-11, and 4-12). The HCP grouped wildlife Covered Species with co-existing habitats and ranges into 10 suites of co-existing species:

1. Vernal pool fairy shrimp, midvalley fairy shrimp, vernal pool tadpole shrimp, California tiger salamander
2. California tiger salamander, California red-legged frog, Giant garter snake.
3. California tiger salamander, San Joaquin kit fox.
4. Blunt-nosed leopard lizard, Tipton kangaroo rat, San Joaquin antelope squirrel, San Joaquin kit fox.
5. Blunt-nosed leopard lizard, giant kangaroo rat, San Joaquin antelope squirrel San Joaquin kit fox.
6. Blunt-nosed leopard lizard, San Joaquin antelope squirrel, San Joaquin kit fox.
7. San Joaquin antelope squirrel, San Joaquin kit fox.
8. San Joaquin kit fox.
9. Riparian brush rabbit, riparian woodrat.
10. Limestone salamander.

The acquisition of grassland land-cover for Suites 1-8 in the above list will also provide foraging habitat benefits for bald eagle, golden eagle, white-tailed kite, and western burrowing owl.

For each land-cover type in each region, the co-existing wildlife species with the most effected habitat (i.e. the species which requires the most compensation acreage) was identified, and that compensation amount was used as the required compensation needed for that land-cover type in that region. This assumes that all compensation acreage for the most widespread covered species within the land-cover type will also provide habitat for all of the other covered species requiring compensation for disturbance to that land-cover type and in that region of the San Joaquin Valley. HCP Compensation for species effects will be obtained largely through acquiring grassland habitat that is suitable for a suite of species. Acquired San Joaquin Valley grasslands should provide foraging habitat for covered large and small mammals, raptors, and reptiles and, depending on the proximity to water, dispersal habitat for amphibians. Other suitable habitats will also be acquired to achieve species requirements. The estimated acreages required in each region to achieve compensation for each suite of coexisting species are shown in HCP Table 4-12. Plant covered species were not grouped into suites.

Five Mechanisms for Compensation.
PG&E proposes to compensate for species effects through five mechanisms. As discussed in Chapter 4 of the HCP document, these mechanisms may be combined in various configurations, including purchase of compensation lands, purchase of mitigation credits from existing mitigation banks, placement of conservation easements on PG&E lands, and purchase of conservation easements. PG&E will place an emphasis on the purchase of compensation lands, purchase of credits from mitigation banks, and placement of conservation easements on PG&E lands. The use and purchase of proposed compensation lands is subject to Service and CDFG approval and will be lands protected and maintained in perpetuity.

PG&E will purchase high-quality land (i.e., predominantly native or unimproved land) suitable to support the effected Covered Species and will place conservation easements on these lands. In consultation with both the Service and CDFG, PG&E will survey and rank conservation lands based on 1) the proximity of the site to other compensation lands or mitigation banks, 2) the proximity of the site to other important habitats (e.g. wetlands, vernal pools, riparian areas) that may not be a target of compensation efforts, 3) minimum of past site disturbance or high capability of restoration from disturbances, 4) verification of demonstrated species use and, 5) overall habitat suitability and quality. Specific site selection criteria are described in HCP Chapter 6. The attributes of compensation parcels, the land acquisition process, approval of compensation lands, and post-acquisition requirements are further defined in the final Implementing Agreement and in Chapter 4 of the HCP. PG&E will work with qualified organizations such as the Center for Natural Lands Management, The Nature Conservancy, and Wildlands, to manage their compensation parcels.

Mechanism 1: Purchase from Existing Mitigation Banks: Any conservation credits purchased by PG&E will be from Service-approved mitigation banks. PG&E conducted an inventory of existing conservation and mitigation banking opportunities in the San Joaquin Valley in fall 2002. At that time, there were 15 mitigation banks with credits available, as well as several prospective mitigation banks in development. There appeared to be sufficient mitigation bank credits in the northern and southern San Joaquin Valley to meet PG&E's needs but insufficient bank capacity in the central San Joaquin Valley.

Mechanism 2: Conservation Easements on Existing PG&E Lands: Several PG&E land holdings in the San Joaquin Valley provide potential habitat for covered species. Ten parcels were evaluated for endangered species habitat and suitability as compensation land. Five of the parcels were identified as suitable to support several of the covered species. Use of conservation easements on these parcels will be subject to the review and approval by Service and CDFG. All conservation easements will be protected in perpetuity.

Mechanism 3: Purchase Conservation Easements. It may not be feasible to purchase conservation credits for some narrowly-endemic plant covered-species or susceptible wildlife covered-species from existing mitigation banks. Furthermore, because of timing issues, determination of the presence of plants may not be possible when pursuing the purchase of a conservation parcel. In these instances, PG&E will secure conservation easements from willing landowners where occupied habitat for plants is identified in a PG&E right-of-way. PG&E would tailor management plans to meet the needs of each landowner and the biological goals of the specific Covered Species. All conservation easements will be subject to the review and approval of the Service and CDFG. All conservation easements will be protected in perpetuity.

Mechanism 4: Enhancement as Compensation: Enhancement of plant or wildlife covered-species occupied habitat is another possible compensation tool. In the event a plant or wildlife covered-species is identified within a ROW during pre-activity surveys, a qualified biologist will identify actions that could enhance habitat conditions.

Compensatory enhancement and its contribution toward HCP compensation obligations will be contingent on Service and CDFG advance approval. If approved, this compensation approach would be quantified through PG&E's documentation of pre- and post-enhancement of the species population attributes (e.g., number of individuals, density, and extent). Specific survey and monitoring design, and the compensation value associated with enhancement, will need the advance approval of the Service and CDFG. If this option is selected, the habitat enhancement will be implemented within two years of the project impact.

Mechanism 5: Donate Money to a Conservation Organization:
In the event that narrowly endemic plant covered species compensation areas or susceptible wildlife covered-species compensation areas cannot be established through any of the foregoing mechanisms because of the rarity of a species, PG&E might donate money to a conservation organization (e.g., The Nature Conservancy, a local land trust, or the USACE Wetland Plant Conservation Program) for use in habitat acquisition, habitat preservation, or habitat restoration which benefits the species that was impacted. Habitat compensation would be in a manner that is consistent with the HCP's conservation strategy of mitigating for permanent effects at a ratio of 3:1 and temporary effects at a ratio of 0.5:1. The amount of money will be based on the relative size of the disturbance to the species, current land values in the vicinity of the sensitive species, and the long-term management costs needed to maintain a parcel of equivalent size. The HCP states that donations to conservation organizations are expected to be a very small percentage of the HCP's total conservation efforts. These donations will be subject to the review and approval of Service and CDFG. The need to use the Conservation Organization Donation compensation-mechanism will be discussed with the Service and CDFG prior to PG&E implementing any activity that could affect such covered-species. Donations must be completed within two years of impacts.

Management of Compensation Lands.
The major goal for all compensation land management and habitat enhancement activities is the maintenance and protection of habitat quality for Covered Species. To ensure this end, PG&E will design management plans for each conservation parcel in consultation with both the Service and CDFG within 120 days of the acquisition of the compensation lands. Required content of these management plans is described in Chapter 4 (page 4-26) of the final HCP document.

Monitoring
PG&E will monitor elements of the HCP Conservation Strategy annually, as discussed in HCP Chapter 6. Monitoring results and their relevance to the HCP Biological Goals and Objectives will be summarized in the HCP annual report, discussed below.

Monitoring AMMs Implemented.
PG&E staff will record the number and type of AMMs implemented each year, as discussed in HCP Chapter 4(Data Archiving, page 4-15) and HCP Chapter 6 (Monitoring AMMs, page 6-2).

Monitoring Effects Requiring Compensation .
The HCP administrator will use data collected during the previous year to report the area of temporary and permanent habitat loss attributable to covered-activities based on the size of the work area (determined during the pre-activity surveys) and the percentage of that area providing suitable habitat for each species. This habitat loss will be calculated for all sites at which pre-activity surveys were conducted and the acres affected will be summed. Because pre-activity surveys will be conducted prior to all non-emergency medium and large disturbance activities with effects to natural land-cover, this sum will reflect the majority of the expected habitat loss from O&M activities.

Habitat lost because of emergency activities and small-disturbance activities (see Chapter 3, "Analysis of Habitat Disturbance for Covered Species") will be estimated using the HCP habitat effect methodology and added to habitat losses documented for surveyed activities, for the duration of the Permit.

Monitoring Compliance with Compensation Requirements.
Compliance with the required compensation will be tracked using the database documenting the impacts and the amount and locations of habitat preserved to mitigate impacts. The HCP administrator will include a report on impacts and the accompanying compensation in the annual HCP Monitoring Report, as described in Chapter 6 of the HCP.

Compensation Effectiveness.
Two types of monitoring will occur to evaluate whether compensation lands achieve their desired results. These include monitoring of proposed acquisition parcels to ensure the habitat is suitable for Covered Species, and long-term habitat monitoring to ensure the habitat remains suitable for Covered Species. Details of required compensation monitoring are presented in Chapter 6 of the HCP document. Monitoring of plant compensation parcels would need to be conducted annually to guide site management.

Reporting
PG&E will prepare an annual HCP Monitoring Report for the Service and CDFG. This report will present the results of all analysis of data collected during the previous period as described in Chapter 6 of the HCP document. The annual HCP Monitoring Report will include impacts and the accompanying compensation. The compensation monitoring section of the report will summarize the amount of habitat disturbance by species, the compensation required to mitigate habitat disturbance, and the compensation acreage procured or dedicated to offset those effects. The report will also summarize a running total of disturbance impacts and compensation over the life of the project. This documentation will be used to verify if PG&E is meeting its commitment to achieve a level of compensation that meets or exceeds the requirements of the HCP. The report will indicate if credits acquired in previous years are being applied to the current year's compensation. The compensation element of the HCP Monitoring Report will provide details of compensation actions, including copies of deeds for all land purchases and contracts for compensation transactions. Furthermore, the report will describe anticipated actions to acquire additional lands in advance of impacts. This will help ensure that the HCP's Biological Goals and their objectives are achieved. Efforts to acquire compensation for years 5

through 10 of the Permit will begin 1 year in advance of the anticipated use of remaining compensation, and compensation will always stay ahead of impacts.

The Service will presume use of the general AMMs on all Covered Activities, unless a specific AMM is not appropriate for that activity. Likewise, the Service will presume that the PG&E Vegetation Management staff will use each BMPs listed on HCP Table 4-7 and Table 4-8, unless a specific BMP is not appropriate for that activity. PG&E is not required by the Service to provide detailed reports to the Service on the use/application of many general AMMs (AMMs 1-11) or PG&E's use of most vegetation management BMPs.

Adaptive Management Program

Based on the information collected through the survey, monitoring, and reporting efforts, PG&E will employ an Adaptive Management Program (AMP) to modify or revise its conservation strategy to improve its effectiveness. The AMP is an integral component of the HCP.

Some uncertainty exists about the number of Covered Activities, the precise size of disturbance created by each activity, and the effects of these activities on habitat for Covered Species. Implementing the consistent, area-wide AMP will provide greater certainty with respect to tracking the total number of Covered Activities that occur, where these activities occur, the average disturbance size created by each covered activity, and the implementation of AMMs to reduce effects to habitat and species.

There are several types of feedback loops in the HCP monitoring which provide mechanisms to adjust the conservation strategy:

- the estimates of the average area of habitat disturbed by each activity such that compensation will always precede and exceed impacts,
- the percentage of disturbed habitat that is considered suitable for species occupancy,
- the frequency of implementation of AMMs,
- the amount of compensation land provided (based on above information), and
- the management of suitable compensation lands.

PG&E will conduct an audit of Covered Activities every third year for the first 10 years to ensure that the disturbance estimates are accurate and the AMMs are effective. PG&E will design an auditing study during the third year of HCP implementation which will include samples of small- and large-disturbance activities and sites where species were documented as present or not present in pre-activity surveys. The sample size will be between 50 and 200 activities, to be determined by PG&E's auditing risk management team, but will be large enough to provide a rigorous evaluation of disturbance estimate sizes, and large enough to determine whether alternative or revised AMMs could be implemented. PG&E may also conduct additional assessments to ensure disturbance accounting is accurate.

Revise Estimate of Disturbance for Each Covered Activity.

The AMP allows estimates of the average area of land-cover disturbed by each covered activity to be adjusted with concurrence of the Service and CDFG based on data collected during the first audit in year 3. Adjusting these estimates will help forecast which activities are actually larger

than 0.1 acre, and need a pre-activity survey (e.g., if additional activities need to be monitored or additional pre-activity surveys are needed) and better predict future compensation needs such that compensation will always precede and exceed impacts.

Revise Estimates of Habitat Suitable for Occupancy.
The AMP allows the percentage of disturbed land-cover considered suitable for species occupancy to be revised with concurrence of the Service and CDFG based on pre-activity surveys after the first 3 years, including the first audit in year 3. Pre-activity surveys will provide useful information on the quality and type of habitat being disturbed and the likelihood that species are present. Adjusting the assumptions made in the HCP document will help PG&E better forecast of which Covered Activities are most likely to affect species, and better project future compensation needs.

Adjust Frequency of AMM Implementation.
The frequency (including duration and location) of implementation of the Additional-AMMs (AMMs 11-30) may be revised with concurrence of the Service and CDFG based on the results from the first 3 years of database information, and from the first audit in year 3. If the AMMs are being implemented less than 80% of the time for all activities and less than 90% of the time for activities where species were identified as being on-site, PG&E will investigate and report the reasons. Adjusting the frequency, location, and duration of AMMs will help ensure that the measures are being applied in locations where they will best avoid and minimize effects on Covered Species.

Adjusting the type of AMMs.
If the audit reveals that alternative avoidance measures could be implemented and a biologist is able to identify additional species-specific protection measures that are practicable, PG&E will use the Adaptive Management Program to develop, expand, or integrate new AMMs to address the species. Any changes in AMMs or AMM implementation will be approved by the Service and CDFG.

Adjusting the Management of Compensation Lands.
If the monitoring of compensation lands indicate habitat values are declining for Covered Species, PG&E or their designated land manger will evaluate and test techniques to improve habitat conditions. For example, vegetation reduction techniques may be needed following high rainfall years to maintain habitat suitable for blunt-nosed leopard lizards, kangaroo rats, antelope squirrels and other desert-adapted species of the San Joaquin Valley. Subsequent compensation lands management actions will be evaluated for their effectiveness and used to shape future management decisions.

General Assessment.
After the first several years of HCP implementation, PG&E, the Service, and CDFG will have a more detailed understanding of the activities, Covered Species, AMMs, and overall program estimates. This information will be used to determine whether the overall compensation program is sufficient. As part of this process, PG&E will ensure that compensation is always maintained in advance of project effects for wildlife covered-species and the plant covered-species which are not classified as a narrowly-endemic plant species. Efforts to acquire future increments of

compensation will begin at least 1 year in advance of the anticipated use of the remaining compensation. Compensation for plant covered-species will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

The HCP's Monitoring, Reporting and Adaptive Management Program shall track the number and location of "minor construction" covered activities G16, E12, E13, line extensions over the 30-year Permit term in relation to the 2007 existing transmission and distribution facilities. PG&E will initiate a separate ESA consultation with the Service if an increment of new line would cumulatively add more than one mile to the existing facilities.

PG&E responsibilities for implementing the AMP include:

- gathering monitoring data and maintaining databases;
- assessing results of avoidance, minimization, and compensation measures;
- identifying the need to modify avoidance, minimization, and compensation measures;
- funding implementation of the AMP;
- identifying the need for changes to the HCP avoidance, minimization, and compensation measures and implementing changes that are within the authorization of the HCP incidental take permit; and
- recommending changes to the Service and CDFG that may require modification.

Unforeseen Circumstances/"No Surprises"/ Changed Circumstances

"Unforeseen circumstances" is defined as changes in circumstances affecting a species or geographic area covered by a habitat conservation plan that could not reasonably have been anticipated by plan developers and the Service at the time of the plan's negotiation and development, and that result in a substantial and adverse change in the status of the Covered Species (50 C.F.R. 17.3).

The "No Surprises" Rule states, in part, that when negotiating unforeseen circumstances, the Service will not require the commitment of additional land, water or financial compensation or other natural resources beyond the level otherwise agreed upon for the species covered by the habitat conservation plan without the consent of the Permittee (63 FR 8859).

The assurances contained in the No Surprises rule apply only "where the conservation plan is being properly implemented, and apply only with respect to species adequately covered by the conservation plan". For purposes of the No Surprises assurances, the term "operating conservation program" shall mean the specific conservation, mitigation/compensation, and management measures provided under the HCP to minimize and mitigate the impacts of incidental take of the Covered Species.

Another category of circumstances under the Federal "No Surprises" rule is "changed circumstances". This term is defined under the rule as: "*changes in circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by plan developers and the Service and that can be planned for (e.g., the listing of a new species, or a fire or other natural catastrophic event in areas prone to such events)*" (50 FR 17.3). A number of possible changed circumstances are addressed in Chapter 6 of the HCP document and

Section 11.3 of the IA. The following changed circumstances are recognized and funded by this Plan.

- New Listing of a Covered Species
- New Non-Covered Species Listed.
- Vandalism on Compensation Areas /Compensation Lands
- Fire at Compensation Areas/Compensation Lands.
- Flood on Compensation Areas /Compensation Lands
- Landslides and Wind/Water Erosion
- Prolonged Drought
- Invasion of Exotic Species at Compensation Areas/Compensation Lands.
- Emergency Maintenance of PG&E Facilities, including those in and near preserves.
- Pond or Wetland Control Structures Fail.
- Multiple Changed Circumstances in temporally proximity

Enforcement, Amendments, and HCP Requirements

The IA and other binding legal documents for this HCP provide direction on the enforcement and monitoring of AMMs and conservation activities for PG&E and their 3rd party contractors. The Service may suspend the Permit of a Permittee if that Permittee fails to implement a HCP in accordance with the terms and conditions of the Permit and as provided for under applicable regulations. Suspension or revocation of a section 10(a)(1)(B) permit, in whole or in part, by the Service shall be in accordance with 50 CFR 13.27-29 and the final IA.

There are three types of changes which may be made to this HCP and/or the Permit and/or its associated documents: (1) minor amendments, (2) major amendments, (3) new minor construction. Any changes, revisions, modifications, or amendments shall be in accordance with all applicable legal requirements, including but not limited to the ESA, NEPA, CESA, CEQA, and any other applicable State and Federal laws and regulations. PG&E shall process all modifications and amendments to the HCP, circulating proposed changes to all IA Parties (Service, CDFG, and PG&E) and, if appropriate, approving the amendment or revision by action of all IA Parties.

Minor Amendments.

Minor Amendments to the Permit, the IA and the HCP may include but are not limited to the following:

- Corrections of typographical, grammatical, and similar editing errors in the HCP and the IA that do not change the intended meaning;
- Correction of any maps or exhibits to correct errors in mapping;
- Minor changes to survey, monitoring or reporting protocols;
- Changing any measure(s) in the Conservation Strategy to respond to a Changed Circumstance identified above.
- Correction of any tables or appendices in the HCP to reflect previously approved amendments to the HCP or the Federal and State Permits; and

- Amendments to the Permits that would not significantly modify the scope or nature of the Covered Activities or the minimization, compensation or monitoring measures in the Permits, as determined by the Service and CDFG.

Any party to the IA may propose a Minor Amendment to the Federal and State Permits, the IA and the HCP by providing written notice to all other Parties. Such notice shall include a statement of the reason for the proposed amendment and an analysis of its environmental effects, if any, including any effects on Covered Activities and on Covered Species, and any other information required by law. The Parties shall respond in writing to the proposed amendment within sixty (60) days of receipt of such notice.

Major Amendments.
All changes to the Permit, the IA, and the HCP that do not qualify as a Minor Amendment may be processed as a Major Amendment in accordance with all applicable laws and regulations, including but not limited to ESA, NEPA, CESA and CEQA. The party proposing the Major Amendment shall provide a statement of the reasons and an analysis of its environmental effects, if any, including its effects, if any, on Covered Species and Covered Activities under the HCP.

New Type of Minor Construction.
During the term of the Permit, PG&E may need to engage in minor construction activities that are not specifically included above as Covered Activities ("New Type of Minor Construction"). These activities may be necessary to respond to human population increases that were not reasonably foreseeable at the time of the preparation of the HCP, or to comply with new Federal or State regulatory mandates enacted during the term of the Permit. Nothing in the IA, the HCP, or the proposed Permit limits PG&E's right to engage in other New Minor Construction in the action area that is not specifically included as a Covered Activity. Nothing in the proposed Permit, the IA, or the HCP requires PG&E to amend the HCP or the Permit to include such New Minor Construction. Any such New Minor Construction shall have a separate ESA consultation, and any take of covered species is authorized and permitted separately. Unless such New Minor Construction is added to the Permit through either the Minor or Major Amendment processes provided (as above and in Section 10.4 of the IA), these new activities will be not be covered by the Permit.

PG&E may seek take authorization from the Service and CDFG for new minor construction in the action area pursuant to the minor- or major-amendment process and controlling law. The Service may provide take authorization to PG&E for such new minor construction as a major or minor amendment of the proposed Permit. Any such activities that PG&E successfully includes for coverage under the Permit through the minor or major amendment process will thereafter be a covered activity. All subsequent references to the HCP will include a reference to such new minor construction. All provisions of the IA, the HCP, and the proposed Permit will apply to those new minor construction Covered Activities. No modification or other change to any provision of the implementing agreement, the HCP, and the Federal and State permits, including levels of authorized take, will be implied, unless such provision is specifically amended in writing during the amendment process.

PG&E may propose to add new types of minor construction, by providing to the Service and CDFG a proposal for new minor construction that includes:

- A map showing that the new minor construction is within the action area;
- A concise description of the new minor construction;
- A discussion, based upon the best currently available information, of the land-cover types, the species habitat, and any known occurrences of Covered Species in the area to be affected by the new minor construction;
- A statement describing how the new minor construction will be implemented by PG&E in accordance with all applicable measures in the conservation strategy detailed in the HCP;
- An analysis of whether the proposed take authorization for new minor construction and related major or minor amendments are consistent with the Federal and State permits;
- An analysis of whether the proposed take authorization for new minor construction will result in significant impacts not analyzed or mitigated to less than significant under the HCP, EIS/EIR, or Federal and State permits; and
- Any other information required by statute, regulation, or federal policy.

Implementation of the Proposed HCP

A cornerstone of the HCP conservation strategy is the full integration of the HCP into PG&E's operations. PG&E's Management Committee, which reports to the PG&E Board of Directors will approve the HCP Implementing Agreement (IA). PG&E's Environmental Services Department will administer the HCP. A utility standard will document the process of implementing provisions of the HCP; this utility standard is intended to detail the responsibilities of the electric and gas transmission and distribution operating departments' responsibilities, as described in Figures 4-3 and 4-4 of the HCP document. The PG&E HCP Administrator will manage the implementation of the HCP and will oversee the monitoring, data management, reporting, and adaptive management program, and will serve as the point of contact for the Service.

Funding Sources.

PG&E estimates that the cost to implement the HCP would be $42.6 million over the 30-year Permit term with inflation. These costs include staff time, training, audits, pre-activity surveys, monitoring, implementation of AMMs, database management, purchase of compensation acreage requirements, mitigation bank costs, real estate transaction costs, endowment to cover maintenance and management of compensation lands, and other costs detailed in Chapter 7 of the HCP.

PG&E's costs for compliance with all aspects of the HCP will be covered by funds paid by PG&E's natural gas and electric customers. Collection of these funds is authorized by the California Public Utilities Commission and the Federal Energy Regulatory Commission for the ongoing operation, maintenance and construction of utility facilities. The company is solvent and is able to meet its current financial obligations, including any conditions and obligation of the HCP. PG&E has adequate resources to fulfill all commitments as described in the HCP and the final Implementing Agreement.

By December 1st of each year after the proposed Permit is in effect, PG&E shall submit to the Service a written declaration by PG&E's Environmental Policy's Habitat and Species Protection Program Manager confirming that all costs for full implementation of the HCP for the following calendar year have been budgeted and authorized for expenditure for that purpose. PG&E will promptly notify the Service and CDFG of any material change in PG&E's funding resources. A material change in PG&E's funding resources is any change in the financial condition of PG&E, or the availability of its funds, that will impair PG&E's ability to carry out its obligations under this Agreement, the HCP, and the Federal and State permits.

PG&E has provided funding assurances for its compensation obligation by entering into a land acquisition and management agreement with the Center for Natural Lands Management in December 2004. PG&E placed $2.1 million into a mutually agreed upon compensation lands fund account designed to fulfill the compensation obligations of the HCP. This amount is expected to be sufficient to cover nearly 10-years of compensation requirements. The agreement includes information on meeting the compensation objectives of the HCP, acquisition requirements, management requirements, and other financial and contractual obligations. Funds for subsequent 5-year compensation periods will be budgeted for by each line of business and will be made available in advance of project effects.

Action Area Environmental Baseline

Regulations implementing the ESA (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area already affecting the species or their designated Critical Habitat. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of State and private actions that are contemporaneous with the consultation in progress. For the purposes of this Opinion, the Service has defined the 276,350-acre focus-area as the action area, as defined above. We anticipate the direct and indirect effects to covered species would be confined to PG&E's gas and electrical transmission and distribution facilities, existing right-of-ways (ROWs), the lands owned by PG&E and/or subject to PG&E easements for these facilities, access to ROWs, private access routes to facilities, the 1,110 miles of facility-expansion areas, and the approximately 1,350 acres of compensation areas, all in the 276,350-acre area. Compensation areas will be regionally located in the north San Joaquin Valley (San Joaquin Stanislaus, and Mariposa Counties), central San Joaquin Valley (Merced, Madera, and Fresno Counties), and south San Joaquin Valley (Kings, Kern and Tulare Counties) so that compensation occurs near the area of the disturbance, as discussed in Chapter 4 of the HCP document and the final Implementing Agreement.

Existing Land Use in the Action Area. The San Joaquin Valley is occupied by four urban areas each with populations numbering from 200,000 to more than 500,000 people (Stockton, Modesto, Fresno, and Bakersfield), and eight smaller urban centers each with between 50,000 and 150,000 people (Lodi, Tracy, Manteca, Turlock, Merced, Madera, Hanford-Lemoore, and Visalia). By 1979, nearly all the Valley floor and many of the flatter upland areas were urbanized or converted to cultivated cropland. Less than 5 percent of the Valley floor remains

uncultivated. Much of the remaining undeveloped land is in the foothills on the Valley floor's perimeter. The remaining natural communities are highly fragmented. In addition, the remaining natural communities have been permanently altered by the introduction and proliferation of non-native plants, which now dominate many remaining natural communities (Service 1998). Significant portions of the land not cultivated or urbanized have been developed for petroleum extraction, strip-mined for gypsum and clay, or occupied by roads, canals, airstrips, oil-storage facilities, pipelines, and evaporation and percolation basins. These human activities can be linked to subsidized imported water and population growth in the San Joaquin Valley. Completion of the San Luis Unit of the Central Valley Project and the California Aqueduct of the State Water Project resulted in rapid cultivation and irrigation of wild lands along the west side of the San Joaquin Valley (Service 1998). PG&E electrical and gas transmission and distribution facilities, the lands owned by PG&E and/or subject to PG&E easements for these facilities, ROWs, and access to ROWs occur within approximately 276,350 acres of the 12.1-million-acre San Joaquin Valley planning area.

The 12.1 million-acre San Joaquin Valley planning area is characterized by agricultural operations intermixed with rural, suburban, and urban development, and areas of undeveloped land, and is located in the heart of California's most important agricultural region. The HCP's planning area includes part of all of nine San Joaquin Valley counties: San Joaquin, Stanislaus, Merced, Fresno, Kings, Kern, Mariposa, Madera, and Tulare counties. Although land uses vary somewhat within each county, the dominant land use in each county is agricultural fields and grazing. Agricultural fields and grazing occupy 77 percent of San Joaquin County, 89 percent of Stanislaus County, 94 percent of Merced County, 86 percent of Fresno County, 92 percent of Kings County, 74 percent of Kern County, 52 percent of Mariposa, 79 percent of Madera, and 84 percent of Tulare County. The San Joaquin Valley planning area also includes a substantial amount of public land and open space, partially attributable to the presence of several large recreation facilities. A list of the public lands present in the San Joaquin Valley planning area is presented in Chapter 15 of the Final EIS/R. Six National Wildlife Refuges (NWRs) are located in the planning area. The 6,642-acre San Joaquin River NWR is west of Modesto in north central Stanislaus County. In central Merced County, the San Luis NWR complex includes the 10,621-acre Kesterson Unit, the 4,000-acre East Bear Creek Unit, the 3,892-acre West Bear Creek unit, the 555-acre Blue Goose Unit and the 8,234-acre Merced NWR. The Grassland Wildlife Management Area in central Merced County includes these NWR lands and 65,000 acres of private wetlands and associated grasslands on which perpetual conservation easements have been purchased. The 6389-acre Pixley NWR is located in southwestern Tulare County, and the 10,618-acre Kern NWR is located in northwestern Kern County. State managed lands in the San Joaquin Valley planning area include the 258-acre Caswell Memorial State Park in San Joaquin County; approximately 29,000 acres of the Henry W. Coe State Park, and the 228-acre Turlock Lake State Recreation Area in eastern Stanislaus County; and the George J. Hatfield State Recreation Area, the Great Valley Grasslands State Park, the McConnell State Recreation Area, the Pacheco State Park, and the San Luis Reservoir State Recreation Area in Merced County. The Millerton Lake State Recreation Area reserves land in Madera and Fresno County, acres are preserved at the Allensworth State Historic Park in Tulare County, and acres are preserved in the Fort Tejon State Historic Park, the Tomo-Kahni State Historic Park and the Tule Elk State Reserve in Kern County.

Existing Land-Cover in the Action Area.
A classification system for land-cover types was developed by PG&E for the HCP's San Joaquin Valley planning area based on Wildlife Habitat Relationships (WHR)(Mayer and Laudenslayer (1988), on Holland (1986), and on Sawyer and Keeler-Wolf (1995). This classification was designed to support the impact analysis for Covered Species in the HCP, and contains the 15 land cover types described below. The most common land-cover types in the action area are agricultural fields and grasslands. Approximately 168,074 acres (68 percent) of land-cover in the 276,350-acre action area are non-natural land cover, composed of the agricultural field, other disturbed/developed, or urban land-cover types. Approximately 87,598 acres of the action area are natural land-cover (32 percent). Approximately 64,561 acres (26 percent) of land-cover in the action area are Grassland, with much smaller amounts of other natural vegetation types and open water.

Most PG&E facilities in the action area occur in agricultural, urban, and grassland land-cover types (see HCP Tables 3-3, 3-4, 3-5, and 3-6). Fifty percent of gas transmission facilities occur within agricultural areas, 23% within urban areas, and 22% within grassland areas. Forty-seven percent of electric transmission facilities occur within agricultural areas, 34% within grassland areas, and 12% within urban areas. Forty-one percent of electric distribution facilities occur within agricultural areas, 31% within urban areas, and 21% within grassland areas. Gas distribution facilities occur primarily within urban areas (90%), with 7% in agricultural areas and 2% in grassland areas.

Agricultural Fields
The agriculture land-cover type encompasses all areas where the native vegetation has been cleared for agriculture. This land cover type may include row crops, fallow fields, irrigated pasture crops, orchards, and vineyards. The agricultural field land-cover type occurs on approximately 5,138,895 acres (42 percent) of the 12.1 million-acre San Joaquin Valley planning area, with 1,353,791 acres in Fresno County. Only 128 acres of agricultural fields occur in Mariposa County portion of the planning area. Inside the smaller 276,350-acre action area, approximately 103,305 acres (42 percent) are agricultural field. Covered-species in the action area which may utilize the agricultural field land-cover type are giant garter snake, Swainson's hawk, white-tailed kite, western burrowing owl, tricolored blackbird, and San Joaquin kit fox.

Urban
Developed areas include all types of urban development for residential, commercial, industrial, and recreational uses. Developed areas also include sites that have structures, paved surfaces, horticultural plantings, and lawns. The urban land-cover type occurs on approximately 61,673 acres (25 percent) of the 276,350-acre action-area. Except for the San Joaquin kit fox and burrowing owls, no covered-species are expected to utilize the Urban cover type in the action area.

Other Developed and Disturbed Lands (ODD)
This land cover-type includes the barren WHR habitat type include other developed and disturbed lands consisting of perennial weeds, non-native species, and land with urban infrastructure. The ODD land-cover type occurs on approximately 3,096 acres (1.3 percent) of the 267,350-acre action area. Covered-species in the Action area which may occasionally utilize

ODD cover type are Valley elderberry longhorn beetle, California tiger salamander, and western burrowing owl and San Joaquin kit fox.

Grasslands

Grasslands cover type consists of herbaceous vegetation dominated by grasses and forbs. This land-cover type includes a variety of grassland habitats: annual grassland, perennial grassland, natural pasture, valley sacaton grassland, alkali meadow, and vernal pools.

Annual grasslands are dominated by introduced annuals, including wild oats (*Avena* spp.), brome grasses (*Bromus* spp.), barleys (*Hordeum* spp.), and annual fescues (*Vulpia* spp.). Common herbs are also introduced annuals such as filarees (*Erodium* spp.) and clovers (*Trifolium* spp.), and native species such as fiddleneck (*Amsinkia* spp.), lupines (*Lupinus* spp.), and owl's-clover (*Castilleja* spp.). These annuals germinate after late fall and winter rains and grow, flower and set seed through spring. Most of these plants die by summer. Perennial grasslands are dominated by California oatgrass (*Danthonia californica*), sweet vernal grass (*Anthoxanthum odoratum*), brome grasses, and fescues (*Festuca* spp.). The associated herb cover includes native and non-native forbs and native wildflowers. The valley-sacaton grassland type occurs especially on the fine-textured, usually alkaline soils of the Tulare Lake Basin area, where it used to be extensive. Alkali sacaton (*Sporobolus airoides*), a tussock-forming, native, perennial grass, is the dominant species, and saltgrass and low barley (*Hordeum depressum*) are common. Alkali meadow is characterized by open to dense perennial grasses and sedges, and occurs on fine-textured, alkaline soils that are usually permanently moist. Typical plants include yerba mansa, sedges, saltgrass, rushes, alkali mallow (*Malvella leprosa*), alkali cord grass (*Spartina gracilis*), and alkali sacaton.

The grassland land-cover type (including vernal pools) occurs on approximately 64,561 acres (26 percent) of the 276,350-acre action area. Approximately 74 percent of the total 87,598 acres of natural land-cover in the action area is grassland. Covered Species in the Action area which utilize Grassland cover type are blunt-nosed leopard lizard, white-tailed kite, golden eagle Swainson's hawk, western burrowing owl, Tipton kangaroo rat, giant kangaroo rat, San Joaquin (Nelson's) antelope squirrel, San Joaquin kit fox, large-flowered fiddleneck, lesser saltscale, big tarplant, Springville clarkia, Vasek's clarkia, hispid bird's-beak, Kern mallow, striped adobe lily, pale-yellow layia, Comanche point layia, Panoche peppergrass, San Joaquin woollythreads, Hartweg's golden sunburst, San Joaquin adobe sunburst, Keck's checkerbloom, oil neststraw, and showy madia.

The California Department of Fish and Game has identified 17 distinct vernal pool regions (Keeler-Wolf *et al.* 1998) in California. Two of these vernal pool regions, the San Joaquin Valley and the Southern Sierra Foothills, occur in the 276,350-acre action-area.

The San Joaquin Valley Vernal Pool Region occupies the trough that runs southward from San Joaquin County to Kern County, roughly in the area between Interstate 5 on the west and Highway 99 or Highway 65 on the east. The entire San Joaquin Valley Vernal Pool Region is within the boundary of the 12.1 million-acre San Joaquin Valley planning area. This vernal pool region includes parts of San Joaquin, Merced, Madera, Fresno, Kings, Tulare, and Kern Counties. The San Joaquin Valley Vernal Pool Region is entirely within the Great Valley

Section of the California Dry Steppe Province (Goudey and Smith 1994). Soils in this vernal pool region are alkaline and are typically of the Lewis, Rossi, Waukena, Fresno, and Traver series. The Aeolian Hilmar and Delhi soil series still exists at Arena Plains Unit of Merced National Wildlife Refuge (NWR) in Merced County. The latter are among the rarest vernal pool soil types in the Great Valley. Vernal pools in the San Joaquin Valley Vernal Pool Region are primarily the Northern Claypan type; they can exist as shallow, playa-like pools or the more typical vernal pools in mima mound topography (Keeler-Wolf *et al.* 1998). Landowners in the core areas of this vernal pool region include the California Department of Fish and Game, the Center for Natural Lands Management, the U.S. Fish and Wildlife Service, and private individuals (USFWS 2005).

Southern Sierra Foothills Vernal Pool Region includes the high and low terrace landforms located along west border of the San Joaquin Valley planning area, which is east of Highway 99. In the north end of the San Joaquin Valley planning area, the Southern Sierra Foothills Vernal Pool Region begins near the junction of San Joaquin and Stanislaus counties, and continues south to include portions of Mariposa, Merced, Madera, Fresno, and Tulare counties. The Southern Sierra Foothills Vernal Pool Region occurs in two ecological units, the Great Valley Section of the California Dry Steppe Province and the Sierra Nevada Foothills Section of the Sierran Forest-Alpine Meadows Province (Goudey and Smith 1994). The Southern Sierra Foothills Vernal Pool Region includes three types of vernal pools: the Northern Hardpan, the Northern Claypan, and the Northern Basalt Flow. Due to the mima mound topography prevalent in this vernal pool region, the vernal pools tend to be small. Vernal pool species also occupy swales. Soil series underlying Northern Hardpan Vernal Pools in the region include Amador, Corning, Hornitos, Keyes, Pentz, Peters, Redding, San Joaquin, and Yokohl. Cometa, Lewis, Madera, and Meikle are among the soil series associated with Northern Claypan Vernal Pools in the region, and the Hideaway series is associated with Northern Basalt Flow Vernal Pools (Keeler-Wolf *et al.* 1998). Northern claypan and northern hardpan vernal pools communities are dominated by native annual species that germinate, grow, and flower as the pools dry up in the spring. Characteristic species include goldfields (*Lasthenia* spp), downingia (*Downingia* spp), meadowfoam (*Limnanthes alba*), navarettia (*Navarettia* spp.), and popcorn flower (*Plagiobothrys* spp.). Much of the vernal pool region is in private ownership, but some of the core areas are owned by the California Department of Fish and Game, California Department of Parks and Recreation, the U.S. Bureau of Land Management, the U.S. Bureau of Reclamation, or various land trusts. The Nature Conservancy also has easements on some of the most important habitats (USFWS 2005).

There are 24 covered species in the 276,350-acre action area which utilize vernal pools (HCP Table 3-10). Thirteen of the covered-species are dependent on vernal pool habitat: the vernal pool fairy shrimp, Midvalley fairy shrimp, vernal pool tadpole shrimp, legenere, succulent owl's clover, pincushion navarretia, Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria, Bogg's Lake hedge-hyssop, and California tiger salamander.

Upland Scrub

This land cover type includes a wide variety of shrub types, including but not limited to alkali desert scrub (including "Valley/Coast Range Saltbush Scrub and Valley Sink Scrub") and three types of chaparral: mixed, chamise-redshank, and montane.

Alkali desert scrub is similar to the WHR type "Valley/Coast Range Saltbush Scrub and Valley Sink Scrub", and includes both xerophytic and halophytic shrub-dominated communities such as Valley/Coast Range Saltbush Scrub and Valley Sink Scrub. These habitat types are dominated by shrubs in the chenopod family, especially all-scale (*Atriplex polycarpa*), and other Atriplex species. Characteristic shrubs of Valley and Coast Range Saltbush Scrub include all-scale, arrowscale (*Atriplex phyllostegia*), goldenbush (*Isocoma acradenia* var. *bracteosa*), bladderpod (*Isomeris arborea*), and alkali heath. Valley Sink Scrub is an open shrub-dominated community on highly alkaline soils, usually heavy, sticky clay. Alkali playas (or balds) are common. The groundwater table is usually high, and the soil surface is often covered with a salty crust. Characteristic shrubs include iodine bush (*Allenrolfea occidentalis*), bush seepweed (*Suaeda moquinii*), and typical forbs are saltgrass, nitrophila (*Nitrophila occidentalis*), pickleweed (*Salicornia subterminalis*), and alkali sacaton. Three types of chaparral are distinguished in the San Joaquin Valley planning area, and are characterized by dense stands of evergreen shrubs whose species composition varies greatly with elevation, location, aspect, climate, and substrate. Fire is regular in these communities, and influences structure and species composition. Herbaceous plants include annual and perennial grasses and forbs in small openings in the shrub canopy. Mixed chaparral is typically dense and diverse. Dominant species include shrubby oaks (*Quercus* spp.), manzanitas, and several species of ceanothus, in mixed or patchy stands. Commonly associated shrubs include chamise, toyon, yerba-santa, birchleaf mountain-mahogany (*Cercocarpa betuloides*), buckeye, silk-tassel (*Garrya* spp.), fremontia (*Fremontia californicum*), and chaparral-pea (*Pickeringia montana*). Chamise-redshank chaparral is characterized by a dense monolayer dominated by chamise and redshank. Associated shrubs are similar to those in mixed chaparral. Montane chaparral is characterized by evergreeen shrubs with small amounts of broadleaved species. Typical shrubs include mountain whitethorn (*Ceanothus cordulatus*), manzanitas, bitter cherry, huckleberry oak, mountain-mahogany, and toyon.

The upland scrub land-cover type occurs on approximately 1,907 acres (0.8 percent) of the 276,350-acre action area. Covered species in the action area which utilize upland scrub land-cover are limestone salamander, blunt-nosed leopard lizard, golden eagle, bald eagle, western burrowing owl, San Joaquin antelope squirrel, San Joaquin kit fox, lesser saltscale, Mariposa pussypaws, tree-anemone, Merced clarkia, Springville clarkia, Congdon's woolly sunflower, Bakersfield smallscale, Kern mallow, Comanche point layia, Congdon's lewisia, Mariposa lupine, Hall's bush mallow, San Joaquin woollythreads, oil neststraw and Bakersfield cactus.

Blue Oak Woodland

The blue oak woodland land-cover type includes woodland dominated by blue oak (*Quercus douglasii*), with included patches of coast live oak (*Quercus agrifolia*), interior live oak (*Quercus wislizenii*), and valley oak (*Quercus lobata*). At higher elevations, foothill pine (*Pinus sabiniana*) becomes frequent. Shrub species found within blue oak woodland include poison-oak (*Toxicodendron diversilobum*), California coffeeberry (*Rhamnus californica*), California buckeye (*Aesculus californica*), holly-leaf cherry (*Prunus ilicifolia*) and manzanitas (*Arctostaphylos* spp.). The herb layer is mainly annual grasses and forbs.

The blue-oak woodland land-cover type occurs on approximately 3,827 acres (1.6 percent) of the 276,350-acre action area. Covered species in the action area which utilize blue oak woodland land-cover are limestone salamander, California red-legged frog, Swainson's hawk, white-tailed kite, golden eagle, bald eagle, tricolored blackbird, Mariposa pussypaws, tree-anemone, Merced clarkia, Springville clarkia, Congdon's woolly sunflower, striped adobe lily, pale-yellow layia, Mariposa lupine, showy madia, San Joaquin adobe sunburst, Keck's checkerbloom, and Congdon's lewisia.

Blue Oak/Foothill Pine

Blue oak and foothill pine form a mixed, open canopy in blue-oak/foothill pine type. Associated tree species include blue oak, interior live oak, California buckeye, and elderberry (*Sambucus mexicana*), with chaparral species such as manzanitas, chamise (*Adenostoma fasciculatum*), and buckbrush (*Ceanothus cuneatus*) in the understory.

The blue-oak/foothill pine land-cover type occurs on approximately 1,910 acres (0.8 percent) of the 276,350-acre action area. Covered species in the action area which utilize Blue Oak/Foothill Pine land-cover are Valley elderberry longhorn beetle, limestone salamander, California red-legged frog, bald eagle, Mariposa pussypaws, tree-anemone, Merced clarkia, Springville clarkia, Congdon's woolly sunflower, striped adobe lily, pale-yellow layia, Mariposa lupine, showy madia, San Joaquin adobe sunburst, Keck's checkerbloom, and Congdon's lewisia.

Valley Oak Woodland

Valley oak woodland is strongly dominated by valley oak, but may also contain blue oak, California sycamore, black walnut, and boxelder. The canopy layer is typically open, forming a savanna structure rather than woodland. Associated understory shrubs include elderberry, poison oak, toyon, and California blackberry. The herb layer is often dominated by leymus grass (*Leymus triticoides*), and includes a variety of annual and perennial grasses and forbs.

The Valley oak woodland land-cover type occurs on approximately 1,616 acres (0.7 percent) of the 276,350-acree action area. Covered species in the action area which utilize Valley oak woodland are Valley elderberry longhorn beetle, California tiger salamander, white-tailed kite golden eagle, bald eagle, Swainson's hawk, San Joaquin kit fox, Mariposa pussypaws, tree-anemone, Merced clarkia, Springville clarkia, Congdon's woolly sunflower, striped adobe lily, pale-yellow layia, Mariposa lupine, showy madia, San Joaquin adobe sunburst, Keck's checkerbloom, and Congdon's lewisia.

Coastal Oak Woodland

The coastal oak woodland land cover-type includes vegetation such as coast live oak, Pacific madrone (*Arbutus menziesii*), interior live oak, foothill pine, and California blackberry (*Rubus ursinus*).

The coastal oak woodland land-cover type occurs on approximately 23 acres (0.01 percent) of the 273,350-acre action area. Covered species in the action area which utilize coastal oak woodland land-cover are California tiger salamander, California red-legged frog, bald eagle, Mariposa pussypaws, tree-anemone, Merced clarkia, Springville clarkia, Congdon's wooly

sunflower, striped adobe lily, pale-yellow layia, Mariposa lupine, showy madia, San Joaquin adobe sunburst, Keck's checkerbloom, and Congdon's lewisia.

Montane Hardwood

This land cover-type includes the WHR habitats montane hardwood, montane hardwood conifer, and montane riparian. Montane hardwood has a clear hardwood layer with a sparse shrub layer, and may include occasional coniferous trees. The dominant tree in the San Joaquin Valley planning area canyon live oak is (*Quercus chrysoplepis*), with a small component of foothill pine, knobcone pine *(Pinus attenuata*), and Pacific madrone. This habitat type borders mixed conifer, montane hardwood-conifer, and mixed chaparral habitat types. Montane hardwood conifer consists of a diverse mixture of hardwood and conifer trees, comprising at least one-third conifers and one-third broadleaved trees. The tree canopy is typically dense and multi-layered; characteristic trees in the San Joaquin Valley planning area include black oak, black cottonwood (*Populus balsamifera*), canyon live oak, ponderosa pine, sugar pine, and incense cedar. Montane riparian habitat as a narrowly band of deciduous broadleaved trees along seeps, streams and rivers. In the HCP's San Joaquin Valley planning area, characteristic trees include popular (*Populus tremuloides*), willows, and white alder (*Alnus rhombifolia*).

The montane hardwood land-cover type occurs on approximately 1,840 acres (0.8 percent) of the 276,350-acre action area. Covered species in the action area which utilize montane hardwood land-cover are limestone salamander, Mariposa pussypaws, tree-anemone, Merced clarkia, Springville clarkia, Congdon's woolly sunflower, striped adobe lily, pale-yellow layia, Mariposa lupine, showy madia, San Joaquin adobe sunburst, Keck's checkerbloom, and Congdon's lewisia.

Conifer

This land cover-type includes the WHR habitat types Sierran mixed conifer, closed-cone pine-cypress, and Ponderosa pine. The Sierran mixed conifer forest has a multi-layered canopy that includes five conifers: white fir (*Abies concolor*), Douglas-fir (*Pseudotsuga menziesii*), Ponderosa pine (*Pinus ponderosa*), sugar pine, and incense cedar (*Calocedrus decurrens*); and one hardwood, the black oak (*Quercus kelloggii*). Shrubs such as deerbrush (*Ceanothus integerrimus*), manzanitas, bitter cherry (*Prunus emarginata*), gooseberries and currants (*Ribes* spp.), and mountain misery (*Chamaebatia foliolosa*) occur in openings. Closed-cone pine-cypress generally occurs on low-nutrient or serpentine substrates, the species in the San Joaquin Valley planning area are Gowan cypress (*Cupressus goveniana*) and knobcone pine. The shrub layer is generally well-developed and includes manzanitas, ceanothus, shrubby oaks, buckthorn, and poison-oak. Ponderosa pine woodland varies from pure stands of Ponderosa to mixed stands with oaks, Pacific madrone (*Arbutus menziesii*) and other conifers. Associated shrubs include manzanitas, mountain-misery, ceanothus, yerba-santa (*Eriodictyon californicum*), bitter cherry, poison-oak, and Sierra gooseberry (*Ribes roezlii*).

The conifer land-cover type occurs on approximately 529 acres (0.2 percent) of the 276,350-acre action area. Covered species in the action area which utilize Conifer cover type are limestone salamander, bald eagle, Mariposa pussypaws, tree-anemone, Merced clarkia, Springville clarkia, Congdon's woolly sunflower, striped adobe lily, pale-yellow layia, Mariposa lupine, showy madia, San Joaquin adobe sunburst, Keck's checkerbloom, and Congdon's lewisia.

Woody Riparian Habitat

The woody riparian land-cover type includes valley-foothill riparian and desert riparian habitat types (as defined by WHR). Woody riparian types include Great Valley Cottonwood Riparian Forest and Great Valley Mixed Riparian Forest, and are dominated by trees and shrubs such as Fremont's cottonwood (*Populus fremontii* ssp. *fremontii*), valley oak, sycamore (*Platanus racemosa*), box elder (*Acer negundo*), willows, blackberries (*Rubus* spp.), buttonbush (*Cephalanthus occidentalis*), and California grape (*Vitis californica*).

The woody riparian land-cover type occurs on approximately 265 acres (0.1 percent) of the 276,350-acre action area. Covered species in the action area which utilize woody riparian land-cover are Valley elderberry longhorn beetle, Swainson's hawk bald eagle, bank swallow, Buena Vista Lake shrew, riparian brush rabbit, riparian (San Joaquin Valley) woodrat, Delta button-celery, and Mason's lilaeopsis.

Permanent Freshwater Wetland

This land cover-type includes freshwater emergent wetland and wet meadow. Dominant vegetation in freshwater wetlands includes cattails (*Typha* spp.), tules and bulrushes (*Scirpus* spp.), sedges (*Carex* spp.), nutsedges (*Cyperus* spp.), arrowhead (*Sagittaria* spp.), baltic rush (*Juncus balticus*), and common reed (*Phragmites australis*), and on more alkali sites, saltgrass (*Distichlis spicata*).

The permanent freshwater wetland land-cover type occurs on approximately 211 acres (0.1 percent) of the 276,350-acre action area. Covered species in the action area which utilize freshwater wetlands include California tiger salamander, California red-legged frog, giant garter snake, bald eagle, tricolored blackbird, Buena Vista Lake shrew, hispid bird's-beak, palmate-bracted bird's-beak, Bogg's Lake hedge-hyssop, legenere, Mason's lilaeopsis.

Seasonal Wetland

Seasonal wetlands support ponded or saturated soil conditions, but generally only during winter and spring. The vegetation is composed of wetland generalists, such as hyssop loosestrife (*Lythrum hyssopifolia*), cocklebur (*Xanthium* spp.), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*) and Italian ryegrass (*Lolium multiflorum*), that typically occur in frequently disturbed sites, such as along streams. In cismontane alkali-marsh, yerba mansa (*Anemopsis californica*), saltgrass, rushes, pickleweed (*Salicornia virginica*), cattails, alkali heath (*Frankenia salina*) may be found.

The seasonal wetland land-cover type occurs on approximately 190 acres (0.1 percent) of the 276,350-acre action area. Covered species in the action area which may utilize seasonal wetlands are vernal pool fairy shrimp, midvalley fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, Swainson's hawk, white-tailed kite, bald eagle, western burrowing owl, tricolored blackbird, San Joaquin kit fox, legenere, Mason's lilaeopsis, succulent owl's clover, pincushion navarretia, Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria

Open Water
Open water land-cover types are natural and man-made aquatic habitats that support submerged or floating vegetation, such as lakes, reservoirs, flood control basins, ponds (including stock ponds), sloughs, canals, and rivers. Many of the large water bodies include permanent and seasonal wetland and riparian communities along their edge.

The open water land-cover type occurs on approximately 1,172 acres (0.5 percent) of the 276,350-acre action area. Covered species in the action area which utilize open water are California tiger salamander, California red-legged frog, giant garter snake, bald eagle, and bank swallow.

Covered-Species Environmental Baselines. The overall status of each covered-species, as well as the existing environmental-baseline of each species inside the action area, are discussed below in the Opinion section titled *Species by Species Evaluations.*

Environmental Baselines of Critical Habitat in the Action Area.
Designated critical habitat for a listed species consist of: (1) specific areas within the geographical area occupied by the species at the time it was listed, on which are found those physical or biological features (primary constituent elements) that are (i) essential to the conservation of the species, and (ii) that may require special management consideration or protection, and (2) specific areas outside the geographical area occupied by a species, upon a determination by the Secretary of the Interior that such areas are essential for the conservation of the species. "Conservation" is defined to mean the use of all methods and procedures which are necessary to bring the listed species to the point at which the measures provided pursuant to the ESA are no longer necessary (16 USC 1532(5)), and speaks to the recovery of the listed species.

The status of the entire designated critical-habitat area for the species, the primary constituent elements of the critical habitat, and the existing (baseline) conditions of designated critical-habitat located inside the action area are discussed below, in the Opinion section titled *Species by Species Evaluations.* These evaluations analyze the current condition of the individual critical habitat unit(s) located in the action area, discuss factors responsible for that condition, discuss the conservation role of the individual critical habitat unit(s) located in the action area, and discuss the relationship of the unit(s) to the entire designated critical habitat of the listed species. This analysis provides the basis for determining the significance of any adverse or beneficial effects of the proposed action on the function and conservation role of the affected critical habitat unit.

Existing Habitat Conservation Plans in the Action Area.
Five individual Habitat Conservation Plans (HCPs) have been approved with this action area, and two are under development (see Enclosure A attached). The permitted HCP are the Colinga-Cogeneration HCP, the Metro-Bakersfield HCP, the ARCO Western Energy HCP, the Kern Water Bank HCP, and Nuevo Torch HCP. These previously permitted HCPs authorized incidental take for single and multiple species and listed and non-listed species. These permitted HCPs addressed the permanent loss of habitat, the temporary disturbance of habitat acres, and provided for the conservation of habitat acres. These HCPs addressed many of the species addressed by this proposed HCP, including blunt-nosed leopard lizard, giant kangaroo rat, Tipton

kangaroo-rat, San Joaquin kit fox, vernal pool tadpole shrimp, California jewelflower, Kern mallow, San Joaquin woollythreads and Bakersfield cactus. Please refer to Enclosure A (attached) for more information on the species addressed in our internal section 7 consultations for the above referenced HCPs.

Past Federal Actions in the Action Area.
Enclosure A of this Opinion describes past actions and species-effects within the action-area region of the San Joaquin Valley that have been evaluated under section 7 of the ESA. This enclosure outlines previous Federal actions that have affected covered-species environmental baselines within the action area in general terms, and cannot be used to summarize precisely previous impacts. In some cases, projects were not implemented as described in our biological opinions, or were not implemented at all. In cases for which we have specific knowledge regarding implementation, we describe actual results of project completion.

Effects Of The Proposed Action

Effects refer to the direct and indirect effects of an action on the species or on designated Critical Habitat, together with the effects of other activities that are interrelated or interdependent with that action. Direct effects are immediate effects of the action. Indirect effects are caused by or result from the proposed action and are later in time, but still are reasonably certain to occur. The Service has determined that no other activities in the action area are interrelated or interdependent to the proposed action.

This Opinion estimated the direct and indirect effects on species from the acres of suitable species habitat likely to be permanently lost or temporarily disturbed by Covered Activities over the term of the proposed Permit. An estimate of effects expected over the 30-year term of the proposed Permit is needed at this time to allow the Service and CDFG to issue take permits for the covered-species. The estimates of habitat disturbance and species effects presented in this Opinion will also be used by PG&E to provide compensation in advance of Covered Activities and impacts. Some uncertainty exists about the number of Covered Activities, the size of disturbance created by each activity, and the effect of these activities on habitat for covered species. PG&E will verify the actual acres of species habitat impacted by HCP Covered Activities in the field through the pre-activity surveys associated with activities larger than 0.1 acre, as described in Chapter 4 of the HCP document. Auditing and validation of actual effects will occur through the annual reports submitted to the Service and CDFG, and through the HCP adaptive management program (described above and in Chapter 6 of the HCP document).

Evaluation methods. Effects on species were estimated in the HCP and in this Opinion based on the impacts to each land-cover type and the amount of suitable wildlife-species habitat and occupied plant-habitat in each of the land-cover types.

Method for Calculating Impacts to Each Land-Cover Type

1. PG&E's technical-expert HCP Advisory Group, described in Chapter 10 of the HCP document, prepared detailed descriptions for each O&M and minor-construction covered activity. The HCP Advisory Group determined the acres of direct disturbance expected from

each covered activity, determined how much of that disturbance would be temporary or permanent, and determined the frequency of each covered activity per year (HCP Table 3-1).

This Opinion also considered acreages adjacent to the covered-activity site if there was potential for additional acres of direct species impacts from construction dust, construction noise, vehicle traffic, ground vibration, human disturbance, or other direct impacts of that covered activity. Those direct effects were generally considered insufficient to permanently or temporarily eliminate land-cover and habitat in areas adjacent to Covered Activity disturbances. Those direct effects do have the potential to harass or harm individuals of some covered-species occupying areas adjacent to the Covered Activity.

The Opinion's effects analysis also considered any indirect effects of Covered Activities that could result later in time. Examples of potential indirect effects from PG&E Covered Activities include introduction of invasive weeds, habitat modification that could create favorable conditions for establishment of non-native species, disruption of hydrological integrity within vernal pool complexes, subsequent effects of construction dust on plants and wildlife habitat, loss of soil structure, loss of soil fertility, loss of soil water holding capacity, disruption of essential micro habitat features essential for some plant species, and fragmentation of plant populations, which could isolate individuals and affect genetic variability within the population. Because PG&E only expands or upgrades their facilities in response to (not in advance of) new energy-service need in the action area, facility upgrades and the minor construction elements of the proposed action were not considered growth inducing. New urban development served by the expansion of natural-gas and electric facilities installed under the proposed action is not an indirect-effect of the proposed action, and they were not included in this effects analysis.

The HCP Advisory Group also determined acres on which "other disturbances" could occur from each covered activity. Other disturbances do not disturb land-cover or cause direct habitat loss, but could potentially contribute to other forms of direct take (for example; off-road travel during patrols or inspections, or pruning and clearing vegetation from exiting structures or wires). The HCP Advisory Group also quantified the acreages of "other disturbances" for each covered activity.

2. The acres of disturbance were multiplied by the frequency of the activity per year to determine the acres of temporary and permanent impacts expected each year, and over the 30-year term of the permit, for each covered activity. These "disturbance acreages" are summarized in Table 3-1 of the HCP document. As discussed in HCP Table 3-1, Covered Activities associated with electrical facilities will result in approximately three times greater temporary and permanent disturbance than Covered Activities associated with gas facilities. HCP Table 3-1 also indicates that medium- and large-disturbance activities (i.e., those activities typically disturbing $\geq$0.1 acre) account for the majority of total land disturbance. "Total disturbance" is the product of activity-type frequency and the acreage disturbed per activity, summed over all Covered Activities. The HCP "total disturbance" is 495 acres of temporary and 5.41 acres of permanent disturbance each year for all covered-activities. Total disturbance anticipated over 30 years is 14,850 acres of temporary disturbance and 162.3 acres of permanent loss.

3. GIS imagery data was assembled as discussed in Appendix A of the HCP document, and used to map land-cover inside the 12.1 million-acre San Joaquin Valley planning area, including the 276,350-acre action area. Land cover was classified into 15 land-cover types to support the impact analysis for HCP Covered Species. The locations and acres of each land-cover type in the 12.1 million-acre San Joaquin Valley planning area are shown in HCP figure 1-2, and discussed above. The mapping-resolution of the GIS imagery was 25-meters.

4. Available GIS data was used to map the locations of the PG&E facilities in the 12.1 million-acre San Joaquin Valley planning area. Four PG&E "facility types" were mapped (i.e. gas transmission, electric transmission, gas distribution, and electric distribution). Total facility length is 6,138 miles of transmission lines (1,550 miles gas and 4,488 miles of electric) and 26,039 miles of distribution lines (8,326 miles gas and 17,713 miles electric). Facility details such as valve site locations and pole locations along the length of the facility are not available. Portions of PG&E's facilities are not mapped; therefore, it was assumed that 1% of the transmission and 5% the distribution lines remain to be mapped. The locations of ROW access and new minor-construction were not mapped.

5. GIS was then used to intersect the locations of each facility type with the land-cover map to determine the length of each facility type (transmission or distribution) located in each of the 15 land-cover types.

   Gas-distribution facility data are not available on GIS. Using the best available information, the analysis assumed that 90% of gas distribution facilities are located in the urban land-cover category and that the remaining 10% of the gas distribution facilities were distributed among other land-cover types in proportion to the area they occupied within 5 miles of urban areas. For land within 5 miles of the largest urban areas, the GIS database was used to quantify the proportion of land area within each land-cover type. These proportions were used to partition 10% of the miles of gas distribution facilities among the non-urban land-cover types: miles of gas distribution facilities in a land-cover type was calculated as 10% of total gas distribution mileage (832.6 miles) multiplied by the proportion of land within 5 miles of an urban area in that land-cover type.

   The locations of minor construction and ROW access are not available. The amount of natural land-cover types present where new minor construction and ROW access will occur was estimated to be 10% of the land present at all other facility types.

6. The exact locations where most O&M and minor construction covered-activities might occur along the gas and electric lines are unknown. Therefore, it was assumed that Covered Activities would be uniformly distributed along the length of each facility type. The "disturbance acreage per mile of facility" was calculated by dividing "total disturbance" anticipated over 30 years by total facility length. HCP Table 3-7 displays the expected annual acreage of temporary and permanent disturbance per mile for each of the four facility types.

However, vegetation management covered-activities E10a, E10c, and E10d are restricted to electric transmission facilities in land-cover types dominated by trees, and activity G13 is restricted to gas facilities in tree- or shrub-dominated land-cover types. Therefore, the locations and disturbance attributable to these four activities were distributed only among PG&E facilities intersecting tree-dominated land-cover types. As a result, disturbance acreage per mile of PG&E electric transmission facility is greater in tree-dominated land-cover types, and disturbance acreage per mile of gas facility is greater in tree- and shrub-dominated land-cover types.

7. To calculate the acreage disturbed annually in each land-cover type, the facility length in that land-cover type was multiplied by the "disturbance acreage per mile of facility". The calculation of the acreage disturbed in each land-cover type was performed separately by facility type for permanent and temporary land-cover type conversion (i.e., permanent and temporary losses).

   This approach to estimating disturbance in land-cover types essentially distributes "total disturbance" across land-cover types in proportion to the mileage of each facility type in each land-cover type (i.e., disturbance of a land-cover type equals "total disturbance" times the proportion of all facilities that are in that land-cover type). For example, because 22% of gas transmission facilities are in grassland, 22% of all disturbances attributable to gas transmission covered-activities were estimated to be in grassland land-cover type. HCP Table 3-8 shows the results of these calculations for the 15 land-cover types.

The above methodology for calculating the acres of each land-cover type impacted per year provides the most accurate quantification of potential impacts, based on available data. More accurate or detailed analysis would require more detailed GIS spatial data on individual facility locations and on the distributions of land-cover types and suitable habitat; such data are not readily available. Consequently, these estimates constitute the best available scientific data for summarizing the general impacts by land-cover type and county within the action area at this time. These land-cover impact estimates will be verified through the pre-activity surveys, and impact estimates will be adjusted as necessary in the future, as part of the HCP reporting and adaptive management programs.

Methods for Estimating Animal Species Effects

The number and location of CNDDB extant wildlife occurrences known to be inside the existing PG&E ROWs were not compiled for the HCP document. The HCP estimated the direct and indirect effects of the proposed action on wildlife Covered Species based on the amount of the species suitable-habitat likely to be destroyed or disturbed by the Covered Activities.

1. After considering the habitat needs of each Covered Species, the HCP steering committee determined which HCP land-cover types were likely to be used by each covered species, as discussed above in the Species Environmental Baseline section of this Opinion.

2. Because of past disturbances to remaining natural land-cover, fragmentation of natural land-cover types, specific micro habitat requirements of each species, the historical range of a species, and other factors in the action area, the HCP determined that only a portion of the

area mapped as each land-cover type could provide suitable habitat for a species. The HCP evaluated each of the 15 land-cover types in the action area, and determined the portion of each land-cover type considered likely to provide suitable habitat for each wildlife species. The HCP based the portion of each land-cover type considered suitable for species occupancy (i.e. the portion that would provide suitable habitat for that wildlife species) on literature and on professional judgment regarding the distribution of the covered species in the action area and their habitat requirements. The species environmental baseline discussions presented below in the Opinion section titled *Species by Species Evaluations* indicate the percentages of each land-cover type the HCP considered suitable for occupancy by that species. These percentages are also presented in HCP Table 3-10.

3. The acres of a species' habitat disturbed by Covered Activities are the product of the acreage disturbed annually in each land-cover type and the portion of that land-cover type which is considered to be suitable for species occupancy (i.e. could provide habitat for that species). As an example, direct effects to kit fox were estimated by taking the acreage of grassland temporarily disturbed by Covered Activities [105 acres annually (HCP Table 3-8)] and multiplying it by the percentage of grassland in the action area the HCP considered suitable for kit fox occupancy [estimated at 70% (HCP Table 3-10)] to arrive at an estimate of 73 acres of kit fox habitat temporary disturbance per year (HCP Table 3-11). This was done for each land-cover type suitable for each covered species (see HCP Tables 3-10 and 3-11).

The HCP land-cover type actually present at an activity site, the percentage of that cover-type that could provide suitable habitat for each covered-species, and the acres of suitable habitat impacted by the covered activity will be verified in the field, through the pre-activity surveys associated with all activities larger than 0.1 acre (see HCP Figure 4-5). It is the Service's understanding that the compensation required for an activity will be based on 1) the actual land-cover present at the activity site, 2) actual acres of land-cover impacted, and 3) the percentages of that land-cover type PG&E determined would be suitable for each covered species (HCP Table 3-10).

Methods for Estimating Plant Species Effects

Determining the effects of Covered Activities is complicated because information on the exact locations for each Covered Activity over the 30-year permit term is limited, and because information on the exact locations of both known and unknown extant plant-occurrences is limited. The average maximum ROW width is 250 feet for electric transmission lines, 150 feet for gas transmission lines, and 25 feet for both electric and gas distribution lines. The HCP assumed that only plant populations within 100-feet of a gas or electric line could be affected by most of the 35 Covered Activities.

Existing plant occurrence records are not sufficient to determine the area of occupied habitat within 100 feet of PG&E facilities because most of the 32,177 miles of ROW have never been surveyed for these sensitive plant species. Undocumented populations of most plant covered-species are likely to be present inside the 276,350-acre action area. Therefore, the HCP first used statistical modeling to provide an estimate of the total area of occupied plant-habitat disturbed by the proposed action, and combined for all species.

1. Known plant covered-species occurrence-records whose distribution center is within 200 meters (656 feet) of a PG&E facility were mapped as a GIS layer. (Twenty-one of the 42 covered plant species have documented extant occurrences within this buffer).

2. The potential geographic range of each plant covered-species inside the 12.1 million-acre San Joaquin Valley planning area was determined using information on the number of known occurrences for each species, the HCP county where extant occurrences occur, species habitat attributes, elevation and soil map units at the known occurrence sites, and other factors, as discussed in HCP Chapter 3 and Appendix F. The areas of each species' potential geographic range were mapped as a GIS layer for the 12.1 million-acre HCP planning-area as well as the 276,350-acre action area (the area where covered activities and effects would occur).

3. The "abundance of the species within its potential geographic range" was calculated by dividing the area of the species' potential geographic range in the 12.1-million by the total acres of known occurrences for that species.

4. The length (miles) of PG&E facilities within the species potential range was determined by intersecting the potential geographic-range GIS layer with the PG&E facilities GIS layer.

5. The potential acres of disturbance within each species' potential geographic range was calculated from the length of the facility type within the species geographic range, multiplied by the previously calculated "disturbance acreage per mile of facility type". (This was done separately for temporary and permanent disturbances).

   The HCP assumed that Covered Activities related to vegetation maintenance, including covered activities G-13, E10c, and E10d, could not effect plant Covered Species. These vegetation-management covered activities include mowing and use of brush hogs, hydro-axes, or brush rakes. Therefore, the acres of temporary effects from the vegetation-management covered-activities (HCP Table 3-1) were excluded from the HCP's plant effects analysis. It is the Service's understanding that PG&E will avoid effects to occupied plant habitat during implementation of activities G-13, E10c, and E10d as discussed above, in the Opinion section titled *Covered Activities.*

6. The above information was used to statistically model the total acreage of habitat occupied by covered plant species that would be disturbed over the 30-year term of the Permit. The statistical modeling consisted of simulations based on the size and distribution of documented populations, the number of documented populations within 200-meters of PG&E facilities, and assumed numbers of undocumented populations. To quantify the area affected by Covered Activities, the model randomly located species populations of different sizes (i.e., different acreages) along the PG&E facilities, and then tallied the fraction of their area within the estimated 100-foot work-zone surrounding a facility. Estimates of total disturbance of occupied habitat for each plant species were based on sets of 1,000 simulations. The development of the statistical model, each of the indicators, and the analyses based on them are described in detail in HCP Chapter 3 and Appendix F.

7. An additional approach was used by PG&E to refine the estimate of potential effects on plant covered-species and to provide additional analysis to support the preparation of the Biological Opinion. On June 08, 2007, PG&E provided additional information to the Service further clarifying the information presented in HCP Chapter 5 and in HCP Appendix F about the possible impacts of the proposed action on each plant covered-species.. For this approach, PG&E used GIS to intersect CNDDB data on plant known occupied habitat (i.e. plant covered-species occurrences classified by the CNDDB as 1) presumed extant, and 2) have an accuracy class of 1, 2, or 3) within the foot print of existing PG&E facility right-of-ways and the existing facilities to estimate where known plant occurrences could be affected by covered activities inside the 276,350-acre Action Area. PG&E multiplied the miles of facility in each CNDDB plant covered-species occurrence-polygon by the "annual disturbance estimates per mile" of each facility type to estimate the amount of plant covered-species occupied-habitat (acres) that could be impacted annually. This amount was then multiplied by the permit term (30 years) to arrive at an estimate of maximum species impacts (acres). For each plant covered-species, PG&E calculated 1) possible impacts(acres) to plant occurrences known to be present within the existing rights-of-way of the action area, and 2) estimated potential impacts (acres) to plant covered species from the "minor construction" activities (Activities G14-G16 and Activities E12-15) that will occur outside the existing right-of-ways, and totaled both numbers for each species. PG&E summed these two impact acreages and then compared the new total against the HCP Appendix F estimated species-impact ranges to provide a more accurate estimate of effects to plant species occupied-habitat (acres) for use in the Biological Opinion analysis. The revised impact-acreages for each covered plant species are presented in below in the *Species By Species Evaluations.* Depending on the species, and number and size of CNDDB records in close proximity to PG&E facilities, final impact amounts were adjusted up slightly from the HCP Appendix F estimate, or remained the same if estimates were similar to the previous HCP Appendix F analysis. (Information on the acres of "other disturbance" covered activities that may occur in occupied-habitat for each plant covered-species is not available to the Service).

The actual acres of plant covered-species occupied-habitat directly and indirectly impacted by HCP Covered Activities will be verified in the field through the pre-activity surveys associated with activities larger than 0.1 acre, as described above under *Pre-Activity Surveys.* It is the Service's understanding that plant compensation will be based on the actual acres of occupied plant habitat directly and indirectly impacted by the activities, and not on the estimated acres of impacts presented in the HCP document.

Method for Estimating Impacts to Vernal Pools

Vernal pools, which provide important habitat for 13 of the Covered Species, occur as small areas within grassland and other land-cover types; consequently, vernal pools could not be mapped as a HCP land-cover type category. Accordingly, a GIS map layer based on Holland's mapping of vernal pool densities in the Central Valley (Holland 1996) was used by the HCP to determine the location vernal pools.

1. The HCP estimated impacts to vernal pool habitat by intersecting the GIS layer for PG&E facilities and a GIS map-layer of vernal pool densities in the Central Valley (Holland 1996), to determine the miles of PG&E facilities crossing areas of high, medium, and low vernal

pool density (1%, 5%, and 10% of the area in low-, medium-, and high-density classes, respectively). Because the locations of gas-distribution facilities are not mapped, the length of gas-distribution facilities crossing vernal pool areas was estimated by multiplying their length in each HCP land cover type (estimated as described previously) by the proportion of that land cover type in each vernal pool density category.

2. The lengths of each facility-type crossing the areas of each vernal pool density-class were multiplied by the "disturbance acreage per mile of facility" to estimate the acres of vernal pool habitat likely to be disturbed by HCP covered activities. (As described above, the "disturbance acreage per mile of facility" was calculated by dividing the "total disturbance" by the total length of the facility type). The disturbance acres per mile of facility, for the four PG&E facility types, are presented in HCP Table 3-7. These acreages include vernal pools within covered-activity construction-zones and access routes, but do not include impacts in the surrounding upland-watershed.

   Previously undisturbed areas could be excavated under construction-activities G14, G15, G16, E12, E13, E14, and under activity G8 (cathodic protection). The HCP determined that these seven activities could result in a permanent loss of vernal pool habitat because they would damage the restrictive soil layer underlying the pool and could permanently change watershed contiguity patterns within the surrounding vernal-pool landscape. The other covered-activities that excavate, trench, or drill into soil layers (i.e. G5, G6, G7, G9, G10, G11, E11) would occur at existing PG&E facilities, where vernal pool habitat was excavated previously, and the restrictive layer is already damaged. The HCP determined that activities G5, G6, G7, G9, G10, G11, and E11 may only result in temporary disturbance to pools in each vernal pool density class.

3. To estimate the acreage of vernal pools directly disturbed over the term of the permit, the acres of land disturbed within areas containing vernal pools was multiplied by the proportion of the area occupied by vernal pools (i.e. 1%, 5%, or 10%). The results of this analysis are summarized in HCP Table 3-9. The HCP estimated that direct temporary vernal pool impacts would total approximately 0.473 acres per year and direct permanent vernal-pool impacts would total approximately 0.104 acres per year. The combined estimate for temporary and permanent vernal-pool direct impacts is 0.577 acres per year. However, at most, activity sites, additional hydrologically connected vernal pools and associated uplands will also be indirectly affected by the covered activity. To estimate indirect effects, the HCP determined that that an area just one-half times the size of the direct effects (i.e. the combined permanent and temporary effects of 0.577 acres per year) will also experience indirect effects; therefore, PG&E multiplied the annual direct vernal-pool impact (0.577 acres) by 1.5 to arrive at an estimate of 0.8655 acre per year as the total annual vernal-pool impact (i.e. 25.965 acres over 30 years). Over the 30-year permit term approximately 26 acres of vernal pool habitat will be impacted by covered activities.

4. To estimate the quantity of compensation required in the Conservation Strategy for project effects to vernal pool habitat, PG&E applied the 3:1 compensation ratio to the estimated direct vernal pool effects (0.577 acre/year) and applied the 0.5:1 compensation ratio to the estimated indirect vernal pool effects (0.29 acres/year). Therefore, PG&E estimated they

will provide at least 1.875 acres of vernal pool compensation annually, or at least 56.26 acres over the 30-year permit term. If the 3:1 compensation ration is applied to both the direct and indirect estimated vernal pool effects (as in Service 1996), the estimated vernal pool compensation amount may increase to approximately 2.6 acres per year, or 77.9 acres over 30 years. The amount of compensation will be adjusted (either up or down) based on the actual vernal pool effects documented from the pre-activity surveys and estimated for the small-disturbance activities. PG&E will provide compensation based on actual effects to vernal pool habitat, but the compensation acreage will always be in place before vernal pool impacts occur.

PG&E will quantify the actual impacts to vernal pool habitat in the field, during the pre-activity surveys associated with activities larger than 0.1 acre, as discussed above in *Quantity of Compensation*. PG&E will not conduct protocol-level surveys for the vernal-pool shrimp covered-species prior to conducting Covered-Activities within 250-feet of a vernal pool. Instead, as indicated on HCP page 5-2, PG&E will assume that all acres of impacted vernal pool habitat are occupied by the three vernal-pool shrimp covered-species. Compensation for actual vernal pool effects is discussed above in the Opinion section *Quantity of Compensation* and *Compensation Ratios*..

Methods for Evaluating Effects to Critical Habitat.

The HCP methods for calculating acres of direct and indirect permanent, temporary, and "other" disturbance of land inside designated critical-habitat were consistent with the methods described above for calculating land-cover effects, wildlife-species effects and plant-species effects.

For the critical habitat inside the action area, our effects analysis will first determine how the primary constituent elements or habitat qualities essential to the conservation of the species are likely to be affected by the proposed action, and in turn, how those effects may influence the function and conservation role of the affected critical habitat unit. Likewise, our cumulative effects analysis will evaluate effects of future, non-Federal actions reasonably certain to occur in the action-area in terms of how primary constituent elements are likely to be affected and, in turn, how that will influence the function and conservation role of the affected critical habitat unit. In evaluating project effects on critical habitat, the Service must be satisfied that any direct or indirect project alterations, when added to the environmental baseline and the cumulative effects, are not likely to appreciably diminish the value of the critical habitat for the conservation of the species. Such direct and indirect alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical. Conservation activities (e.g. management, mitigation, etc.) that occur outside of the designated critical habitat are not considered when evaluating effects to critical habitat.

Our evaluation of the effects to designated critical habitat will consider the statutory concepts embodied in ESA sections 3, 4, and 7 (16 USC 1531 et seq.) to determine the significance of any adverse or beneficial project effects on the function and conservation role of the affected critical habitat unit. The Service will determine whether, with implementation of the proposed Federal action, the critical-habitat would remain functional to serve the intended conservation role for the

species, based on the critical habitat analyses presented below in the Opinion section titled *Species by Species Evaluations.*

Effects of the Proposed Action on Covered Species and their Critical Habitat.
The direct, indirect, and cumulative effects of the proposed action on each Covered Species and their designated Critical Habitat are discussed below, in the Opinion section titled *Species by Species Evaluations.*

Cumulative Effects on the Species and Critical Habitat.

The Service must consider both the effects of the proposed action and the cumulative effects of other activities in determining whether the action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat. Cumulative effects are defined as the effects of future State, local government, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this cumulative effects section because they require separate consultation pursuant to section 7 of the ESA.

The 276,350-acre action area includes PG&E's gas and electrical transmission and distribution line facilities, the lands owned by PG&E and/or subject to PG&E easements for the facilities, right-of-ways (ROWs) for the gas and electric transmission and distribution line facilities, ROW access areas or access roads, private access routes to infrastructure associated with the Covered Activities, approximately 1,400 acres which will compensate for impacts resulting from HCP Covered Activities, and approximately 1,110 miles of minor construction of line facility expansions. Most lands included in the 276,350-acre action area are privately owned but within a right-of-way or easements deed with PG&E. Under the terms of these deeds, the landowner may use the right-of-way lands for any purpose which will not interfere with PG&E's use of the right-of-way. Buildings or other structures cannot be erected within the boundary of the right-of-way, as these would interfere with PG&E's activities. Consequently, the right-of-way easement deed provides no protection from land-use change within the ROWs, with the exception that buildings will not be constructed within the ROW boundaries. Other State or private activities are expected to occur within these rights-of-way, including cattle grazing, extensive agricultural development, timber harvesting, fuel wood cutting, fire suppression, road building, oil exploration, and herbicide use. Oil fields in the southern half of the San Joaquin Valley also continue to be an area of expansion and development activity. This expansion is reasonably certain to increase in the near future owing to market-driven increases in the price of oil. Although housing development is not expected within the boundary of a right-of-way, development or other land-use changes may occur on lands directly bordering the ROWS. Although land-cover in a right-of-way area may stay in a natural condition, development or other land-use changes on bordering lands would substantially reduce the habitat value of the ROW lands. These future activities may not be subject to section 7 consultation (and thus are considered to enter into cumulative effects). These activities are not associated with the proposed project.

The proposed project will not contribute to the local and rangewide trend of urbanization, habitat loss, fragmentation, and degradation, the principal causes of the decline of the species addressed in this biological opinion. The proposed action allows the on-going operation and maintenance of existing natural gas and electric distribution facilities, and minor extensions of gas and electric lines. PG&E would construct the facility extensions in advance or simultaneous to the new energy need, and the capacity of the new pipelines would not exceed the peak-need of the new subdivisions and businesses, on a sustained basis. Therefore, the new facility extensions would occur in response to urban development, would not remove an obstacle for future urban development, and are not considered growth-inducing.

Continued human population growth in the San Joaquin Valley is expected to drive further development of agriculture, cities, industry, transportation, and water resources in the foreseeable future. This future development, and the associated infrastructure will further contribute to the continued loss and fragmentation of natural areas, including areas harboring the Covered Species. On going loss and fragmentation of natural land-cover in the San Joaquin Valley and anthropogenic factors such as pesticides and invasion of exotic species is expected to continue for the 30-year term of the proposed permit.

SPECIES-BY-SPECIES EVALUATIONS

WILDLIFE - INVERTEBRATES

Threatened vernal pool fairy shrimp (*Branchinecta lynchi*) and its Critical Habitat

Fairy shrimp are aquatic species in the order Anostraca. The vernal pool fairy shrimp is a small crustacean in the Branchinectidae family. It ranges in size from ½ to one inch long. They have delicate elongate bodies, large stalked compound eyes, no carapaces, and eleven pairs of swimming legs. They glide gracefully upside down, swimming by beating their legs in a complex, wavelike movement that passes from front to back.

Status of the Species and its Critical Habitat

Listing Status

The vernal pool fairy shrimp was federally listed as endangered on September 19, 1994 (59 FR 48136). A detailed account of the taxonomy, ecology, and biology of the vernal pool fairy shrimp is presented in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005) and in the final rule (59 FR 48136).

Life History, Reproductive Ecology

Vernal pool fairy shrimp are highly adapted to the environmental conditions of their ephemeral habitats. One adaptation is the ability of the vernal pool fairy shrimp eggs, or cysts, to remain dormant in the soil when their vernal pool habitats are dry. Another important adaptation is that the vernal pool fairy shrimp has a relatively short life span, allowing it to hatch, mature to adulthood, and reproduce during the short time period when vernal pools contain water. The vernal pool fairy shrimp can reach sexual maturity in as few as 18 days at optimal conditions of 68 degrees Fahrenheit, and can complete its life cycle in as little as 9 weeks (Gallagher 1996, Helm 1998). However, maturation and reproduction rates of vernal pool crustaceans are

controlled by water temperature, and can vary greatly (Eriksen and Brown 1980, Helm 1998). Helm (1998) observed that vernal pool fairy shrimp did not reach maturity until 41 days at water temperatures of (59 degrees Fahrenheit. Helm (1998) observed six separate hatches of vernal pool fairy shrimp in a single pool within a single wet season, and Gallagher (1996) observed three separate hatches of vernal pool fairy shrimp in vernal pools in Butte County. In larger pools that hold water for longer durations, vernal pool fairy shrimp are capable of hatching multiple times, if water temperatures drop to below 50 degrees Fahrenheit, a necessary environmental cue for vernal pool fairy shrimp cyst hatching (Gallagher 1996, Helm 1998). Helm (1998) observed vernal pool fairy shrimp living for as long as 147 days.

Habitat Affinities
Vernal pool fairy shrimp exist only in vernal pools or vernal pool-like habitats. Individuals have never been found in riverine, marine, or other permanent bodies of water. Vernal pool habitats form in depressions above an impervious soil layer or duripan. Due to local topography and geology, the depressions are part of an undulating landscape, where soil mounds are interspersed with basins, swales, and drainages. Water movement within complexes allows vernal pool fairy shrimp to move between individual pools. These movement patterns, as well as genetic evidence, indicate that vernal pool fairy shrimp populations exist within and are defined by entire vernal pool complexes, rather than individual vernal pools (Simovich *et al.* 1992, King, *et al.* 1996).

The vernal pool fairy shrimp occupies a variety of different vernal pool habitats, from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley-floor pools (Eng *et al.*1990, Helm 1998). Although the vernal pool fairy shrimp has been collected from large vernal pools, including one exceeding 25 acres in area (Eriksen and Belk 1999), it tends to occur primarily in smaller pools (Platenkamp1998), and is most frequently found in pools measuring less than 0.05 acre in area (Gallagher 1996, Helm 1998). The vernal pool fairy shrimp typically occurs at elevations from 33 feet to 4,003 feet (Eng *et al.* 1990). The vernal pool fairy shrimp has been collected at water temperatures as low as 40 degrees Fahrenheit (Eriksen and Belk 1999), and has not been found in water temperatures above about 73 degrees Fahrenheit (Helm 1998, Eriksen and Belk 1999). The species is typically found in pools with low to moderate amounts of salinity or total dissolved solids (Collie and Lathrop 1976, Keeley 1984, Syrdahl 1993). Although there are many observations of the environmental conditions where vernal pool fairy shrimp have been found, there have been no experimental studies investigating the specific habitat requirements of this species.

The vernal pool fairy shrimp has been found in the same vernal pool habitats as the vernal pool tadpole shrimp, and the midvalley fairy shrimp, the other pool crustaceans described in this opinion. However, the vernal pool fairy shrimp has rarely been collected from the same pools as other fairy shrimp species (Eng *et al.* 1990, Maeda-Martinez *et al.* 1997, Eriksen and Belk 1999). When coexistence does occur, it has been in longer-lived pools and there the vernal pool fairy shrimp are often less abundant than other fairy shrimp species (Eng *et al.* 1990, Gallagher 1996, Eriksen and Belk 1999). Given the apparently wide distribution of this species and its tolerance for a wide range of conditions, it is possible that the absence of the vernal pool fairy shrimp in certain habitats is explained by competitive exclusion by other fairy shrimp (Helm 1998, Eriksen and Belk 1999). The vernal pool tadpole shrimp, also a HCP covered species, are predators of

vernal pool fairy shrimp, whereas vernal pool fairy shrimp feed on algae, bacteria, protozoa, rotifers, and bits of detritus. The vernal pool fairy shrimp also occurs in the same vernal pool habitats as the California tiger salamander (*Ambystoma californiense*), also a HCP covered species. Vernal pool fairy shrimp are usually found in vernal pools although they are sometimes found in a range of natural and artificially created ephemeral habitats such as alkali pools, seasonal drainages, stock ponds, vernal swales, and rock outcrops

Historical and Current Range, Distribution, Dispersal
The vernal pool fairy shrimp was identified relatively recently, in 1990, and there is little information on the historical range of the species. It is likely the historical distribution of this species coincides with the historical distribution of vernal pools in California's Central Valley and southern Oregon. Holland (1978) estimated that roughly 4,000,000 acres of vernal pool habitat existed in the Central Valley prior to the widespread agricultural development that began in the mid-1800s. The remaining populations of the vernal pool fairy shrimp are now considerably more fragmented and isolated than in pre agricultural times.

The Agate Desert of southern Oregon comprises the northern extent of the range of the vernal pool fairy shrimp. Approximately 400 occurrences of the vernal pool fairy shrimp are present in 28 counties across the Central Valley and Coast Ranges of California (CNDDB 2007). The species occupies a variety of vernal pool habitats, and occurs in 11 of the 17 vernal pool regions identified in California (Keeler-Wolf *et al.* 1998, USFWS 2005). In California, the vernal pool fairy shrimp occurs in Tehama County and at isolated locations in Glenn and Shasta Counties in the Northwestern Sacramento Valley Vernal Pool Region. In the Northeastern Sacramento Valley Vernal Pool Region, the species occurs in the vicinity of Vina plains and the City of Chico in Tehama and Butte Counties, respectively.

The vernal pool fairy shrimp is also found in isolated patches along the central and southern Coast range of California. In the Livermore Vernal Pool Region, the vernal pool fairy shrimp has been found in the Springtown area and in the vicinity of Byron Airport in Alameda and Contra Costa Counties respectively. In the Central Coast vernal pool region, the species has been found in a minimum of 55 wetland pools at Fort Hunter Liggett in Monterey County; at two locations in San Benito County; and at one site 2.5 miles east of the City of Paso Robles. The vernal pool fairy shrimp occurs at a single location in Napa County in the Lake-Napa Vernal Pool Region.

The greatest number of known occurrences of the vernal pool fairy shrimp is found in the Southeastern Sacramento Vernal Pool Region, where it is in scattered vernal pool habitats in Placer, Sacramento, and San Joaquin Counties, in the vicinity of Beale Air Force Base in Yuba County, and at a single location in El Dorado County. The San Joaquin County area of the Southeastern Sacramento Vernal Pool Region includes portions of the action area. In the Solano-Colusa Vernal Pool Region, the vernal pool fairy shrimp is known from the vicinity of Jepson Prairie, and the cities of Vacaville and Dixon in Solano County.

In the San Joaquin Valley Vernal Pool Region, the vernal pool fairy shrimp is found at the Grasslands Ecological Area in Merced County, at the Pixley National Wildlife Refuge in Tulare

County, and at isolated locations in Kings and Stanislaus Counties. The action area includes portions of the San Joaquin Valley Vernal Pool Region.

In the Southern Sierra Foothills Vernal Pool Region, the vernal pool fairy shrimp is known from the Stone Corral Ecological Reserve and the Hogwallow Preserve in Tulare County and from scattered locations on private land in Stanislaus, San Joaquin, Fresno, Madera, and Merced Counties. The action area includes portions of the Southern Sierra Foothills Vernal Pool Region.

In the Carrizo Vernal Pool Region, the vernal pool fairy shrimp has been found in a minimum of 61 pools in San Luis Obispo County. In the Santa Barbara Vernal Pool Region, the vernal pool fairy shrimp has been found Ventura County and in the Cruzan Mesa vernal pools in Los Angeles County. Vernal pool fairy shrimp have also been found at two locations within the Los Padres National Forest in Ventura County, outside the Santa Barbara Vernal Pool Region. In the Western Riverside County Vernal Pool Region, the species is known to occur at Skunk Hollow and on the Santa Rosa Plateau.

Reasons for Decline and Threats to Survival
In Oregon, vernal pool fairy shrimp occurring on the Agate Desert are threatened by commercial and industrial development, agricultural conversion, and utility projects (Oregon Natural Heritage Program 1997). Over 40 percent of the vernal pool habitats remaining in Oregon have been degraded (Borgias and Patterson 1999). Vernal pool habitats that are protected on the Agate Desert by the Nature Conservancy are threatened by the indirect effects of adjacent land use, including alteration of hydrology (Evans 2000). Vernal pool fairy shrimp populations on the Table Rocks area managed by the Bureau of Land Management are also threatened by direct influences of incompatible land uses.

In California, 291 of the approximately 400 presumed extant occurrences of vernal pool fairy shrimp are classified as threatened by the CNDDB (2007). Approximately 101 (25 percent) are presently threatened by development, 29 occurrences (7 percent) are threatened by agricultural conversion, 45 (11 percent) are threatened by road construction, and additional 41 occurrences (10 percent) are threatened by military operations.

In the Solano-Colusa region of California, the vernal pool fairy shrimp is threatened by development on the private property where it occurs. In the Northeastern Sacramento Valley vernal pool region, most of the known occurrences of the vernal pool fairy shrimp are located on Caltrans rights-of-way and are thus threatened by various future road-improvement projects in this region, particularly the future expansion of Highway 99. Additional populations are threatened by commercial and residential development projects. In the Central Coast vernal pool region of California, the vernal pool fairy shrimp is known only from Federal land on the Fort Hunter Liggett Military Reservation. Training and maintenance activities on this military base also may degrade some historical wetland habitats that are inhabited by fairy shrimp. In the Livermore Vernal Pool Region, the vernal pool fairy shrimp is located primarily on private land, where it is threatened by development, including expansion of the Byron Airport. Some occurrences on private land in the Northwestern Sacramento Vernal Pool Region may be threatened by agricultural conversion or development. In the Southeastern Sacramento Vernal Pool Region, the vernal pool fairy shrimp is threatened by urban development. Both Sacramento

and Placer Counties are currently developing Habitat Conservation Plans to address growth in the region.

In the San Joaquin Valley Vernal Pool Region, including portions of the action area, the vernal pool fairy shrimp is found primarily on private land where it is threatened by direct habitat loss, including urban development and agricultural conversion.

In the Southern Sierra Foothills region, including portions of the action area, the species is threatened by the proposed University of California, Merced campus, which will likely also contribute to significant growth in the region, resulting in additional loss of vernal pool crustacean habitat. Agricultural conversion and flood control projects on Bureau of Reclamation land also threaten the species in this region.

In the Carrizo Vernal Pool Region, vernal pool habitats known to contain the vernal pool fairy shrimp are currently located on Federal land at the Camp Roberts Military Base and at the Carrizo Plains National Monument. Although these areas are not immediately threatened by development, Camp Roberts may be threatened by military activities that alter historical vernal pools characteristics and introduce non-native plant species. In two of the three plots that were fenced to protect vernal pools from training activities on Camp Roberts, non-native *Taeniatherum caput-medusae* became more prolific and threatened to diminish the pool area available to fairy shrimp because non-native plants encroached on pool edges.

In the Western Riverside County vernal pool region, vernal pool fairy shrimp populations are threatened by development where they occur on private land in Los Angeles, Ventura, and Riverside Counties. Although other populations in Riverside County are protected at the Santa Rosa Plateau managed by the Nature Conservancy, these habitats may be threatened by the development of adjacent lands (Chester 2000).

Status with Respect to Recovery/Conservation
Approximately 13,000 acres of vernal pool habitats, including mitigation banks, have been set aside for the vernal pool fairy shrimp specifically as terms and conditions of section 7 consultations. These areas are scattered throughout the California Central Valley and represent important building blocks toward recovery of the vernal pool fairy shrimp (USFWS 2005).

In the Solano-Colusa Vernal Pool Region, the vernal pool fairy shrimp is protected on several preserves in the Jepson Prairie area and at Travis Air Force Base in Solano County. Several Habitat Conservation Plans are developing vernal pool preserve plans in the region, including Solano and Yolo Counties (USFWS 2005).

In the San Joaquin Valley Vernal Pool Region, vernal pool fairy shrimp are protected at the Grasslands Ecological Area, including Federal and State wildlife refuges in Merced County.

In the Southern Sierra Foothills Vernal Pool Region, the species is protected at the Stone Corral Ecological Reserve in Tulare County. The California Department of Fish and Game recently implemented a 3 year grazing lease on the Stone Corral Ecological Reserve to reduce competitive exclusion of native vernal pool plant species by exotic weeds and invasive native

(e.g., *Eleocharis* spp.) plant species, and to enhance the upland native plant species needed by native pollinators. They will be monitoring the Stone Corral Ecological Reserve in conjunction with the grazing lease. The California Department of Fish and Game has also initiated a preliminary sampling program for vernal pool invertebrates on several of the southern San Joaquin Valley California Department of Fish and Game preserves, including the Big Table Mountain Preserve in Fresno County and Stone Corral Ecological Reserve in Tulare County (USFWS 2005).

Status of designated Critical Habitat
Critical Habitat for vernal pool fairy shrimp was originally designated on August 6, 2003 (68 FR 46683). The designation was revised August 11, 2005 (70 FR 46923). The Service subsequently published species-specific Critical Habitat unit descriptions and maps on February 10, 2006 (71 FR 71117). 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, San Benito, San Joaquin, San Luis Obispo, Santa Barbara, Shasta, Solano, Stanislaus, Tehama, Tulare, Ventura, and Yuba Counties, California. A broad distribution of vernal pool fairy shrimp across its geographical and elevational distribution protects the natural environmental processes for the species and provides the best chance for retaining the species across the full extent of the species' range. The vernal pool types and soils associated with the eight general areas of concentration of vernal pool fairy shrimp differ greatly across the geographic range of the species and lead to different species compositions and ecological conditions between vernal pool fairy shrimp occurrences. Providing for a mosaic of habitat types both between and among vernal pool species is essential because it would include the full extent of the physical and environmental conditions for the species.

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 (described in the paragraph below), providing for dispersal and promoting hydroperiods of adequate length in the pools; (2) depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days, in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands; (3) sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding; and (4) structure within the pools described in the paragraph above, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter. Existing manmade features and structures, such as buildings, roads, railroads, airports, runways, other paved areas, lawns, and other urban landscaped areas do not contain one or more of the primary constituent elements. Covered Activities limited to those areas, therefore, would not affect the critical

habitat unless the action may affect the species and/ or primary constituent elements in adjacent critical habitat.

Verna pool fairy shrimp Environmental Baseline within the Action Area

Species Baseline

There are 31 extant occurrences for vernal pool fairy shrimp in the 267,350-acre action area (CNDDB 2007). Fourteen of these occurrences are located in the Merced County portion of the action area. The Fresno, Tulare, and Madera portions of the action area each have five or six occurrences, and one occurrence is known in San Joaquin County portion of the action area. The extant occurrences for this species occupy approximately 459 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007).

Only a small percentage of grassland habitats (1–10%) in the action area contain vernal pools. Moreover, vernal pool fairy shrimp occupy a small percentage of the area of vernal pools in the action area. The HCP concluded that 30% of all seasonal wetlands and 50% of vernal pools in the action area are suitable for vernal fairy shrimp occupancy.

Critical Habitat Baseline

Of the 597,821 acres of vernal-pool fairy shrimp designated Critical Habitat (71 FR 7118), approximately 1,900 acres are located in existing PG&E right-of-ways in the 250,350 acre action area. As shown below in Opinion Table 3, most of the 1,900 acres of vernal pool fairy shrimp critical habitat in the action area are in existing electric transmission ROWs.

Table 3. Vernal Pool Fairy Shrimp Critical Habitat Units and Acres inside the Action Area

VPFS Critical Habitat Units within the action area	Total Acres in the Critical Habitat Unit	Acres of existing Electric Transmission ROW in the Unit	Acres of existing Electric Distribution ROW in the Unit	Acres of existing Gas Transmission ROW in the Unit	Acres of existing Gas Distribution ROW in the Unit*	Total acres of existing ROW in the Unit	Percent of the Critical Habitat Unit overlapping an existing PG&E line-facility ROW (where effects could occur)
18	14,181	416.1	31.5	0	*	447.6	3.2 %
20	746	0	0	9.1	*	9.1	1.2 %
21	48,640	37.8	52.4	0	*	90.2	0.2 %
22	69,139	693.7	75.3	0	*	769.0	1.1 %
23	28,540	199.8	44.5	0	*	244.3	0.9 %
24	28,950	47.6	52.6	0	*	100.2	0.4 %
25	2,456	26.9	6.5	0	*	33.4	1.4 %
26	6,688	0.8	16.2	0	*	16.2	0.3 %
27	15,465	103.5	52.4	0	*	52.4	0.4 %
total acres	214,805	1,526.2	332.5	9.1	33.2	1,900.0	Average =1.0 %

* PG&E does not have location information for most of their gas distribution lines. The HCP assumed that the acres of gas distribution ROW inside designated Critical Habitat are approximately 10% of the Electric Distribution ROW acres inside Critical Habitat. Most gas distribution-lines are located in the Urban land cover type and are not expected to be inside designated critical habitat.

Of the 30 Critical Habitat units designated for vernal pool fairy shrimp (71 FR 7118), 9 units and 22 subunits are located in the 276,250-acre action area. These are: Unit 18 (San Joaquin

County), Unit 20 (Stanislaus County), Unit 21 B,C (Stanislaus and Merced counties), Unit 22 (Merced and Mariposa counties), Unit 23 C-K(Merced County), Unit 24 A, B(Madera and Fresno counties), Unit 25 (Madera County), Unit 26 A, D(Tulare and Kings counties), and Unit 27 A-C(Tulare County). The acres of each existing PG&E line-facility ROW in each Critical Habitat Unit are shown in Table 3 above.

Effects of the Action on vernal pool fairy shrimp and its Critical Habitat

Direct and Indirect Effects

It is not possible to estimate reliably the level of direct and indirect take of individual shrimp resulting from Covered Activities. Therefore, the HCP and this Opinion estimated take in terms of the amount of vernal pool habitat expected to be disturbed. The amount of vernal-pool habitat impacted was used as a surrogate for the number of individuals taken by the proposed action.

PG&E will always seek to avoid effects to vernal pool habitat to the maximum extent possible. PG&E will establish minimum work-exclusion zone 250-feet from the vernal pool perimeter prior to beginning a covered-activity. Work within this zone will be avoided during periods when vernal pool habitat is wet. Where establishing 250-foot work-exclusion zones are not possible, PG&E will establish a work exclusion zone of the maximum practicable distance.[1] The establishment of buffers around vernal pools would reduce habitat loss and reduce direct mortality to vernal pool fairy shrimp. However, even with the implementation of exclusion zones and other AMMs, direct and indirect effects to vernal pool fairy shrimp individual or populations could still occur from Covered Activities.).

Ground-disturbing Covered Activities have the potential to result in direct mortality, life cycle disturbance, and reduce habitat quality for the vernal pool fairy shrimp. Shrimp cysts could be buried by soil moved into vernal pools or swales during ground-disturbing activities. In addition, upland habitat and swales around a vernal pool and within a vernal pool complex are essential to the hydrological biological integrity of the vernal pool and complex. Vernal pool habitat indirectly affected would include all habitat supported by upland areas and all habitat otherwise damaged by effects to the watershed, introduced species, human intrusion, or pollution caused by a covered activity. Where the reach of these indirect effects cannot be determined definitively, the Service considers all area within 250 feet of a vernal pool to be indirectly affected. If any habitat within a vernal pool complex is impacted, then all remaining habitat within the complex should be considered indirectly affected. Examples of potential indirect effects from PG&E Covered Activities include possible disruption of hydrological integrity within a vernal pool, within the associated upland habitat, or within the vernal pool complex. Other potential indirect effects to vernal pool habitat could result from dust generated during covered activities and subsequently deposited within vernal pools adjacent to work sites. Water and habitat quality

[1] If an exclusion zone cannot extend the specified distance from the habitat, the biologist will stake and flag a restricted activity zone of the maximum practicable distance around the habitat. This exclusion zone distance is a guideline that may be modified by a qualified biologist, based on site-specific conditions (including habituation by the species to background disturbance levels). Measures are practicable where physically possible and not conflicting with other regulatory obligations or safety considerations; PG&E activities will be prohibited or greatly restricted within work exclusion zones. However, vehicle operation on existing roads and foot travel may occur for certain species habituated to those activities. A qualified biologist will monitor covered activities near flagged work exclusion and restricted activity zones. Within 60 days after O&M activities have been completed at a given worksite, all staking and flagging will be removed.

could be reduced by a variety of indirect effects associated with Covered Activities. Covered Activities have the potential to spread invasive weeds that could reduce habitat quality within vernal pools or their associated uplands.

PG&E will assume that all vernal pools in the action area are occupied by the vernal pool fairy shrimp. The HCP estimated that Covered Activities would directly disturb 0.557 acre of vernal pool habitat each year (HCP Table 3-9). Indirect vernal pool effects will also occur. The HCP estimated that indirect effects would occur in an area just one-half times the size of the estimated direct vernal pool effects. Therefore, the HCP determined the combined annual direct and indirect effects to habitat for the vernal pool fairy shrimp would be 0.8655 acre/year. Over the 30-year permit term, approximately 26 acres of vernal pool fairy shrimp habitat will be directly or indirectly affected.

In addition to direct and indirect vernal pool fairy shrimp habitat-losses from ground-disturbing covered-activities, the HCP estimated that the less intensive "other disturbances" (such as patrols, off-road travel and other activities that do not disturb the ground) will occur on 3.16 acres of vernal pool fairy shrimp habitat per year (i.e. 94.8 acres of "other disturbance" over 30 years)(HCP Table 3-9). These "other disturbances" could occur if vehicles and equipment crush shrimp cysts or adults when entering or passing through vernal pools or swales during travel to worksites, inspections, and other incidental activities. Only a small portion of the cysts in disturbed areas would be expected to be damaged by vehicle travel. AMM 15 requires "other disturbance" work to avoid wet vernal pools from after the first significant rain until June 1 or until pool remain dry for 72 hours. It is the Service's understanding that all vehicles conducting "other disturbance "activities will avoid driving in vernal pools at any time of the year, and will not enter a wet vernal pool when adults could be present.

Effects of Compensation Measures
All impacts to vernal pool habitat will be compensated as discussed above under *Compensation ratios* and *Quantity of Compensation*. Compensation will be consistent with the compensation methodology described in the Service's Programmatic Formal Endangered Species Consultation to the Sacramento District of the USACE For Projects With Relatively Small Effects on Listed Vernal Pool Crustaceans (Service 1996), and as discussed above under *Compensation Ratios* and *Quantity of Compensation.* Covered activities will directly and indirectly impact approximately 0.865 acre of vernal pool habitat annually (26 acres over 30 years). To estimate the quantity of compensation required for project effects to vernal pool habitat, PG&E applied the 3:1 compensation ratio to the annual direct vernal pool effects (0.577 acre) and applied the 0.5:1 compensation ratio to the annual indirect vernal pool effects (0.29 acres). PG&E estimates they will provide approximately 1.875 acres of vernal pool compensation annually, or 56.26 acres over the 30-year permit term. The actual direct and indirect effects to vernal pools will be quantified in the field by PG&E during the pre-activity surveys for medium and large Covered Activities, and estimated for the small-disturbance Covered Activities. Compensation for vernal pool impacts will entail permanent preservation of vernal pools and the creation of vernal pools. Each 3 acres of vernal pool compensation will include a minimum of 2 acres of vernal pool preservation and up to 1 acre of created vernal pool. PG&E will provide compensation based on actual effects to vernal pool habitat, but the compensation acreage will always be in place before vernal pool impacts occur.

PG&E will not conduct protocol surveys for the three vernal-pool shrimp covered-species prior to conducting covered activities in vernal pool habitat, but instead will assume all vernal pools are occupied by the species. However, not all impacted vernal pools will actually be occupied by the vernal-pool shrimp covered species. The HCP estimates that only 20% to 50% of vernal pools in the San Joaquin Valley are occupied by one or more of the covered shrimp species. Therefore, the amount of vernal pool compensation provided annually by PG&E is expected to be in excess of the amount of compensation that would have been required if protocol-level shrimp surveys were conducted during all pre-construction surveys.

Because PG&E is assuming all impacted vernal-pool acres are occupied by the vernal pool fairy shrimp, and because permanent compensation will be provided for temporary disturbances to vernal pools, no additional compensation is proposed by PG&E for the "other disturbance" effects to vernal pools.

Effects on Vernal Pool Fairy Shrimp Critical Habitat
Of the approximately 1,900 acres of vernal pool fairy shrimp designated critical habitat located within the existing PG&E right-of-ways (see Table 3 above), PG&E estimates that ground-disturbing covered activities will temporarily disturb 66.6 acres of critical habitat over 30 years (2.22 acres annually)and will permanently remove (hardscape) 0.3 acres over 30 years (0.01 acre annually).

PG&E also estimates that "other disturbance" covered activities (activities which do not disturb land-cover such as tree trimming or off-road travel) will occur on 10.92 acres of vernal pool fairy shrimp designated critical habitat annually (327.6 acres over 30 years). These effects would occur in the existing PG&E rights-of-ways within the critical habitat units. The area of PG&E right of way within each vernal-pool fairy-shrimp critical habitat unit is small, occupying 0.9 to 3.2 percent of each unit (Table 3).

The "minor construction" covered-activities will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries and will include the acquisition of additional right-of-way acres. PG&E cannot predict where these line extensions will be constructed, and some may be constructed inside designated vernal pool fairy shrimp critical-habitat. PG&E will confer with the Service prior to implementing any "minor construction" covered-activity or other medium or large covered-activities within a designated critical habitat unit. During the Confer Process, PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Conclusion for vernal pool fairy shrimp.
We anticipate that the proposed action will directly and indirectly affect the vernal pool fairy shrimp as described in the analysis above, including the disturbance or loss of up to 0.865 acre of suitable vernal pool habitat annually, or approximately 26 acres over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to the vernal pool fairy shrimp. Compensation will be provided for all impacts to vernal pool habitat, even for vernal pools where the vernal pool fairy shrimp may not

be present. Compensation measures will preserve or create at least 1.87 acres of suitable vernal pool habitat annually (56.26 acres over 30 years). For each wetland or vernal pool acre impacted by covered-activities, PG&E will preserve at least 2 acres of vernal pool habitat occupied by the vernal pool fairy shrimp or the vernal pool tadpole shrimp, and will create not more than one acre of vernal pool habitat.

The "other disturbances" covered activities (such as patrols, inspections, off-road travel, and other activities that do not disturb the ground) will occur on 3.16 acres of vernal pool fairy shrimp habitat per year (i.e. 94.8 acres of "other disturbance" over 30 years). These "other disturbance" activities could crush (harm) vernal pool fairy shrimp adults or cysts if vehicles conducting "other disturbance activities enter or pass through vernal pools or swales. Given the typical abundance of vernal-pool shrimp cysts in occupied pools, the relatively small proportion of the vernal pool area in the action area, the application of AMM 15 to "other disturbance" activities, and the relatively small proportion of the shrimp population affected by incidental travel, the "other disturbance" effects of vehicle travel through vernal pools are likely to be insignificant and discountable.

We anticipate the proposed action will temporarily disturb 66.6 acres of vernal pool fairy shrimp designated critical habitat over 30 years (2.22 acres annually) and will permanently remove (hardscape) 0.3 acres of designated critical habitat over 30 years (0.01 acre annually). PG&E also estimates that "other disturbance" activities (activities which do not disturb land-cover such as tree trimming or off-road travel) will occur in 10.92 acres of vernal pool fairy shrimp designated critical habitat annually (327.6 acres over 30 years). The area of impact expected in each critical habitat unit is a very small proportion of the total area in that unit; these impacts are not expected to change the current ability of the primary constituent elements to support the function and conservation role of that critical habitat unit.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the vernal pool fairy shrimp, or adversely modify its designated critical habitat.

We reached this conclusion because the impact to this species' habitat, when viewed in conjunction with the compensation measures long-term protection and management of suitable vernal pool habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Given the typical abundance of shrimp cysts in occupied pools, the relatively small proportion of the vernal pool area in the action area, and the relatively small proportion of the shrimp population affected by incidental travel, the "other disturbance" effects of vehicle travel through dry vernal pools are likely to be insignificant and discountable.

Amount or Extent of Take and Effect of the Take

It is not possible to quantify the number of vernal pool fairy shrimp adults, cysts, or populations that will be impacted throughout the action area over the 30-year permit term. Thus, the Service

is quantifying incidental take as the acres of vernal pool habitat that will be impacted annually in the action area as a result of the proposed action.

We anticipate the take of an undetermined number of vernal pool fairy shrimp individuals within 0.865 acres of vernal pool habitat annually (26 acres of vernal pool habitat over the term of the Permit). A very small but undetermined number are also expected to be taken during the management of the conservation lands. Take will be in the form of harm (death, and injury) and harassment.

The Service also anticipates take (harm) of an undetermined number of vernal pool fairy shrimp from "other disturbance" activities within 3.16 acres of vernal pools each year (94.8 acres of vernal pools over the term of the permit).

In the above biological opinion, the Service determined that these levels of anticipated take are not likely to result in jeopardy of the vernal pool fairy shrimp or the adverse modification of its critical habitat.

Midvalley fairy shrimp (*Branchinecta mesovallensis*)

The midvalley fairy shrimp is characterized by relatively simple male antennae, lacking spines or protuberances. Male midvalley fairy shrimp range in length from 12 to 20 millimeters (0.5 to 0.8 inch), and females range from 7 to 20 millimeters (0.3 to 0.8 inch) (Belk and Fugate 2000). T he midvalley fairy shrimp (*Branchinecta mesovallensis*) was only recently described (Belk and Fugate 2000). The species was named for its limited range in the Central Valley of California. The type locality is on the Virginia Smith Trust land in Merced County, California (Belk and Fugate 2000). Midvalley fairy shrimp specimens had been collected as early as 1989.

Status of the Species

Listing Status

After reviewing the available scientific and commercial information, the Service found that listing of the midvalley fairy shrimp is not warranted at this time (69 FR 3592). A detailed account of the taxonomy, ecology, and biology of the midvalley fairy shrimp is presented in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005).

Life History, Reproductive Ecology

The life cycle of the midvalley fairy shrimp is well suited to the unpredictable conditions of vernal pool habitats. The midvalley fairy shrimp can mature and reproduce very rapidly; it has been observed to reach maturity in as little as 8 days and reproduction was observed in as few as 16 days after hatching(Helm 1998). Under the culturing conditions described in Helm (1998), the midvalley fairy shrimp lived for 147 days, about as long as other Central Valley species observed. Multiple hatchings of the midvalley fairy shrimp have been observed in a single rainy season as its vernal pool habitat repeatedly fills and dries. Helm (1998) found the midvalley fairy shrimp to be very tolerant of warm water, occurring in pools with water temperatures ranging from 41 to 89 degree Fahrenheit. This temperature is higher than that measured of any other Central Valley fairy shrimp except for the California fairy shrimp.

Habitat Affinities
The midvalley fairy shrimp has been found in small, short-lived vernal pools and grass-bottomed swales ranging from 4 to 663 square feet in area and averaging less than 4 inches in depth (Helm 1998). The species has been collected from pools on a volcanic mudflow landform of the Merhten Formation in Pentz Gravelly Loam and Raynor Clay soils. The midvalley fairy shrimp has also been found on San Joaquin Silt Loam soils on the Riverbank formation on Low Terrace landforms. At the time the type specimens were collected, the dominant macrophytes in the pool were the wetland grasses *Lolium multiflorum, Hordeum maximum gussoneanum,* and *Deschampsia danthanoides*, species that are characteristic of extremely short-lived pools and swales. Little is known about the midvalley fairy shrimp's tolerance to variations in water chemistry, but it has been found in some relatively alkaline pools (Helm 1998). The midvalley fairy shrimp has only been collected with one other fairy shrimp, the vernal pool fairy shrimp(Eriksen and Belk 1999). It may occupy habitats that are not inundated long enough for other species to inhabit.

Historical and Current Range, Distribution, Dispersal
Although the historical distribution of the midvalley fairy shrimp is unknown, vernal pool habitats in the regions where it is currently known to occur have been dramatically reduced since pre-agricultural times (Holland 1998). The habitat of the midvalley fairy shrimp may have been even more severely reduced than other vernal pool habitats since it can occur in swales and short-lived pools that may escape detection in dry years or during the dry season (Helm 1999, Belk and Fugate 2000).

Midvalley fairy shrimp have been found in the following California counties: Solano, Contra Costa, Yolo, Sacramento, San Joaquin, Madera, Merced, and Fresno, with the largest number of known locations in Merced County and Sacramento County (Belk and Fugate 2000; CNDDB 2003). The midvalley fairy shrimp is endemic to this small portion of California's Central Valley. Helm (1998) found midvalley fairy shrimp in less than 0.5 percent of the vernal pools he examined. Based on the few known occurrences, the species' distribution is apparently limited to the Solano-Colusa, Southeastern Sacramento, Southern Sierra Foothill, and San Joaquin vernal pool regions. In the Southeastern Sacramento region, most occurrences are clustered around the City of Sacramento and the former Mather Air Force Base in Sacramento County. In the Southern Sierra Foothills and San Joaquin Vernal Pool Regions, the midvalley fairy shrimp has been documented in the vicinity of the Virginia Smith Trust property in Merced County and from isolated occurrences in San Joaquin, Madera, and Fresno Counties. However, because this species was described only recently, it is likely additional occurrences will be found in the future.

Reasons for Decline and Threats to Survival
Continued conversion of the grassland-vernal pool ecosystem matrix to urban or agricultural uses, and associated hydrological changes, is the largest threat to survival of the midvalley fairy shrimp. The small depressions in which midvalley fairy shrimp typically reside require less preparation prior to conversion to urban or agricultural uses because they are already relatively level, and thus may be more attractive to developers. During the wet season, they may not contain water continuously, even when nearby larger pools are full. Under these conditions,

midvalley fairy shrimp pools may not be surveyed, and conversion may proceed without the required regulatory review.

Of the 99 midvalley fairy shrimp occurrences in the CNDDB (2007), roughly 19 (36 percent) are directly threatened by proposed development projects, while 22 (41.5 percent) are on protected lands. The protected lands include two National Wildlife Refuges, several vernal pool mitigation banks, a California Department of Fish and Game ecological reserve, and several Nature Conservancy conservation easements. Sacramento and Merced Counties have the most threatened occurrences, with seven and five, respectively. Threats in Sacramento County mostly involve urban development projects, while the primary threat in Merced County is construction of the proposed University of California, Merced campus. Merced County also has the highest number of protected occurrences, with a total of 14 occurrences located on lands that have been set aside for the conservation of vernal pool species. These lands are intended to function as conservation areas to offset the direct, indirect, and cumulative effects of the new university campus. Three ranches containing conservation easements held by The Nature Conservancy (totaling about 9,900 hectares [24,500 acres]) contain known midvalley fairy shrimp sightings. The easements are permanent, will generally be managed by The Nature Conservancy, and cannot be extinguished by selling the land to a new owner.

Environmental Baseline within the Action Area

There are 11extant occurrences for midvalley fairy shrimp in the 267,350-acre action area (CNDDB 2007). Eight of these action area occurrences are located in San Joaquin County, two are in Merced County, and one is in Madera County. The extant occurrences for this species occupy approximately 51 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007).

Only a small percentage of the grassland cover-type (1–10%) in the action area contains vernal pools. Moreover, midvalley fairy shrimp occupy a small percentage of the area of vernal pools in the action area. The HCP concluded that 20% of all seasonal wetlands (including vernal pools) in the action area are suitable for midvalley fairy shrimp occupancy.

Effects of the Action on Midvalley Fairy Shrimp

Direct and Indirect Effects

It is not possible to estimate reliably the level of direct and indirect take of individual midvalley fairy shrimp resulting from Covered Activities. Therefore, the HCP and this Opinion estimated take in terms of the amount of vernal pool habitat expected to be disturbed. The amount of vernal-pool habitat impacted was used as a surrogate for the number of individuals taken by the proposed action.

The direct and indirect effects of the proposed action on midvalley fairy shrimp are the same as discussed above for the vernal pool fairy shrimp. Please see the vernal pool fairy shrimp direct and indirect effect analysis above for 1) ground-disturbing covered activities, and 2) the "other disturbance" covered activities.

Effects of Compensation Measures
As specified in the AMMs (See HCP Chapter 4, "Conservation Strategy"), 250-foot work exclusion zones will be established prior to Covered Activities, and work will be avoided during periods when vernal pool habitat is wet. The establishment of buffers around vernal pools during the wet and dry periods would reduce habitat loss and reduce direct mortality

Compensation amounts for vernal pool impacts are discussed in the vernal pool fairy shrimp section. Please see that discussion above.

Although the ESA affords incidental protection to midvalley fairy shrimp where they co-exist with listed vernal pool shrimp species, none of the listed-species, except vernal pool fairy shrimp, has been found to co-occur with midvalley fairy shrimp in the same vernal pools (Eriksen and Belk 1999). Biological surveys are often inadequate and PG&E may miss detection of midvalley fairy shrimp due to its ability to occur in shallow pools which are inundated for short periods. In instances where midvalley fairy shrimp are documented in a vernal pool complex, PG&E will treat this unlisted species "as if" it were federally listed for the purposes of implementing the HCP.

PG&E will seldom conduct protocol surveys for the three vernal-pool shrimp covered-species prior to conducting covered activities in vernal pool habitat, but instead will assume all vernal pools are occupied by the species. However, not all impacted vernal pools will actually be occupied by the midvalley fairy shrimp. Therefore, the amount of vernal pool compensation provided annually by PG&E is expected to be in excess of the amount of compensation that would have been required if protocol-level shrimp surveys were conducted during all pre-construction surveys.

Because PG&E is assuming all impacted vernal-pool acres are occupied by the midvalley fairy shrimp, and because permanent compensation will be provided for temporary disturbances to vernal pools, no additional compensation is proposed by PG&E for the "other disturbance" effects to vernal pools.

Effects on Critical Habitat
Midvalley Fairy Shrimp has no Critical Habitat designated.

Conclusion
We anticipate that the proposed action will directly and indirectly affect the midvalley fairy shrimp as described in the analysis above (see discussion for vernal pool fairy shrimp), including the disturbance or loss of 0.865 acre of suitable vernal pool habitat annually, or approximately 26 acres over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to the midvalley fairy shrimp. Compensation will be provided for all impacts to vernal pool habitat, even for vernal pools where the midvalley fairy shrimp may not be present. Compensation measures will preserve or create at least 1.87 acres of suitable vernal pool habitat annually (56.26 acres over 30 years). For each wetland or vernal pool acre impacted by covered-activities, PG&E will preserve at least 2 acres of vernal pool habitat occupied by the midvalley fairy shrimp or the vernal pool tadpole shrimp, and will create not more than one acre of vernal pool habitat.

The "other disturbances" covered activities (such as patrols, inspections, off-road travel, and other activities that do not disturb the ground) will occur on 3.16 acres of vernal pool fairy shrimp habitat per year (i.e. 94.8 acres of "other disturbance" over 30 years). These "other disturbance" activities could crush (harm) vernal pool fairy shrimp adults or cysts when vehicles conducting "other disturbance" activities enter or pass through vernal pools or swales. Given the typical abundance of vernal-pool shrimp cysts in occupied pools, the relatively small proportion of the vernal pool area in the action area, the relatively small proportion of the shrimp population affected by incidental travel, and AMM 15 requiring vehicles to avoid wet vernal pools, the "other disturbance" effects of vehicle travel through vernal pools are likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the midvalley fairy shrimp.

We reached this conclusion because the impact to this species habitat, when viewed in conjunction with the compensation measures long-term protection and management of suitable vernal pool habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take.
It is not possible to quantify the number of midvalley fairy shrimp adults, cysts, or populations that will be impacted throughout the action area over the 30-year permit term. Thus, the Service is quantifying incidental take as the number of acres of vernal pool habitat that will be impacted annually in the action area as a result of the proposed action.

We anticipate the take of an undetermined number of midvalley fairy shrimp individuals within 0.865 acres of vernal pool habitat annually (26 acres of vernal pool habitat over the term of the Permit). A very small but undetermined number are also expected to be taken during the management of the conservation lands. Take will be in the form of harm (death or injury) and harassment.
The Service also anticipates take in the form of harm of an undetermined number of midvalley fairy shrimp from "other disturbance" within 3.16 acres of vernal pools each year (94.8 acres of vernal pools over the term of the permit).

In the above Conference Report, the Service determined that these levels of anticipated take are not likely to result in jeopardy of the midvalley fairy shrimp.

Endangered vernal pool tadpole shrimp (*Lepidurus packardi*) and its Critical Habitat
Vernal pool tadpole shrimp are distinguished by a large, shield-like carapace, or shell, that covers the anterior half of their body. Mature vernal-pool tadpole-shrimp range in size from 15 to 86 millimeters (0.6 to 3.3 inches) in length.

Status of the Species

Listing Status

The vernal pool tadpole shrimp was listed as endangered on September 19, 1994 (59 FR 48136). A detailed account of the taxonomy, ecology, and biology of the vernal pool tadpole shrimp is presented in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005) and in the final rule (59 FR 48136)

Life History, Reproductive Ecology

After winter rains fill their vernal pool habitats, dormant vernal pool tadpole-shrimp cysts may hatch in as little as 4 days. Additional cysts produced by adult tadpole shrimp during the wet season may hatch without going through a dormant period. Multiple hatching within the same wet season allows vernal pool tadpole shrimp to persist within vernal pools as long as these habitats remain inundated, sometimes for 6 months or more. Vernal pool tadpole shrimp hatching is temperature dependent. Optimal hatching occurs between 50 to 59 degrees Fahrenheit, with hatching rates becoming significantly lower at temperatures above 68 degrees Fahrenheit.

Although the vernal pool tadpole shrimp is adapted to survive in seasonally available habitat, the species has a relatively long life span compared to other vernal pool crustaceans. Vernal pool tadpole shrimp continue growing throughout their lives, periodically molting their shells. Vernal pool tadpole shrimp have been found to take a minimum of 25 days to mature and the mean age at first reproduction is 54 days. Researchers have observed that vernal pool tadpole shrimp generally take between 3 and 4 weeks to mature. Variation in growth and maturation rates may be a result of differences in water temperature, which strongly influences the growth rates of aquatic invertebrates.

Vernal pool tadpole shrimp have relatively high reproductive rates. Fecundity increases with body size. Large females, greater than 20 millimeters (0.8 inch) carapace length, could deposit as many as 6 clutches, ranging from 32 to 61 eggs per clutch, in a single wet season.

Vernal pool tadpole-shrimp populations have low rates of gene flow between separated sites, probably as a result of the spatial isolation of their habitats and their reliance on passive dispersal mechanisms. However, gene flow between pools within the same vernal pool complex is much higher. This finding indicates that vernal pool tadpole-shrimp populations, like most vernal pool crustacean populations, are defined by vernal pool complexes and not by individual vernal pools.

Habitat Affinities

Vernal pool tadpole shrimp occur in a wide variety of ephemeral wetland habitats including alkaline pools, clay flats, vernal lakes, vernal pools, vernal swales, and other seasonal wetlands. Occupied habitats range in size from vernal pools as small as two square meters to the large 89 acre vernal Olcott Lake at Jepson Prairie in Solano County.

The ponding depth of occupied habitat ranges from 1.5 inches to 59 inches. The species inhabits vernal pools containing clear to highly turbid water. Vernal pools exhibit daily and seasonal fluctuations in pH, temperature, dissolved oxygen, and other water chemistry characteristics. Vernal pool tadpole shrimp have been found in pools with water temperatures ranging from 50

degrees Fahrenheit to 84 degrees Fahrenheit and pH ranging from 6.2 to 8.5. Vernal pools at Jepson Prairie and Vina Plains (Tehama County) have a neutral pH, and very low conductivity, total dissolved solids, and alkalinity (Barclay and Knight 1984; Eng *et al.* 1990). These pools are located most commonly in grass-bottomed swales of grasslands in old alluvial soils underlain by hardpan or in mud-bottomed claypan pools containing highly turbid water. Determining the vernal pool tadpole shrimp's habitat requirements is not possible based on anecdotal evidence, and the tolerances of this species to specific environmental conditions have yet to be determined.

Historical and Current Range, Distribution, Dispersal
Roughly, 4,000,000 acres of vernal pool habitat existed in the California Central Valley during pre-agricultural times. Historically the vernal pool tadpole shrimp was probably distributed over most of these vernal pool habitats in the Central Valley and Central Coast regions. The distribution of vernal pool tadpole shrimp has been greatly reduced from historical times because of widespread destruction and degradation of its vernal pool habitat. Vernal pool habitats in the Central Valley now represent only about 25 percent of their former area, and remaining habitats are considerably more fragmented and isolated than during historical times.

The vernal pool tadpole shrimp is known from 19 populations in the Central Valley, ranging from east of Redding in Shasta County south to Fresno County, and from a single vernal pool complex located on the San Francisco Bay National Wildlife Refuge in Alameda County. Although the vernal pool tadpole shrimp is found on a variety of geologic formations and soil types, over 50 percent of vernal pool tadpole-shrimp occurrences are on High Terrace landforms and Redding and Corning soils. In the Northwestern Sacramento Vernal Pool Region, vernal pool tadpole shrimp are found at the Stillwater Plains and near Redding in Shasta County. In the Northeastern Sacramento Vernal Pool Region, vernal pool tadpole shrimp have been documented on private land near Chico in Butte County and in Tehama County at the Vina Plains Preserve, the Dales Lake Ecological Reserve, and on Caltrans land. The largest concentration of vernal pool tadpole shrimp occurrences are found in the Southeastern Sacramento Vernal Pool Region, where the species occurs on a number of public and private lands in Sacramento County. Vernal pool tadpole shrimp are also known from a few locations in Yuba and Placer Counties, including Beale Air Force Base. In the Solano-Colusa Vernal Pool Region, the vernal pool tadpole shrimp occurs in the vicinity of Jepson Prairie, Travis Air Force Base, near Montezuma in Solano County, and on the Sacramento National Wildlife Refuge in Glenn County. In the Central Coast Vernal Pool Region, the vernal pool tadpole shrimp is found on the San Francisco Bay National Wildlife Refuge and private land in Alameda County.

In the San Joaquin Vernal Pool Region, vernal pool tadpole shrimp are known from the Grasslands Ecological Area and private land in Merced County and from single locations in Tulare and Kings Counties. In the Southern Sierra Foothills region, the species occurs at the Stone Corral Ecological Preserve in Tulare County, on ranchlands in eastern Merced County, at the Big Table Mountain Preserve in Fresno County, and at a few locations in Stanislaus County.

The CNDDB (2007) 225 extant occurrences of the vernal pool tadpole shrimp, with 2 in San Joaquin County, 8 in Stanislaus County, 8 in Merced County, 3 in Fresno County, 2 in Kings County, 4 in Tulare, and none in Mariposa, Madera, or Kern Counties.

Reasons of Decline and Threats to Survival
Threats facing vernal pool tadpole shrimp include the conversion of vernal pool habitat to agricultural uses and urban development and stochastic extinction due to the small and isolated nature of remaining populations. Approximately two-thirds of the grasslands that once supported vernal pools in the Central Valley had been destroyed by 1973, with an associated loss of nearly 90% of vernal pool habitat. In subsequent years, a substantial amount of the remaining habitat for vernal pool crustaceans has been destroyed, with estimates of new habitat loss ranging from 2% to 3% per year. Current data indicate vernal pool grasslands are being lost in the southern San Joaquin Valley at a rate of approximately 1% per year. (Holland 1978)

The California Natural Diversity Database (CNDDB 2003) lists 17 occurrences of vernal pool tadpole shrimp as threatened by development. An additional 16 occurrences are reported as threatened by various agricultural conversions.
In the San Joaquin Vernal Pool Region, the species is threatened by development on private land. In the Southern Sierra Foothills Vernal Pool Region, the species is threatened by development of the proposed University of California, Merced campus, which will likely contribute to significant growth in the region, resulting in additional loss of vernal pool crustacean habitat. Populations on the Stone Corral Ecological Reserve may be threatened by pesticide drift from adjacent farmlands.

Status with Respect to Recovery/Conservation
The entire population of vernal pool tadpole shrimp is endangered. Vernal pool tadpole shrimp occur on lands with perpetual conservation easements managed explicitly for the species on conservation banks, *e.g.*, Stillwater Plains, Campbell Ranch, Arroyo Seco, Bryte Ranch, Clay Station, Laguna Creek, Sunrise Douglas, Viera Sanda Mush, Kennedy Table, Dolan Ranch, Dove Ridge, Wildlands—Sheridan, and Fitzgerald Ranch; National Wildlife Refuges, *e.g.*, Sacramento NWR Complex, San Francisco NWR, and San Luis NWR Complex; and a variety of natural areas managed to maintain and enhance natural values, *e.g.*, Nature Conservancy easements, Vina Plains Ecological Reserve, Jepson Plains, Grasslands Ecological Area, Dale's Lake Ecological Reserve, Stone Corral Ecological Preserve, Big Table Mountain Ecological Preserve.

Status of designated Critical Habitat
Critical Habitat for vernal pool crustaceans was originally designated on August 6, 2003 (68 FR 46683). The designation was revised August 11, 2005 (70 FR 46923). The Service published species-specific Critical Habitat unit descriptions and maps on February 10, 2006 (71 FR 71117). The total designated Critical Habitat for vernal pool tadpole shrimp is 228,785 acres within 16 Critical Habitat Units and 33 subunits (71 FR 7118). Critical habitat units are depicted for Shasta, Tehama, Butte, Colusa, Alameda, Yuba, Yolo, Sacramento, Amador, Solano, Stanislaus, Merced, Mariposa, Madera, Fresno, Kings, and Tulare counties, California. These critical habitat areas designated for the species constitute our best assessment of areas determined to be occupied at the time of listing, contain the primary constituent elements essential to the conservation of the species that may require special management or protection, and additional areas found to be essential to the conservation of the species. The biological and physical features (primary constituent elements) that are essential to the conservation of vernal pool tadpole shrimp (*Lepidurus packardi*) 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 (described in the paragraph below), 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.

The vernal pool types and soils associated with vernal pool tadpole shrimp differ greatly across the geographic range of the species; these differences lead to different community compositions and environmental conditions between vernal pool tadpole-shrimp occurrences. Providing for a mosaic of habitat types and conditions is essential. We have determined that each subunit is essential for the conservation of the species because it is occupied by each of the associated species, it contains one or more of the PCEs for each of its associated species, and it meets one or more of the criteria used to identify essential areas (70 FR 46945). Within each subunit will therefore be found habitat with the features that are essential for reproduction, germination, hatching, maturation, feeding, shelter, and dispersal of the associated species, as described in the Primary Constituent Elements section for each species. In addition, that subunit also will provide for one or more of the following: (1) Areas representative of the geographic distribution of the species; (2) areas representative of the various combinations of soils, vernal pool chemistry, geomorphic surfaces, vegetation community associations, and other environmental conditions in which the species occurs; (3) areas that provide for dispersal; and (4) areas with the best conservation potential, e.g., lands already fully or partially protected, the largest unfragmented vernal pool complexes for each of its associated species.

Vernal Pool Tadpole Shrimp Environmental Baseline within the Action Area

Species Baseline

There are 15 extant occurrences for vernal pool tadpole shrimp in the 267,350-acre action area (CNDDB 2007). One of these occurrences is in the San Joaquin County, two are in the Stanislaus County, and 11 are in the Merced County portions of the action area. The extant occurrences for this species occupy approximately 2,816-acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007).

Only a small percentage of grassland habitats (1–10%) in the planning area contain vernal pools. Moreover, vernal pool tadpole shrimp occupy a small percentage of the area of vernal pools in

the action area. The HCP concluded that 20% of all seasonal wetlands and 30% of vernal pools in the action area are suitable for vernal pool tadpole-shrimp occupancy.

Critical Habitat Baseline
Of the 228,785 acres of vernal pool tadpole shrimp designated Critical Habitat (71 FR 7118), approximately 640-acres are located in the 276,350-acre action-area (the area where covered activities and effects will occur). Approximately 446-acres of critical habitat area located in existing electric transmission ROWs and approximately 176 are located in electric distribution ROWs and 18 are in gas distribution ROWs.

Table 4. Tadpole Shrimp Critical Habitat Units and Acres inside the Action Area

VPFS Critical Habitat Units within the action area	Critical Habitat Unit acres	Acres of existing Electric Transmission ROW in the Unit	Acres of existing Electric Distribution ROW in the Unit	Acres of existing Gas Transmission ROW in the Unit	Acres of existing Gas Distribution ROW in the Unit*	Total acres of existing ROW in the Unit	Percent of the Critical Habitat Unit overlapping an existing PG&E line-facility ROW (where effects could occur)
13	1,902	0	10.9	0	*	10.9	0.6%
15	21,694	245.7	103.5	0	*	349.2	1.6%
16	11,546	199.8	44.5	0	*	244.3	2.1%
17	729	0	0.7	0	*	0.7	0.1%
18	2,707	0.8	16.2	0	*	17.0	0.6%
total acres	38,578	446.3	175.8	0	18	622.1	Average =1.0 %

* PG&E does not have location information for most of their gas distribution lines. The HCP assumed that the acres of gas distribution ROW inside designated Critical Habitat are approximately 10% of the Electric Distribution ROW acres inside Critical Habitat. Most gas-distribution lines are located in the Urban land cover type and are not expected to be inside designated critical habitat.

Of the 16 Critical Habitat units designated for vernal pool tadpole shrimp (71 FR 7118), 5 units and 13 subunits are located in the 276,250-acre action area (Table 4). These are: Unit 13B (Stanislaus County), Unit 15 (Merced County), Unit 16 C,D,F-K (Merced County), Unit 17 (Fresno County) and Unit 18A,F (Tulare County).

Effects of the Action on Vernal pool tadpole shrimp and its Critical Habitat
Direct and Indirect Effects
It is not possible to estimate reliably the level of direct and indirect take of individual shrimp resulting from Covered Activities. Therefore, the HCP and this Opinion estimated take in terms of the amount of vernal pool habitat expected to be disturbed. The amount of vernal-pool habitat impacted was used as a surrogate for the number of individuals taken by the proposed action.

Direct and indirect effects of the proposed action vernal pool tadpole shrimp are the same as discussed above for the vernal pool fairy shrimp. Please see the vernal pool fairy shrimp *Direct and Indirect Effect* analysis above for 1) ground-disturbing covered activities, and 2) the "other disturbance" covered activities.

Effects of Compensation Measures
As specified in the AMMs (See HCP Chapter 4, "Conservation Strategy"), minimum 250-foot work exclusion zones will be established prior to most Covered Activities, and work will be

avoided during periods when vernal pool habitat is wet. The establishment of buffers around vernal pools during the wet and dry periods would reduce habitat loss and reduce direct mortality to the vernal pool tadpole shrimp

Compensation amounts for vernal pool impacts are discussed in the vernal pool fairy shrimp section. Please see the vernal pool fairy shrimp analysis above. All impacts to vernal pool habitat will be compensated as discussed above under *Compensation ratios* and *Quantity of Compensation*. Compensation will be consistent with the compensation methodology described in the Service's Programmatic Formal Endangered Species Consultation to the Sacramento District of the USACE For Projects With Relatively Small Effects on Listed Vernal Pool Crustaceans (Service 1996), and as discussed above under *Compensation Ratios* and *Quantity of Compensation.* Covered activities will directly and indirectly impact approximately 0.865 acre of vernal pool habitat annually (26 acres over 30 years). . To estimate the quantity of compensation required for project effects to vernal pool habitat, PG&E applied the 3:1 compensation ratio to the annual direct vernal pool effects (0.577 acre) and applied the 0.5:1 compensation ratio to the annual indirect vernal pool effects (0.29 acres). PG&E estimates they will provide approximately 1.875 acres of vernal pool compensation annually, or 56.26 acres over the 30-year permit term. The actual direct and indirect effects to vernal pools will be quantified in the field by PG&E during the pre-activity surveys for medium and large Covered Activities, and estimated for the small-disturbance Covered Activities. Compensation for vernal pool impacts will entail permanent preservation of vernal pools and the creation of vernal pools. Each 3 acres of vernal pool compensation will include a minimum of 2 acres of vernal pool preservation and up to 1 acre of created vernal pool. PG&E will provide compensation based on actual effects to vernal pool habitat, but the compensation acreage will always be in place before vernal pool impacts occur.

PG&E will not conduct protocol surveys for the three vernal-pool shrimp covered-species prior to conducting covered activities in vernal pool habitat, but instead will assume all vernal pools are occupied by the species. However, not all impacted vernal pools will actually be occupied by the vernal pool tadpole shrimp. Therefore, the amount of vernal pool compensation provided annually by PG&E is expected to be in excess of the amount of compensation that would have been required if protocol-level shrimp surveys were conducted during all pre-construction surveys.

Because PG&E is assuming all impacted vernal-pool acres are occupied by the vernal pool tadpole shrimp, and because permanent compensation will be provided for temporary disturbances to vernal pools, no additional compensation is proposed by PG&E for the "other disturbance" effects to vernal pools.

Effects on Vernal Pool Tadpole Shrimp Critical Habitat
Of the approximately 622 acres of vernal pool tadpole shrimp designated critical habitat located within the existing PG&E right-of-ways (see Table 4 above), PG&E estimates that ground-disturbing O&M Covered Activities will temporarily disturb 18 acres of critical habitat over 30 years (0.59 acre annually).

PG&E also estimates that "other disturbance" covered activities (activities that do not disturb land-cover such as tree trimming or off-road travel) will occur on 2.94 acres of vernal pool tadpole shrimp designated critical habitat annually (88.2 acres over 30 years). These effects would be limited to the area of the existing PG&E rights-of-ways within the critical habitat units. The area of PG&E right of way within each vernal-pool fairy-shrimp critical habitat unit is small (Table 4)

Three "minor construction" covered-activities will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries and will include the acquisition of additional right-of-way acres (i.e. Activities G16, E12, and E13). PG&E cannot predict where these line extensions will be constructed, and some may be constructed inside designated vernal pool tadpole-shrimp critical-habitat. PG&E will confer with the USFWS prior to implementing any "minor construction" covered-activity or other medium or large covered-activities within a designated critical habitat unit. PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Conclusion - vernal pool tadpole shrimp

We anticipate that the proposed action will directly and indirectly affect the vernal pool tadpole shrimp as described in the analysis above, including the disturbance or loss of 0.865 acre of suitable vernal pool habitat annually, or approximately 26 acres over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to the vernal pool tadpole shrimp. Compensation will be provided for all impacts to vernal pool habitat, even for vernal pools where the vernal pool tadpole shrimp may not be present. Compensation measures will preserve or create at least 1.87 acres of suitable vernal pool habitat annually (56.26 acres over 30 years). For each wetland or vernal pool acre impacted by covered-activities, PG&E will preserve at least 2 acres of vernal pool habitat occupied by the one of the vernal-shrimp shrimp covered-species (vernal pool fairy shrimp, vernal pool tadpole shrimp, or midvalley fairy shrimp) and will create not more than one acre of vernal pool habitat.

The "other disturbances" covered activities (such as patrols, inspections, off-road travel, and other activities that do not disturb the ground) will occur on 3.16 acres of vernal pool fairy shrimp habitat per year (i.e. 94.8 acres of "other disturbance" over 30 years). These "other disturbance" activities could crush (harm) vernal pool fairy shrimp adults or cysts if vehicles conducting "other disturbance activities enter or pass through vernal pools or swales. Given the typical abundance of vernal-pool shrimp cysts in occupied pools, relatively small proportion of the vernal pool area in the action area, the application of AMM15 to "other disturbance activities, and the relatively small proportion of the shrimp population affected by incidental travel, the "other disturbance" effects of vehicle travel through vernal pools are likely to be insignificant and discountable.

We anticipate the proposed action will temporarily disturb 18 acres of vernal pool tadpole shrimp designated critical habitat over 30 years (0.59 acres annually) and will not permanently remove (hardscape) any designated critical habitat.

We also anticipate that the "other disturbance" activities (activities that do not disturb land-cover such as tree trimming or off-road travel) will occur in 2.94 acres of vernal pool tadpole shrimp designated critical habitat annually (88.2 acres over 30 years). The area of impact expected in each critical habitat unit is a very small proportion of the total area in that unit; these impacts are not expected to change the current ability of the primary constituent elements to support the function and conservation role of that critical habitat unit.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the vernal pool tadpole shrimp, or adversely modify its designated critical habitat.

We reached this conclusion because the impact to this species habitat, when viewed in conjunction with the compensation measures long-term protection and management of suitable vernal pool habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Given the typical abundance of shrimp cysts in occupied pools, the relatively small proportion of the vernal pool area in the action area, and the relatively small proportion of the shrimp population affected by incidental travel, the "other disturbance" effects of vehicle travel through dry vernal pools are likely to be insignificant and discountable.

Amount or Extent of Take. Effect of the Take.
It is not possible to quantify the number of vernal pool tadpole-shrimp adults, cysts, or populations that will be impacted throughout the action area over the 30-year permit term. Thus, the Service is quantifying incidental take as the number of acres of vernal pool habitat that will be impacted annually in the action area as a result of the proposed action.

We anticipate the take of an undetermined number of vernal pool tadpole-shrimp individuals within 0.865 acre of vernal pool habitat annually, or 26 acres of vernal pool habitat over the term of the permit. A very small but undetermined number are also expected to be taken during the management of the conservation lands. Take will be in the form of harm (death and injury) and harassment.

The Service also anticipates take in the form of harm of an undetermined number of vernal pool tadpole shrimp will occur from off-road travel and "other disturbance" activities within 3.16 acres of vernal pools each year (94.8 acres of vernal pools over the term of the permit).

In the above biological opinion the Service determined that these levels of anticipated take are not likely to result in jeopardy of the vernal pool tadpole shrimp or the adversely modification of its designated critical habitat.

Threatened Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) and its Critical Habitat

Longhorn beetles (family Cerambidae) are characterized by somewhat elongate, cylindrical bodies with long antennae, often more than 2/3 of the body length. Valley elderberry longhorn-beetles are stout-bodied, medium-sized longhorn beetles. Males range in length from about 1/2 to nearly 1 inch (measured from the front of the head to the end of the abdomen) with antennae about as long as their bodies. Females are slightly more robust than males, measuring about 3/4 to 1 inch, with somewhat shorter antennae. Adult males have red-orange elytra (wing covers) with four elongate spots. The red-orange fades to yellow on some museum specimens. Adult females have dark colored elytra. Valley elderberry longhorn-beetles are endemic to the Central Valley of California.

Status of the Species and the Critical Habitat

Listing Status

The Valley elderberry longhorn beetle was federally listed as threatened in August 1980 (45 FR 52803). On October 2, 2006, the Service announced a proposal to remove Valley elderberry longhorn beetle from the list of endangered and threatened species.

Life History, Reproductive Ecology

The beetle is found only in association with its host plant, elderberry (*Sambucus* spp.). Adults feed on the foliage and perhaps flowers and are present from March through early June. They are uncommon and rarely observed despite their large size and conspicuous coloration. During this period, the beetles presumably mate, but how they locate mates is unknown, although some other cerambycids appear to use pheromones. The females lay eggs on the bark of living elderberry plants.

The larvae hatch in a few days and the first instar larvae bore to the center of elderberry stems where they develop for one to two years feeding on pith. Prior to forming their pupae, the larvae chew through the bark (Halstead and Oldham 1990) and then plug the holes with wood shavings. The larvae crawl back to their pupal chamber which they pack with frass (Barr 1991). In the pupal chamber, the larvae metamorphose into their pupae and then into adults where upon they emerge between mid-March through June (Barr 1991). The complete life cycle is thought to take one or two years. Adults are presumed to die after reproducing.

Habitat Affinities

The beetle is entirely dependent on elderberry, which is a common component of the remaining riparian forests of the Central Valley. It appears that in order to serve as habitat, the shrubs must have stems that are 1.0 inch or greater in diameter at ground level. Use of the plants by the beetle is rarely apparent. Frequently, the only exterior evidence of the shrub's use by the beetle is an exit hole created by the larva just prior to the pupal stage. Fieldwork along the Cosumnes River and in the Folsom Lake area in Sacramento County suggests that larval galleries can be found in elderberry stems with no evidence of exit holes. The larvae either succumb before constructing an exit hole or are not far enough along in the developmental process to construct an exit hole.

Historical and Current Range, Distribution, Dispersal
At the time of listing, the loss of riparian habitat was identified as a major threat to the beetle. Loss of riparian habitat between 1900 and 1990 in the Central Valley was about 96% in the southern portion of the Valley (Kern County to Fresno County) (16,000 acres remaining), 84% in the middle Valley (Merced County to San Joaquin County) (21,000 acres remaining) and 80% in the northern Valley (Sacramento and Solano counties to Shasta County) (96,000 acres remaining). Between 1960 and 1990, loss rates had slowed somewhat but were still high with 59% loss in the south, 65% loss in the middle, and 35% loss in the northern Central Valley (Geographic Information Center 2003).

At the time of its listing in 1980, the beetle was known from less than 10 locations on the American River, Putah Creek and the Merced River in the Central Valley of California (USFWS 1980b). The beetle is now known to inhabit the Central Valley from southern Shasta County south to Fresno County in the San Joaquin Valley (Barr 1991).

The beetle's current distribution is patchy throughout the remaining riparian forests of the Central Valley from Redding to Bakersfield. The beetle appears to be only locally common, i.e., found in population clusters that are not evenly distributed across available elderberry shrubs in the Central Valley. Surveys conducted by Barr (1991) found evidence of beetle activity at 28 percent of the 230 sites with elderberry. Previously, Jones and Stokes (1987) had found evidence of occupancy in 65% of a total of 4,800 acres of riparian habitat along the Sacramento River. Frequently, only particular clumps or plants in the study areas were found to harbor the beetle. Plants used usually show evidence of repeated use over a period of several years, but sometimes only one or two exit holes are present. Certain drainages or areas appear to contain clusters or groupings of occupies shrubs. Areas in the San Joaquin Valley where the beetle has been found include: the Kaweah and Tule Rivers in Tulare County, the Stanislaus River in San Joaquin and Stanislaus Counties, the Tuolumne River in Stanislaus County, and the area near the community of Coarsegold in Madera County. There are approximately 190 records of the animal (largely based on exit holes) in the Central Valley (California Department of Fish and Game 2006). Although records exist for Kern County (California Department of Fish and Game 2006), no specimens or observations of living beetles exist that support the assertion that the species is found there (Talley et al. 2006).

Due to the secretive nature of the species, little is known about distribution of the Valley elderberry longhorn beetle. Its known range is largely based upon the presence of exit holes in elderberry stems. Population densities of the beetle are probably naturally low (Service 1984); and it has been suggested, based on the spatial distribution of occupied plants (Barr 1991), that the beetle is a poor disperser. Insecticide and herbicide use in agricultural areas and along road right-of-ways may be factors limiting the beetle's distribution. The age and quality of individual elderberry shrubs/trees and stands as a food plant for beetle may also be a factor in its limited distribution.

Reasons for Decline and Threats to Survival
The Valley elderberry longhorn-beetle, though wide-ranging, is in long-term decline due to human activities that have resulted in widespread alteration and fragmentation of riparian

habitats, and to a lesser extent, upland habitats, which support the beetle. The primary threats to survival of the beetle 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
- non-native animals such as the Argentine ant, which may eat the early phases of the beetle
- recreational, industrial, and urban development.

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 ESA for the beetle (as well as other species), other regulatory protections (as discussed below), and restoration efforts. A review of the Section 7 consultations done for Valley elderberry longhorn-beetle provides some estimate of the amount of elderberry habitat lost since the beetles listing in 1980. During this period, the Service had authorized incidental take in the amount of 10,000 to 20,000 acres of beetle habitat, primarily for projects associated with urbanization, transportation, water management, and flood control. A number of HCPs are in development to allow for urbanization projects in the Sacramento Valley (Talley *et al.* 2006).

Ongoing maintenance of levees and canals for purposes of flood control and agriculture may result in loss of habitat for the beetle. Flood control activities appear to be responsible for there being fewer elderberry shrubs and beetles along the lower Sacramento River than the upper Sacramento River (Talley et al. 2006). The lower Sacramento River is constrained by flood control levees and the limitation of available restoration sites will limit future restoration opportunities along this waterway. Additionally, Reclamation Board concerns over negative consequences from allowing a federally listed species to inhabit their facilities prevent the establishment of beetle habitat in many riparian areas that would otherwise be suitable for the beetle.

The invasive Argentine ant (*Linepithema humile*) is a threat to the beetle (Huxel 2000). This ant is both an aggressive competitor and predator on native fauna that is spreading throughout riparian habitats in California and displacing assemblages of native arthropods (Ward 1987; Human and Gordon 1997; Holway 1998). A negative association between the presence of the ant and Valley elderberry longhorn-beetle exit holes was observed along Putah Creek in 1997 (Huxel 2000). This aggressive ant could interfere with adult mating or feeding behavior, or prey on eggs and larvae (Way *et al.* 1992). Between 1998 and 2002, the number of sites infested by the Argentine ant increased by 3 along Putah Creek and the American River (30 sites total were examined) (Huxel 2000; Holyoak and Talley 2001).

The beetle 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 was often found feeding on tethered mealworm (*Tenebrio monitor*) larvae. The earwig may be common in riparian areas and it 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 the irrigation, although this needs to be statistically tested (Klasson *et al.* 2005).

In 2004, 180 million pounds of pesticide active ingredients were reported used in California. The greatest pesticide use occurs in the San Joaquin Valley where four counties had the highest use: Fresno, Kern, Tulare, and San Joaquin (CDPR 2006). The peak timing of application depends on the chemical agent and other factors including the activity period of the targeted pest insects; the use of the agents may coincide with the most vulnerable period of Valley elderberry longhorn beetle adult activity, egg-laying and initial larval exposure on the outside of elderberry stems (Talley *et al.* 2006).

Low density and limited dispersal capability may cause the beetle to be vulnerable to the negative effects of isolation of small subpopulations. Riparian loss has resulted in fragmented and isolated remnants of Valley elderberry longhorn-beetle habitat. Sub-populations of the animal 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 the beetle's limited-dispersal ability could make recolonization difficult if extirpation occurs (Collinge *et al* 2001; Talley 2005).

Critical Habitat Status

Critical Habitat for the Valley longhorn beetle was designated in August 1980 (45 FR 52803). Two areas along the American River in the Sacramento metropolitan area of Sacramento County, California are designated Critical Habitat for the beetle (45 FR 52803): (1) Sacramento Zone: An area 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; and (2) American River Parkway Zone: An area of the American River Parkway on the south bank of the American River, bounded on the north by latitude 38 37'30" N, and on the South and east by Ambassador Drive and its extension north to latitude 38 37'30" N, Goethe Park, and that portion of the American River Parkway northeast of Goethe Park, west of the Jedediah Smith Memorial Bicycle Trail, and north to a line extended eastward from Palm Drive.

In addition, an area along Putah Creek, Solano County, and the area west of Nimbus Dam along the American River Parkway, Sacramento County, are considered essential habitat, according to the *Valley Elderberry Longhorn Beetle Recovery Plan* (Service 1984). These areas support large numbers of mature elderberry (*Sambucus* spp.) plants with extensive evidence of use by the beetle.

Environmental Baseline within the Action Area

Species Baseline

There are 28 extant occurrences for the Valley elderberry longhorn beetle in the 276,350-acre action area (CNDDB 2007). Eight of these occurrences are located in San Joaquin County, three in Stanislaus County, one in Mariposa County, one in Merced County, four in Madera County, and 11 in the Fresno County portions of the action area. The extant occurrences for this species

occupy approximately 1,557 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007).

The HCP land-cover types utilized by Valley elderberry longhorn beetle are blue oak woodland, blue oak-foothill pine, other developed and disturbed lands, valley-oak woodland and, woody riparian. Elderberry shrubs, the host plant of Valley elderberry longhorn beetle, occupy a small proportion of the area within oak and riparian woodland land-cover types; they occupy even less area in developed or disturbed lands. Although elderberry shrubs occur most frequently in the drier areas riparian habitats (USFWS 1984), they are not usually dominant plant species but rather occupy a secondary layer in forest edges, openings, and the understory areas of dominant growth. Accordingly, the HCP estimated that 5% of blue oak woodland, blue oak/foothill pine, and valley oak woodland cover in the action area are suitable for beetle occupancy, and 50% of woody riparian habitat in the action area is suitable for beetle occupancy.

Critical Habitat Baseline
None of the Valley elderberry longhorn beetle designated Critical Habitat is located inside the 276,350-acre action area.

Effects of the Action on the Valley elderberry longhorn beetle
Direct and Indirect Effects
Vegetation clearance such as Covered Activities G13, and E10, and other Covered Activities may have direct effects on the Valley elderberry longhorn beetle, including disturbance of occupied elderberry shrubs. Most impacts on elderberry plants in the action area will occur as the result of maintaining clearance between vegetation and electrical conductors on overhead transmission and distribution lines (Activity E10a, E10d). Beetles could be killed during trimming or pruning of elderberry stems during routine vegetation management activity. Clearance requirements vary with line voltage and other factors. In many areas, conductor vegetation-clearance is sufficient to preclude the need for pruning elderberry plants. Clearance often does not require removal of entire shrubs. Trimming, pruning and other vegetation actions on elderberry shrubs may indirectly affect larvae or beetles through subsequent changes in elderberry plant vigor.

The effects of the HCP vegetation management covered-activities on the Valley elderberry longhorn beetle were included in the detailed analysis of impacts on the beetle from PG&E's vegetation management activities in the Service's 2003 Opinion on PG&E's Transmission Separation Project (1-1-01-F-0114) which applies the March 2003 Service/PG&E final VELB Conservation Program (HCP Appendix D). Because that Opinion provides incidental take authorization for these same vegetation management covered-activities for the entire PG&E system (including the San Joaquin Valley), it is not necessary for this Opinion to re analyze those VELB impacts. Based on PG&E surveys conducted in 2001 and 2002 and summarized in HCP Appendix D, approximately 107 "shrub units" (which includes all stems within a 6-by-6-by-6-foot area) will need to be pruned annually in the action area during the vegetation management covered-activities. Previous surveys by PG&E indicate that nearly one-third of these plants will have been pruned previously. As provided by AMM 11, PG&E will apply the same avoidance and minimization measures required by the VELB Conservation Program to all routine operations and maintenance activities in the action area. Similarly, the lands acquired and

managed in perpetuity under the VELB Conservation Program will mitigate for Valley elderberry longhorn-beetle impacts from PG&E's routine operations and maintenance throughout the system, including Covered Activities in the action area.

The 2003 BO did not analyze effects of substation expansion and minor construction activities (e.g., G14, G15,G16 and E12, E13, E14,E15) which could add 1,110 miles of line expansions over the 30-year term of the permit. Assuming that these activities result in impacts similar to the relative percentage of disturbance estimated in HCP Table 3-2 and habitat disturbed in HCP Table 3-11, approximately 0.01 acre of VELB habitat could be permanently lost annually (0.3 acre over 30 years) and 0.7 acre temporarily disturbed annually (21 acres over 30 years)(Total of 21.3 acres over 30 tears) (final HCP page 5-5). In addition, the "other disturbance" covered activities (such as off-road travel) will occur on 33 acres of VELB habitat per year (99 acres of habitat affected over 30 years).

Effects of Compensation Measures
PG&E's existing Valley Elderberry Longhorn Beetle Conservation Program (HCP Appendix D) provides funding for acquisition and long-term management of compensation areas and for research to determine optimum placement of several elderberry conservation areas. PG&E has successfully established Valley elderberry longhorn-beetle mitigation habitat for a number of individual projects. Under the 2003 Opinion, PG&E is providing mitigation for all impacts to the beetle from all routine operations and maintenance including vegetation management throughout PG&E's service territory; therefore, no further mitigation is required for the potential impacts from such activities in the planning area.

However, because the 2003 BO did not address the potential impacts to the beetle from "minor construction" activities (including substation expansion, new electric poles and towers, new pipeline extensions, and new pressure limiting stations), PG&E will avoid, minimize, and compensate for effects of these additional activities on elderberry plants. PG&E will use the same avoidance, minimization, compensation and monitoring methods described in the 2003 Opinion, in the VELB Conservation Program, and increase the number acres of high quality VELB habitat acquired under the 2003 BO, based on the actual impacts to the beetle from HCP "minor construction" activities in the action area. PG&E will compensate for all elderberry shrubs regardless of species occupancy; therefore, the compensation will provide a substantial amount of habitat relative to the amount of occupied habitat that is expected to be affected by Covered Activities. PG&E anticipates annually providing an additional 0.50 acre of VELB compensation in the North San Joaquin Valley, 1.15 acres in the Central San Joaquin Valley, and 0.59 acre in the South San Joaquin Valley. Overall, PG&E will provide 2.24 acres of VELB compensation annually (67.2 acres over 30 years).

Effects on Critical Habitat
Critical Habitat has been designated for Valley elderberry longhorn-beetle but no designated Critical Habitat is within the action area. Therefore, there the proposed action could not adversely modify designated Critical Habitat for this species.

Conclusion
We anticipate that the proposed action will directly and indirectly affect the Valley elderberry longhorn beetle as described in the analysis above, including the temporary disturbance or permanent loss of 0.71 acres of suitable Valley elderberry longhorn-beetle habitat annually, or approximately 21.3 acres over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts Valley elderberry longhorn beetle. Compensation will be provided for all impacts to elderberry shrubs, even for shrubs where the beetle may not be present.

The "other disturbance" effects of vehicle travel through 33 acres of suitable habitat annually are individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Valley elderberry longhorn beetle, or adversely modify its designated critical habitat.

We reached this conclusion because the impact to this species habitat, when viewed in conjunction with the compensation measures long-term protection and management of suitable vernal pool habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take
The Service expects that incidental take of the Valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of the species and their relatively small body size make the finding of a dead specimen unlikely. The species occurs in habitat that makes them difficult to detect. Due to the difficulty in quantifying the number of beetles that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as based upon the acres of suitable Valley elderberry longhorn-beetle habitat disturbed annually. We anticipate the take of an undetermined number of Valley longhorn beetles inhabiting elderberry shrubs within 0.71 acres of habitat annually (21.3 acres over 30 years). Take will be in the form of harm (death and injury) and harassment. In the above biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy of the Valley elderberry longhorn-beetle or the destruction or adverse modification of its critical habitat.

WILDLIFE - AMPHIBIANS

Threatened California tiger salamander (*Ambystoma californiense*) and its Critical Habitat
The California tiger salamander is a large and stocky salamander with a broad, rounded snout. Adults are terrestrial and may reach a total length of 8.2 inches. California tiger salamanders exhibit sexual dimorphism; males tend to be larger than females are. The coloration of the California tiger salamander is white or yellowish markings against black. As adults, California tiger salamanders tend to have the creamy yellow to white spotting on the sides with much less on the dorsal surface of the animal, whereas other tiger salamander species have brighter yellow spotting that is heaviest on the top of the animals.

Status of the Species and the Critical Habitat

Listing Status

On August 4, 2004, the Service listed the California tiger salamander as threatened throughout its range. In doing so, we changed the status of the Santa Barbara and Sonoma county populations from endangered to threatened (69 FR 47211). On August 19, 2005, U.S. District Judge William Alsup vacated the Service's down listing of the Sonoma and Santa Barbara populations from endangered to threatened. The Sonoma and Santa Barbara populations are again listed as endangered. A detailed account of the taxonomy, ecology, and biology of the California tiger salamander is presented in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005). The state of California classifies the California tiger salamander as a Species of Special Concern

Life History, Reproductive Ecology

California tiger salamanders require both wetland and adjacent upland habitat to complete their life cycle (Shaffer *et al.* 1993). Subadult and adult California tiger salamanders spend the dry summer and fall months of the year in the burrows of small mammals, such as California ground squirrels *(Spermophilus beecheyi)* and Botta's pocket gopher *(Thomomys bottae)* (Storer 1925, Loredo and Van Vuren 1996, Petranka 1998, Trenham 1998a). During this period, California tiger salamanders eat very little (Shaffer *et al.* 1993); although Sweet (2003) stated the salamanders may feed on camel crickets which also live in the burrows.

Once fall or winter rains begin, the salamanders emerge from the upland sites on rainy nights to feed and to migrate to the breeding ponds (Stebbins 1985, 1989, Shaffer *et al.* 1993). Adult salamanders mate in the breeding ponds, after which the females lay their eggs in the water (Twitty 1941, Shaffer *et al.* 1993, Petranka 1998). Historically, the California tiger salamander utilized vernal pools, but the animals also currently breed in livestock stock ponds. Females attach their eggs singly, or in rare circumstances, in groups of two to four, to twigs, grass stems, vegetation, or debris (Storer 1925, Twitty 1941). In ponds with little or no vegetation, eggs may be attached to objects, such as rocks and boards, on the bottom (Jennings and Hayes 1994). After breeding, adults leave the pool and return to the small mammal burrows (Loredo *et al.* 1996, Trenham 1998a), although they may continue to come out nightly for approximately the next 2 weeks to feed (Shaffer *et al.* 1993). In drought years, the seasonal pools may not form and the adults cannot breed (Barry and Shaffer 1994).

Salamander eggs hatch in 10 to 14 days with newly hatched salamanders (larvae) ranging from 0.45 to 0.56 inch in total length (Petranka 1998). The larvae are aquatic. They feed on zooplankton, small crustaceans, and aquatic insects for about 6 weeks after hatching, after which they switch to larger prey (J.D. Anderson 1968). Larger larvae have been known to consume smaller tadpoles of Pacific treefrogs *(Pseudacris regilla)* and California red-legged frogs *(Rana aurora)* (J.D. Anderson 1968, P.R. Anderson 1968). 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 young salamanders are wary and when approached by predators they will dart into vegetation on the bottom of the pool (Storer 1925). The larval stage of the California tiger salamander usually lasts 3 to 6 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 (change into a different physical form) to the terrestrial stage (Wilbur and Collins 1973). Individuals collected near Stockton in the Central Valley during April varied from 1.88 to 2.32 inches in length (Storer 1925). 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. 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 (Pechmann *et al.* 1989, Semlitsch *et al.* 1988, Morey 1998, Trenham 1998b). The larvae will perish if a site dries before metamorphosis is complete (P.R. Anderson 1968, Feaver 1971). In Madera County, Feaver (1971) found that only 11 of 30 pools sampled supported larval California tiger salamanders, and that *5* of these dried before metamorphosis could occur. Therefore, out of the original 30 pools, only 6 (20 percent) provided suitable conditions for successful reproduction that year. Size at metamorphosis is positively correlated with stored body fat and survival of juvenile amphibians, and negatively correlated with age at first reproduction (Semlitsch *et al.* 1988, Scott 1994, Morey 1998). In the late spring or early summer, before the ponds dry completely, metamorphosed juveniles leave them and move to upland habitat. This emigration occurs in both wet and dry conditions (Loredo and Van Vuren 1996, Loredo *et al.* 1996). Unlike during the winter migration, the wet conditions that California tiger salamanders 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 California tiger salamanders leave their birth ponds for upland refugia, they typically do not return to ponds to breed for an average of about 4 to *5* years. However, they remain active in the uplands, coming to the surface during rainfall events to disperse or forage (Trenham and Shaffer, unpublished manuscript).

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 roughly 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 individuals of the California tiger salamanders require 2 years to become sexually mature, but that some individuals may be slower to mature (Shaffer *et al.* 1993). Second, some animals do not breed until they are 4-6 years old. While some individuals may survive for more than 10 years, many breed only once, and in some populations, less than *5* percent of marked juveniles survive to become breeding adults (Trenham 1998b). With such low recruitment, isolated populations are susceptible to unusual, randomly occurring natural events, as well as to human-caused factors that reduce breeding success and individual survival. Factors that repeatedly lower breeding success in isolated pools can quickly extirpate a population.

Habitat Affinities

The upland component of California tiger salamander habitat typically consists of grassland savannah. Within these upland habitats, adult California tiger salamanders spend the greater part of their lives in the underground burrows of California ground squirrels and Valley pocket gophers (Barry and Shaffer 1994). Camel crickets and other invertebrates within these burrows

provide food for California tiger salamanders. Burrows also provide protection from the sun and wind associated with the dry California climate that can cause desiccation (drying out) of amphibian skin. Although California tiger salamanders are members of a family of "burrowing" salamanders, California tiger salamanders are not known to create their own burrows in the wild, likely due to the hardness of soils in the California ecosystems in which they are found. Because they live underground in the burrows of small mammals, they are rarely encountered even where abundant. The burrows may be active or inactive, but because they collapse within 18 months if not maintained, an active population of burrowing mammals is necessary to sustain sufficient underground refugia for the species (Loredo *et* a!. 1996). California tiger salamanders also may seek refugia in leaf litter or desiccation cracks in the soil. Although the upland burrows inhabited by California tiger salamanders have often been referred to as "estivation" sites, which implies a state of inactivity, most evidence suggests that California tiger salamanders remain active in their underground dwellings. A recent study has found that California tiger salamanders move, feed, and remain active in their burrows (Trenham 2001, van Hattem 2004). Because California tiger salamanders arrive at breeding ponds in good physical condition and are heavier when entering a pond than when leaving, researchers have long inferred that the California tiger salamanders are feeding while underground. Recent direct observations have confirmed this (Trenham 2001; van Hattem, 2004). Thus, upland habitat is a more accurate description of the terrestrial areas used by California tiger salamanders than is the term estivation habitat.

Historical and Current Range, Distribution, Dispersal

Historically, the California tiger salamander inhabited low elevation grassland and oak savanna plant communities of the Central Valley, adjacent foothills, and the inner coastal ranges in California (Storer 1925, Shaffer *et al.* 1993) from sea level up to about 1500 feet. In the Central Valley and surrounding foothills, the species occurred from northern Yolo County southward to northwestern Kern County and northern Tulare County. Along the coastal ranges, the species occurred from the Santa Rosa area of Sonoma County south to the vicinity of Buellton in Santa Barbara County. There are presently 877 extant occurrences for California tiger salamander in 25 California counties: Alameda (140), Amador (2), Butte (0), Calaveras (8), Contra Costa (145), Fresno (26), Glenn (0), Kern (2), Kings (1), Madera (45), Mariposa (3), Merced (67), Monterey (85), Riverside (0), Sacramento (12), San Benito (48), San Joaquin (27), San Luis Obispo (7), San Mateo (2), Santa Barbara (22), Santa Clara (120), Santa Cruz (2), Solano (14), Sonoma (70), Stanislaus (25), Sutter (0), Tulare (9), and Yolo (7).

Although the observations show that California tiger salamanders can travel great distances, salamanders typically stay closer to breeding ponds. Dispersal and migration movements made by California tiger salamanders can be grouped into two main categories: (1) breeding migration and (2) interpond dispersal. Breeding migration is the movement of salamanders from and to a pond from the surrounding upland habitat. After metamorphosis, juveniles move away from breeding ponds into the surrounding uplands, where they live for several years. During a study in Monterey County, it was found that upon reaching sexual maturity, most individuals returned to their natal birth pond to breed, while 20 percent dispersed to other ponds (Trenham *et al.* 2001). Following breeding, adult California tiger salamanders return to upland habitats, where they may live for one or more years before breeding again (Trenham *et al.* 2000).

California tiger salamanders are known to travel large distances from breeding ponds to upland habitats. Maximum distances moved are generally difficult to establish for any species, but California tiger salamanders in Santa Barbara County have been recorded to disperse 1.3 miles from breeding ponds (Sweet 1998). California tiger salamanders are also known to travel between breeding ponds; one study found that 20 - 25 percent of the individuals captured at one pond were recaptured later at ponds approximately 1,900 and 2,200 feet away (Trenham *et al.* 2001). In addition to traveling long distances during migration to or dispersal from ponds, California tiger salamanders may reside in burrows that are far from ponds. In Santa Barbara County, an adult California tiger salamander was seen in the mouth of a burrow 1,900 feet from the nearest known breeding pond in June, a month when dispersal is unlikely.

Evidence suggests that juvenile California tiger salamanders disperse further into upland habitats than adult California tiger salamanders do. A trapping study conducted in Solano County during winter of 2002/2003 found that juveniles used upland habitats further from breeding ponds than did adults (Trenham and Shaffer, unpublished manuscript). More salamanders that are juvenile were captured at distances of 328, 656, and 1,312 feet from a breeding pond than at 164 feet. Large numbers, approximately 20 percent of total captures, were found 1,312 feet from a breeding pond. Fitting a distribution curve to the data revealed that *95* percent of juvenile salamanders could be found within 2,099 feet of the pond, with the remaining 5 percent being found at even greater distances. Preliminary results from the 2003-04 trapping efforts detected juvenile California tiger salamanders at even further distances, with a large proportion of the total salamanders caught at 2,297 feet from the breeding pond (Trenham *et al.* unpublished data). Surprisingly, most juveniles captured, even those at 2,297 feet, were still moving away from ponds (Ben Fitzpatrick, University of California at Davis, pers. comm., 2004). In Santa Barbara County, juvenile California tiger salamanders have been trapped approximately 1,200 feet away while dispersing from their natal pond. These data show that many California tiger salamanders travel great distances while still in the juvenile stage.

Post-breeding movements away from breeding ponds by adults appear to be much smaller. During post- breeding emigration, radio-equipped adult California tiger salamanders were tracked to burrows 62 - 813 feet from their breeding ponds (Trenham 2001). These reduced movements may be due to adult California tiger salamanders having depleted physical reserves after breeding or to the drier weather conditions that can occur during the period when adults leave the ponds. Rather than staying in a single burrow, most individuals also used several successive burrows at increasing distances from the pond. Although the studies discussed above provide an approximation of the distances that California tiger salamanders regularly move from their breeding ponds, upland habitat features will determine the details of movements in a particular landscape. Trenham (2001) found that radio-tracked, adult salamanders favored grasslands with scattered large oaks over more densely wooded areas. A drift-fence survey at a Santa Barbara County pond that is bordered by a strawberry field found that many emigrating juveniles moved towards the strawberry field; however, no adults wire captured entering the pond from this direction. Most of the California tiger salamanders entered the pond from extensive, overgrazed grassy flats rather than from sandhill or eucalyptus habitats in other quadrants. Based on radio-tracked adults, there is no indication that certain habitat types are favored as corridors for terrestrial movements (Trenham 2001). In addition, at two ponds completely encircled by drift fences and pitfall traps, captures of arriving adults and dispersing

new metamorphs were distributed roughly evenly around the ponds. Thus, it appears that dispersal into the terrestrial habitat occurs randomly with respect to direction and habitat types.

Reasons for Decline and Threats to Survival
Numerous species have either been documented to prey upon the California tiger salamander or are likely to do so, including coyotes *(Canis latrans),* raccoons *(Procyon lotor),* opossums *(Dideiphis virginiana),* egrets *(Egretta* spp.), great blue herons *(Ardea herodias),* crows *(Corvus brachyrhynchos),* ravens *(Corvus corax),* bullfrogs *(Rana catesbeiana),* mosquito fish *(Gambusia affinis),* and crayfish *(Procrambus* spps.). Domestic dogs *(Canis familiaris)* have been observed eating California tiger salamanders at Lake Lagunitas at Stanford University (Sean Barry, pers. comm. to C. Nagano, July 2004).

California tiger salamanders are imperiled by a variety of human activities. Current factors associated with declining populations of the salamander include continued degradation and loss of habitat due to agriculture and urbanization, hybridization with non-native tiger salamanders (Riley *et al.* 2003), and introduced predators. Vernal pools, other water bodies utilized for breeding, and upland areas used by the salamanders in this region are threatened by conversion to intensive agriculture, as well as by residential and commercial housing developments. Large vineyards planted in areas along the San Joaquin-Sacramento County line have also degraded and destroyed habitat for California tiger salamanders. Fragmentation of existing habitat and the continued colonization of existing habitat by non-native tiger salamanders *(Ambystoma tigrinum* and other species) may represent the most significant current threats to California tiger salamanders, although populations are likely threatened by more than one factor. Isolation and fragmentation of habitats within many watersheds have precluded dispersal between sub-populations and jeopardized the viability of metapopulations (broadly defined here as multiple subpopulations that occasionally exchange individuals through dispersal, and are capable of colonizing or "rescuing" extinct habitat patches).

Lifetime reproductive success for the Central population of the California and other tiger salamanders is naturally 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 reproduction resulted in roughly 11 metamorphic offspring over the lifetime of a female. In part, this low reproductive success is due to the extended time it takes for CTS to reach sexual maturity; most do not breed until four or five years of age. While individuals may survive for more than ten years, many breed only once. Combined with low survivorship of metamorphosed individuals [in some populations, fewer than 5 percent of marked juveniles survive to become breeding adults (Trenham et al. 2000)], reproductive output in most years is not sufficient to maintain populations. This trend suggests that the species requires occasional large breeding events to prevent extirpation (temporary or permanent loss of the species from a particular habitat) or extinction (Trenham et al. 2000). With such low recruitment, isolated populations are susceptible to unusual, randomly occurring natural events, as well as human-caused factors that reduce breeding success and individual survival. Factors that repeatedly lower breeding success in isolated vernal pools or ponds can quickly extirpate an occurrence of the species. Therefore, an essential element for successful conservation is the presence and maintenance of sets of interconnected sites that are within the dispersal distance of other ponds (Trenham et al. 2001).

Other threats are disease; road-crossing mortality; various chemical contaminants; possible commercial over-utilization; predation and competition from introduced exotic species; and certain unrestrictive mosquito and rodent control operations. The various primary and secondary threats are not currently being offset by existing Federal, State, or local regulatory mechanisms to conserve the species. The California tiger salamander is also vulnerable to chance environmental or demographic events, especially small populations. The combination of its biology and specific habitat requirements makes the animal highly susceptible to random events, such as drought, disease, and other occurrences.

Status of designated Critical Habitat
Approximately 80,576 acres of critical habitat for the Central Population of the California tiger salamander was designated on August 23, 2005 (70 FR 49379) in 19 California counties divided into four geographic regions: the Central Valley Region, Southern San Joaquin Valley Region, East Bay Region, and Central Coast Geographic Regions. Each region includes 5 to 12 units. Critical habitat for the Central population of the CTS provide for breeding and nonbreeding habitats and for dispersal between these habitats, as well as allowing for an increase in the size of CTS populations. Critical habitat for the Central population of the CTS includes essential aquatic habitat features, essential upland (nonbreeding season) habitat features with underground refugia, and essential dispersal routes.

The Central population of the CTS requires the following three primary constituent elements: (1) Standing bodies of fresh water including natural and manmade (e.g., stock ponds), 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.

Environmental Baseline within the Action Area
Species Baseline
There are approximately 79 extant occurrences for California tiger salamander in the 267,350-acre action area (CNDDB 2007). Seventeen of these occurrences are in the San Joaquin County, 4 are in Stanislaus County, 1 in Mariposa County, 14 in Merced County, 26 in the Madera, 15 in Fresno, and 2 in the Tulare County portions of the action area. The extant occurrences for this species occupy approximately 799 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007). The 79 occurrences in the action area represent approximately 9% of all extant occurrences for this species

The primary HCP land-cover type utilized by California tiger salamander is "grassland", and the species is less frequently associated with the woodland land cover type. California tiger salamanders are dependent on seasonal aquatic habitat for breeding, particularly vernal pools and stock ponds that retain water for sufficient duration. Permanent ponds in the action area that support competing fish are not suitable habitat. Adults spend considerable time in underground refugia, such as rodent burrows or soil cracks. Individuals may move up to 1 mile from aquatic

habitat, but the density of individuals and occurrence at any site decreases with increasing distance from aquatic breeding sites. The availability of suitable aquatic breeding habitat is likely a factor limiting occupancy in otherwise suitable upland habitat. Accordingly, the HCP estimated that 30% of Grassland land-cover, 10% of Permanent Freshwater Wetland land-cover, 10% of Seasonal Wetland (including vernal pools), 2% of Blue Oak Woodland land-cover, 2% of Coastal Oak Woodland land-cover, 2% of Valley Oak Woodland land-cover, 5% of Open Water, and 2% of "Other Developed and Disturbed land" land-cover types in the action area are suitable habitat for California tiger salamander occupancy.

Critical Habitat Baseline

Of the 80,576 acres of designated Critical Habitat (70 FR 49379), 598.5 acres are located in the 250,350 acre action area (the area where covered activities and effects will occur). Of the 598.2 acres in the action area, approximately 404 acres are in existing electric transmission-line ROWs, 59 acres area are in gas transmission pipeline ROWs, 135.5 acres are in electric distribution ROWs, and an estimated 0.4 acre are in gas distribution ROWs. The action area includes three of the four CTS critical-habitat geographic-regions (the East Bay geographic region, the Central Valley geographic region, and the southern San Joaquin Valley geographic region).

Table 5. CTS Critical Habitat Units and Acres inside the Action Area

CTS Critical Habitat Units within the action area	Critical Habitat Unit acres	Acres of existing Electric Transmission ROW in the Unit	Acres of existing Electric Distribution ROW in the Unit	Acres of existing Gas Transmission ROW in the Unit	Acres of existing Gas Distribution ROW in the Unit*	Total acres of existing ROW in the Unit	Percent of the Critical Habitat Unit overlapping an existing PG&E line-facility ROW (where effects could occur)
CV2	2,306	13.8	28.7	0	*	42.5	1.8%
CV4	9,603	58.6	11.2	59.1	*	128.9	1.3%
CV6	23,491	40.3	21.8	0	*	62.1	0.3%
CV7	562	0	2.5	0		2.5	0.4%
CV9	17,799	47.6	5.4	0	*	53	0.3%
CV10	10,585	141.7	20.7	0	*	162.4	1.5%
EB13	2,409	21.6	0	0	*	21.6	0.9%
SSJ1a	3,808	0	10.2	0	*	10.2	0.3%
SSJ1b	3,003	80.3	10.2	0		90.5	3.0%
SSJ2	4,961	0	21.7	0	*	21.7	0.4%
SSJ3a	1,626	0	1.5	0	*	1.5	0.1%
SSJ5A	2,553	0	1.6	0	*	1.6	0.1%
total acres	82,706	403.9	135.52	59.1	13.6	598.5	Average = 0.9%

* PG&E does not have location information for most of their gas-distribution lines. The HCP assumed that the acres of gas distribution ROW inside designated Critical Habitat are approximately 10% of the Electric Distribution ROW acres inside Critical Habitat. Most gas-distribution lines are located in the Urban land cover type and are not expected to be inside designated critical habitat.

Of the 32 designated critical habitat units for the Central population of the California tiger salamander, portions of 9 critical habitat units are located in the 276,350-acre action area. Six of the 12 critical habitat units of the Central Valley geographic region are in the action area: Unit 6 (the Rock Creek Unit) in San Joaquin and Stanislaus counties; Unit 7 (the Rodden Lake Unit) in Stanislaus County; Unit 9 (the Fahrens Creek Unit) in Merced County; Unit 10 (the Miles Creek

Unit) in Merced County. In Western Merced County, Unit 13 (the Los Banos Unit) is part of the East Bay geographic region. Each of the 4 critical habitat units of the Southern San Joaquin geographic region are inside the planning area: Units 1a and 1b (the Millerton Unit) is in Madera County; Unit 2 (the Northeast Fresno Unit) is in Fresno County; Units 3a and 3b (the Hills Valley Unit) is in Fresno and Tulare counties. The acres of each existing PG&E line-facility ROW in each critical habitat unit are shown in Table 5:

Effects of the Action –California tiger salamander

Direct and Indirect Effects

The actual acres of impact to California tiger salamander suitable habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities.

The HCP estimates that Covered Activities will disturb and temporarily remove 33 acres of suitable (potentially occupied) upland and aquatic salamander habitat annually, and will destroy and permanently remove 0.36 acre of suitable aquatic habitat annually (i.e. 990 acres of habitat disturbance and 11 acres of habitat lost over the 30-year plan, or 1,001 acres of habitat effected over 30 years). Of this 1,001-acre total over 30 years, PG&E estimates that 26 acres are aquatic habitat, and 975 acres are upland habitat for California tiger salamander (B. Norton *in litt.* December 2007). In addition, individual California tiger salamanders may be directly displaced from worksites and adjacent occupied habitat by human activity, noise, ground vibrations, and by reduced habitat quality. Any such displacements would be temporary.

HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will occur on 185 acres of suitable California tiger salamander habitat each year. Over the 30-year Permit term, "other disturbance" will occur in 5,550 acres of suitable upland refugia habitat for the California tiger salamander.

To minimize effects on aquatic habitat, AMM 17 includes conducting preconstruction surveys for amphibian covered-species prior to Covered Activities when suitable habitat is present and establishing work-exclusion buffer zones of 50-feet around suitable habitat within work occurs within the range of an amphibian covered-species. Where establishing 50-foot work-exclusion zones are not possible, PG&E will establish a work exclusion zone of the maximum practicable distance. Under AMM 15, covered activities will be avoided near vernal pools during periods when vernal pool habitat is wet, which coincides with the breeding and larval development stages of the species' life cycle. The establishment of exclusion zones around suitable aquatic breeding habitat would reduce habitat removal, habitat disturbance, and mortality to salamanders.

In cases where the buffer or exclusion zone distances around aquatic habitat cannot be maintained or where new access roads are required to complete Covered Activities, the potential exists for direct CTS habitat disturbance or direct mortality of individual California tiger salamanders. Salamanders could be subject to direct mortality from ground-disturbing activities that could crush adults and larvae if equipment enters the aquatic habitat. Salamanders aestivating in upland areas within 1 mile of aquatic habitat could be crushed in their burrows at

any time of the year by Covered Activity equipment or vehicles traveling off-road. This potential effect would occur infrequently and would be localized.

Salamanders may travel to aestivation sites up to 1 mile from aquatic breeding habitat; consequently, individuals are likely to disperse widely over a large area. While this characteristic makes a large area subject to potential for take, it also reduces the potential for mortality and limits the proportion of a local population that may be affected by the relatively small amounts of ground disturbance resulting from most Covered Activities (see HCP Table 3-1).

California tiger salamanders in their upland refugia burrows could be crushed at any time of the year by vehicles and equipment driving over burrows while implementing "other disturbance" activities (i.e. tree trimming, patrols, PG&E vehicles traveling off-road, etc.). PG&E estimates that the "other disturbance" activities would occur on 185 acres of California tiger salamander suitable-habitat per year (5,550 acres cumulatively of "other disturbance" in habitat over 30 years).

The potential effects from all covered activities, including the "other disturbance" covered-activities will be reduced by PG&E's implementation of the general AMMs (AMMs 1-6, 8, 10, 29, and 30). The "general" AMMs , including minimizing the construction of new access roads, vehicles maintain a low speed when traveling off-road (15 mph), and parking vehicles in previously disturbed areas where practicable may minimize direct impacts of the "other disturbance" covered activities on California tiger salamanders. These measures will limit direct mortality but will not eliminate potential for a small amount of take over the life of the project.

Salamander travel and access is not expected to be disrupted by the majority of covered activities because most covered activities will be conducted during dry periods, when salamanders would not be moving. During PG&E emergency activities (Covered Activity E5), salamander travel may be slightly disrupted for short periods. Such effects are localized and infrequent and would have negligible effects on local populations.

Covered activities that result in temporary habitat loss or degradation could subsequently reduce water quality during the wet season which could indirectly lead to lower survivability of larval salamanders. The water quality BMPs specify installation of erosion control measures and AMM 10 which broadcast seeds grassland disturbance sites larger than 0.25-acre will reduce effects of Covered Activities on water and habitat quality to a minimal level.

Aquatic and upland habitat for the tiger salamander could be degraded by invasion of weedy plants following ground-disturbing activities. Implementation of AMM 10 will seed a non-native commercial seed mix on disturbed grassland land-cover larger than 0.25-acres to discourage introduction of weeds and reduce the potential of invasive weeds colonizing disturbance sites in suitable upland tiger salamander habitat.

Effects of Compensation Measures
Permanent loss of suitable habitat will be mitigated at 3:1 and temporary disturbance to suitable habitat will be mitigated at 0.5:1. PG&E anticipates annually providing 4.86 acres of CTS

compensation in the North San Joaquin Valley, 5.7 acres in the Central San Joaquin Valley, and 6.79 acres in the South San Joaquin Valley. Overall, PG&E estimates they will provide 17.7 acres of CTS compensation annually (an estimated 531 acres over 30 years).

Compensation area requirements for California tiger salamander include preserving and/or enhancing areas that support both terrestrial and aquatic habitat at appropriate ratios to ensure that all life history needs of the California tiger salamander are met. Compensation areas will also contain suitable refugia habitat (rodent burrows, soil cracks, or crevices). Compensation will provide perpetual habitat for California tiger salamander as mitigation of temporary effects of Covered Activities.

Effects on Critical Habitat
Of the approximately 598 acres of California tiger salamander critical habitat located within the existing PG&E right-of-ways (see Table 5 above), PG&E estimates that ground-disturbing Covered Activities will temporarily disturb 75 acres of critical habitat over 30 years (2.5 acres annually) and will permanently remove (hardscape) 0.6 acre over 30 years (0.02 acre annually). PG&E also estimates that "other disturbance" covered activities (activities which do not disturb land-cover such as tree trimming or off-road travel) will affect 15.19 acres of California tiger salamander critical habitat annually (477 acres over 30 years). These effects would be limited to the area of the existing PG&E rights-of-ways within the designated critical habitat units. The area of PG&E right of way within each California tiger salamander critical habitat unit is a small percentage of the unit's total area, between 0.1% and 1.8% (Table 5 above).

The "minor construction" covered-activities will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries, and require the acquisition and establishment of additional right-of-way acres. PG&E cannot predict where these ground-disturbing line extensions will be constructed, and some may be constructed inside designated California tiger salamander critical-habitat. PG&E will confer with the USFWS prior to implementing any "minor construction" covered-activity or other medium or large covered-activities within a designated critical habitat unit. PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Conclusion
We anticipate that the proposed action will directly and indirectly affect the California tiger salamander as described in the analysis above, including the disturbance and temporary loss of 33 acres of suitable California tiger salamander habitat annually (approximately 990 acres of habitat disturbance over the 30-year Permit term), and the permanent loss (hardscape) of 0.36 acres of suitable California tiger salamander habitat annually (11 acres over the 30-year Permit term)(i.e. 1,001 acres of habitat effected over 30 years). Of this 1,001-acre total over 30 years, PG&E estimates that 26 acres are aquatic habitat, and 975 acres are upland habitat for California tiger salamander. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to the California tiger salamander. Compensation will be provided for all direct and indirect impacts to suitable habitat, providing 17.4 acres of CTS compensation annually (an estimated 520.5 acres over 30 years).

The area of impact expected in each critical habitat unit is a very small proportion of the total area in that unit; these impacts are not expected to change the current ability of the primary constituent elements to support the function and conservation role of that critical habitat unit. The "other disturbance" effects of vehicle travel through dry vernal pools and suitable upland habitat are individually small, widely dispersed, and likely to be insignificant and discountable.

The "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will occur on 185 acres of suitable California tiger salamander upland habitat each year. Over the 30-year Permit term, "other disturbance" will occur in 5,550 acres of suitable upland habitat for the California tiger salamander. This off-road travel could harm or harass a small number of California tiger salamanders using these uplands for summer refugia, or migrating through these uplands

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the California tiger salamander or adversely modify its designated critical habitat.

We reached this conclusion because the impact to this species habitat, when viewed in conjunction with the compensation measures long-term protection and management of suitable California tiger salamander habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take. (California tiger salamander)
The Service expects that incidental take of the California tiger salamander will be difficult to detect or quantify. Because they live underground, they are rarely encountered even where abundant. The cryptic nature of the species and their relatively small body size make the finding of a dead specimen unlikely, and the species occurs in habitat that makes them difficult to detect. Due to the difficulty in quantifying the number of California tiger salamanders that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project based upon the acres of suitable California tiger salamander habitat disturbed annually.

We anticipate the take in the form of harm (injury, death) of an undetermined number of California tiger salamander individuals within 0.36 acres of suitable upland and aquatic salamander habitat annually, or 11 acres over the term of the Permit from the permanent loss of habitat. The Service anticipates the take in the form of harm and harassment of all California tiger salamander individuals within 33 acres of suitable upland and aquatic salamander habitat each year of the proposed permit (990 acres over 30 years) from the disturbance and temporary loss of suitable upland and aquatic California tiger salamander habitat. In total we anticipate 1,001 acres of California tiger salamander habitat effected over 30 years). Of this 1,001-acre total, PG&E estimates that 26 acres are aquatic habitat, and 975 acres are upland habitat for California tiger salamander.

The Service also anticipates take in the form of harm and harassment from off-road travel and "other disturbance" of an undetermined number of California tiger salamander individuals within 185 acres of suitable upland migration and refugia habitat each year.

In the above Biological Opinion, the Service determined this level of take is not likely to result in the jeopardy of the California tiger salamander or the adverse modification of its critical habitat.

Limestone salamander (*Hydromantes brunus*)

This salamander has webbed toes and a flattened body. Its color is uniformly brown above and pale brown to gray below. The underside of the tail is yellowish. The young are pale yellowish-green above, changing with age through pale yellow to beige or brown. Adults grow from three to four inches. The species was discovered in 1952.

Status of the Species

Listing Status

The limestone salamander is not federally listed under the ESA, but it is a US Forest Service Species of Special Concern. The limestone salamander was listed as Threatened by the California Department of Fish and Game in 1971 and is Fully Protected under California Fish and Game Code. A recovery plan has not been prepared and recovery requirements have not been identified for this species.

Life History, Reproductive Ecology

Little is known about the breeding habits of limestone salamanders but it is thought that eggs are laid in spring and hatch in late fall (Stebbins 1954; Gorman 1956). There are, moreover, no data on their food habits, but they likely forage on insects and other small invertebrates (Zeiner et al. 1988). Limestone salamanders spend much of their time underground but are active at night during fall, winter, and early spring rains, except during cold spells. (Tordoff 1980;

Habitat Affinities

As its name indicates, the species is associated with limestone outcroppings. It is found in the foothill pine-chaparral belt, where it lives in rock crevices and talus, especially where overgrown with moss. The surrounding habitat consists of oak/buckeye woodland with a thick shrub understory. Loose rock piles provide a network of crevices into which salamanders can retreat when surface temperatures rise in the spring and summer. Extensive rock cover is a characteristic of all occupied sites. It also requires a relatively steep north-to-east facing slopes that provide the shade necessary to maintain cool, moist conditions, and moss-covered talus piles and cliff crevices for refugia (Tordoff 1980). Optimal habitat is moist but not wet; the species is accordingly found more often on the slopes of ravines and canyons than on Valley floors (Tordoff 1980; Stebbins 1985).

Historical and Current Range, Distribution, Dispersal

The historical and current distribution of limestone salamander is limited to scattered locations along the Merced River and its tributaries between Briceburg and McClure Reservoir in Mariposa County. The limestone salamander occurs in the Merced River Canyon near the vicinity of Briceburg and along Bear Creek, a tributary to the Merced River, Mariposa County. It has also been found in Hell Hollow, about four miles above Lake McClure and at the confluence of Hell Hollow Creek with Lake McClure. The species was discovered in 1952 and has only been found in areas adjacent to roads or trails; consequently, other populations are

likely to exist (Tordoff 1980). Little is know about the mobility of this species. Tordoff (1980) found one limestone salamander between two occupied sites, approximately 250 meters (820 feet) from ideal habitat.

Reasons for Decline and Threats to Survival
There are no reliable population estimates for limestone salamander; however, surveys conducted by Tordoff between 1980 and 1983 estimated a population in Hell Hollow at 444 individuals in 1981, 763 in 1982, and as high as 904 individuals in 1983. The increase in population size may have been due to an increase in the number of active salamanders through successively wetter years or to improvements in sampling techniques. These are the first estimates of population size reported for this species. (Lehman 1989.)

Because limestone salamanders spend much of their time underground, it is unlikely that adults are frequently taken as prey items. Limestone salamanders may compete with arboreal salamanders (*Aneides lugubris*) in areas where their ranges overlap (Zeiner et al. 1988). The greatest threat to limestone salamanders is the lack of suitable habitat and the fragile nature of this habitat. Human activities, such as gold mining operations, water development, highway or road construction, and quarrying for limestone are threats near existing populations, are likely to have a detrimental effect on the species (Zeiner et al. 1988). Alterations of water flow that provides moisture to the salamander's habitat would negatively affect the species because of its dependence on moist conditions (Hansen and Tordoff 1994).

Status with Respect to Recovery/Conservation
The California Department of Fish and Game established the Limestone Salamander Ecological Reserve, located near Briceburg in Mariposa County, in 1975 to protect 120 acres of limestone salamander habitat (Hansen and Tordoff 1994.). The Bureau of Land Management designated an additional 1,600 acres as the Limestone Salamander Area of Critical Environmental Concern (ACEC) to forestall mining and other developments that would negatively affect limestone salamander. The ACEC encompasses both confirmed and suitable limestone salamander habitat. The status in 1999 of the limestone salamander was unknown

Environmental Baseline within the Action Area
There are only 19 occurrences for limestone salamander (CNDDB 2007). All occurrences of this species are located in Mariposa County. Twelve of the 19 known occurrences are historical (the record is older than 20 years), and 7 are recent (the record is less than 20 years old. Information on the number of occurrences or the occupied area within the 276,350-acre action area portion of Mariposa County is not available to the Service.

This species has a very localized distribution in Mariposa County, where it is restricted to limestone outcrops on north-facing slopes. The HCP land-cover types utilized by limestone salamander are Blue Oak Woodland, Blue Oak/Foothill Pine, Conifer, Montane Hardwood, and Upland Scrub. Suitable limestone microhabitat occupies a small proportion of these cover types in Mariposa County. Because of this very localized species distribution, the limited area of land-cover types that may support suitable microhabitat in Mariposa County, the HCP estimated that 5% of Blue Oak Woodland, Blue Oak/Foothill Pine, Conifer, Montane Hardwood, and Upland

Scrub land-cover present in the 276,350-acre action area are suitable for limestone salamander occupancy.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to limestone salamander suitable habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities. . Limestone salamanders are restricted to limestone outcrops on north-facing slopes in Mariposa County. The HCP designated the limited known and potential distribution of the limestone salamander as "designated occupied habitat", based on the known distribution of the species (see HCP Figure I-1, HCP Appendix I). Because of this, the HCP conservatively estimates that about 0.8 acre of suitable limestone salamander habitat is anticipated to be disturbed and temporarily removed each year (about 24.6 acres over 30 years), and less than 0.0033 acre could be destroyed and permanently removed per year (0.1 acres permanently lost over 30 years)(approximately 30 acres total over 30 years) (Limestone salamander numbers from B. Norton *in litt* 2006).

In addition to the habitat loss from soil-disturbing covered-activities, the less intensive, "other disturbances" would occur on an additional 11 acres of limestone salamander suitable habitat each year (33 acres over 30 years)(HCP Table 3-11). If Covered Activities occurred in occupied limestone salamander habitat, effects to limestone salamanders could also result from ground disturbance or compaction by equipment, which could reduce the quality of refugia habitat available to this species. Vibrations generated by Covered Activities adjacent to potentially occupied habitat have the potential to harass limestone salamanders, but the potential for such effects are very remote.

The direct effects described above are unlikely to result from Covered Activities because occupied habitat is unlikely to be disturbed, and exclusion zones will be established around suitable habitat and occupied to the maximum extent feasible. Effects to limestone salamander will be avoided and minimized by implementing the general AMMs 1-6, 8-10, 28-30, and AMM 17. The HCP also prescribes that the area of all Covered Activities in Mariposa County (even the small-disturbance activities) be checked to determine whether they fall within the limestone salamander's designated-occupied habitat, and a qualified biologist will evaluate any activities within this area prior to construction. If suitable habitat is found, work exclusion zones of at least 50-feet will be established around the suitable habitat (such as rock outcrops) to minimize effects on habitat and avoid direct take of individuals. Where establishing 50-foot work-exclusion zones are not possible, PG&E will establish a work exclusion zone of the maximum practicable distance. The general AMMs also include minimizing construction of new access roads and parking vehicles in previously disturbed areas when practicable.

Indirect effects could occur from the vegetation-management covered-activities that clear woody or herbaceous vegetation. Vegetation loss may change the microclimate around rock outcrops, possibly reducing the quality of the habitat for salamanders, but the potential for such effects are very remote. Covered activities that result in soil disturbance could degrade water quality during the wet season and change the pattern of water movement on the slope and limestone outcrops which could degrade habitat quality. However, the water quality BMPs specify installation of

erosion control measures and AMM 10 which broadcast seeds grassland disturbance sites larger than 0.25 acre will reduce effects of Covered Activities on water and habitat quality to a minimal level. AMM 17 includes establishment of work exclusion zones around potentially occupied suitable habitat (such as rock outcrops) will reduce the potential for indirect effects.

Overall, the covered activities are not expected to result in any direct take of limestone salamanders because the probability that occupied or suitable habitat in Mariposa County will be disturbed is low and AMMs which survey and avoid suitable habitat will be implemented. If it is determined that a specific activity poses potential for take, the HCP requires PG&E to work adaptively with CDFG and the Service to develop measures to avoid take and compensate for any effects on habitat.

Effects of Compensation Measures
If effects to limestone suitable habitat occur, the compensation areas will contain both suitable aquatic and terrestrial habitat, configured spatially so that it is appropriate for occupation by limestone salamander. Compensation areas will be located within dispersal distance to other suitable limestone salamander habitat, or other areas currently occupied by limestone salamander. Permanent loss of suitable habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 0.42-acres of compensation in the North San Joaquin Valley region annually. Overall, PG&E will provide 12.6-acres of limestone salamander compensation over the 30-year term of the permit.

Conclusion
We anticipate that the proposed action will directly and indirectly affect the limestone salamander as described in the analysis above, including the maximum disturbance and temporary loss of approximately 0.8 acre of suitable limestone salamander habitat annually (approximately 24.6 acres of habitat disturbance over the 30-year Permit term), and the permanent loss of approximately 0.003 acre of suitable limestone salamander habitat annually, or 0.1 acre over the 30-year Permit term (total of approximately 30 acres over 30 years). Implementation of the avoidance, minimization, and mitigation measures included in the HCP will substantially reduce these impacts to the limestone salamander.

In addition to the habitat loss from soil-disturbing covered-activities, the less intensive, "other disturbances" would occur on an additional 11 acres of limestone salamander suitable habitat each year (33 acres over 30 years).

If effects occur, compensation will be provided for all direct and indirect impacts to suitable habitat, providing approximately 0.42 acre of limestone salamander compensation annually (an estimated 12.6 acres over 30 years). The "other disturbance" effects of vehicle travel through dry vernal pools and suitable upland habitat are likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the limestone salamander.

We reached this conclusion because the impact to this species habitat, when viewed in conjunction with the compensation measures long-term protection and management of suitable limestone salamander habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take
The Service cannot authorize take in the form of harm (mortality or injury) for the limestone salamander because the species is fully protected under California State law. However, direct or indirect harm to limestone salamander from covered activities is very unlikely.

The Service expects that incidental take of the limestone salamander in the form of harassment will be difficult to detect or quantify because of their relatively small size, their behavior patterns, and because the species occurs in habitat that makes them difficult to detect. Due to the difficulty in quantifying the number of limestone salamander that will be harassed as a result of the proposed action, the Service is quantifying incidental take as the 0.82 acre of disturbance and temporary habitat loss, and the 0.003 acre of destruction and permanent habitat loss in suitable California tiger salamander habitat annually. In total we anticipate the harassment of an undetermined number of limestone salamanders inhabiting approximately 0.823 acres suitable habitat will occur each year of the 30-year proposed permit (approximately 30 acres over 30 years).

In the above Conference Report, the Service determined this level of take is not likely to result in the jeopardy of the limestone salamander.

Threatened California red-legged frog (*Rana aurora draytonii*) and its Critical Habitat
The California red-legged frog is the largest native frog in the western United States, ranging from 1.5 to 5 inches in length. The abdomen and hind legs of adults are largely red; the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color.

Status of the Species and the Critical Habitat
Listing Status
The California red-legged frog was federally listed as threatened in May 1996 (61 FR 25813), effective June 24, 1996. A detailed account of the taxonomy, ecology, and biology of the species is presented in the *Recovery Plan for the California red-legged frog (*USFWS 2002) and in the final rule (61 FR 25813). The recovery plan for red-legged frogs identifies eight Recovery Units (USFWS 2002) delineated by major watershed boundaries as defined by U.S. Geological Survey hydrologic units and the limits of the range of the red-legged frog. The goal of the recovery plan is to protect the long-term viability of all extant populations within each recovery unit.

Life History, Reproductive Ecology
Red-legged frogs breed from November through March with earlier breeding records occurring in southern localities (Storer 1925). Red-legged frogs are often prolific breeders, laying their eggs during or shortly after large rainfall events in late winter and early spring (Hayes and

Miyamoto 1984). Eggs hatch in 6 to 14 days (Jennings 1988). Eggs exposed to salinity levels greater than 4.5 parts per thousand results in 100 percent mortality (Jennings and Hayes 1990). Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. Larvae undergo metamorphosis 3.5 to 7 months after hatching (Storer 1925, Wright and Wright 1949, Jennings and Hayes 1990). Newly metamorphosed juveniles tend to disperse locally July through September and then disperse away from the breeding habitat during spring-rain events (Jennings, *in litt.* 2000). Sexual maturity normally is reached at 3 to 4 years of age (Storer 1925, Jennings and Hayes 1985).

Red-legged frogs may live 8 to 10 years (Jennings *et al.* 1992). Populations of red-legged frogs fluctuate from year to year. When conditions are favorable, red-legged frogs can experience extremely high rates of reproduction and thus produce large numbers of dispersing young and a concomitant increase in the number of occupied sites. In contrast, red-legged frogs may temporarily disappear from an area when conditions are stressful (*e.g.*, drought).

Frogs living in coastal drainages are rarely inactive, whereas those found in interior sites may estivate (enter a dormant state during summer or dry weather). California red-legged frogs estivate in small mammal burrows and moist leaf litter. They have been found up to 100 feet from water in adjacent dense riparian vegetation.

Adult California red-legged frogs forage at night, often in the uplands surrounding their refugia (Bobzein pers. comm. 2002). Although Hayes and Tennant (1985) also found California red-legged frogs to be largely nocturnal, they found juvenile California red-legged frogs to be active diurnally and nocturnally. The diet of red-legged frogs is highly variable. Hayes and Tennant (1985) found invertebrates to be the most common food items. Vertebrates, such as Pacific tree frogs and California mice (*Peromyscus californicus*), represented over half the prey mass eaten by the larger adult California red-legged frogs (Hayes and Tennant 1985).

Habitat Affinities

The California red-legged frog occupies a fairly distinct habitat, combining both specific aquatic and riparian components. The adults require dense, shrubby or emergent riparian vegetation closely associated with deep (greater than 2 1/3-foot deep) still or slow moving water. The largest densities of California red-legged frogs are associated with deep-water pools with dense stands of overhanging willows (*Salix* spp.) and an intermixed fringe of cattails (*Typha latifolia*). Well-vegetated terrestrial areas within the riparian corridor may provide important sheltering habitat during winter.

Breeding sites for the California red-legged frog includes streams, creeks, ponds, marshes, sag ponds, deep pools, and backwaters within streams and creeks, dune ponds, lagoons, estuaries, and artificial impoundments, such as stock ponds. California red-legged frogs often successfully breed in artificial ponds with little or no emergent vegetation, as well as ponds with emergent vegetation, and have been observed to successfully breed and inhabit stream reaches that are not cloaked in riparian vegetation, as well as closed-canopy creeks and streams; therefore, factors other than cover are more likely to influence the suitability of aquatic breeding sites, such as the general lack of introduced aquatic predators.

Red-legged frogs often disperse from their breeding habitat to utilize various aquatic, riparian, and upland habitats as summer habitat. This could include ponds, streams, marshes, boulders or rocks and organic debris such as downed trees or logs; industrial debris; and agricultural features, such as drains, watering troughs, or spring boxes. Red-legged frogs can also use small mammal burrows and moist leaf litter (Jennings and Hayes 1994), and ravines that have "at least some surface flow during most of the year" (Bulger *et al.* 2003).

Red-legged frogs they may complete their entire life cycle in a particular area without using other components (*i.e.*, a pond is suitable for all life stages) or utilize multiple habitat types. Between 11 and 22 percent of adult California red-legged frogs migrate to and from their breeding ponds in Santa Cruz County (Bulger et al. 2003), and some adult California red-legged frogs bury themselves the bed of dry and drying ponds until fall rains (Bobzien, pers. comm., 2002). These variable life history characteristics enable red-legged frogs to change habitat use in response to varying conditions. During a period of abundant rainfall (*e.g.*, El Niño events), the entire landscape may become suitable red-legged frog habitat; conversely, habitat use may be drastically confined during periods of prolonged drought. Populations of red-legged frogs are most likely to persist where multiple breeding areas are embedded within a matrix of habitats used for dispersal, a trait typical of many anuran species (Laan and Verboom 1990, Reh and Seitz 1990, Mann *et al.* 1991, Sjogren-Gulve 1994, Griffiths 1997, Marsh *et al.* 1999). Where this habitat mosaic exists, local extinctions may be counterbalanced by the colonization of new habitat or recolonization of unoccupied areas of suitable habitat.

Historical and Current Range, Distribution, Dispersal

The historic range of the red-legged frog extended coastally from the vicinity of Point Reyes National Seashore, Marin County, California, and inland to the vicinity of Redding, Shasta County, California, and the entire Central Valley, southward to northwestern Baja California, Mexico (Jennings and Hayes 1985). Red-legged frogs were historically documented with 46 counties but the taxon now remains in only 238 streams or drainages within 23 counties, representing a loss of 70 percent of its former range (USFWS 2000). There are 938 extant occurrences of the frog in California (CNDDB 2007). Counties with extant occurrences are Alameda (135), Butte (2), Calaveras (1), Contra Costa (126), El Dorado (3), Fresno (4), Los Angeles (2), Marin (20), Mendocino (7) Merced (29), Monterey (67), Napa (4), Nevada (1), Placer (3), Plumas (1), Riverside (2), San Benito (40) San Bernardino (3), San Diego(0), San Francisco (8), San Joaquin (12), San Luis Obispo (111), San Mateo (64), Santa Barbara (63), Santa Clara (113), Santa Cruz (70), Solano (13), Sonoma (27) Stanislaus (7), Tehama (1), Tuolumne (2), Ventura (6) Yuba (1). Red-legged frogs are still locally abundant within portions of the San Francisco Bay area (including Marin County) and the central coast. Within the remaining distribution of the species, only isolated populations have been documented in the Sierra Nevada, northern Coast, and northern Transverse ranges. The species is believed to be extirpated from the southern Transverse and Peninsular ranges, but is still present in Baja California, Mexico.

Dispersal ability is important for the long-term survival and recovery of the California red-legged frog because the dispersing individuals can recolonize and "rescue" areas subjected to localized extinctions. At any time of the year, adult red-legged frogs may move from breeding sites. They can be encountered living within streams at distances exceeding 2.8 km (1.8 miles)

from the breeding site and have been found greater than 500 m (1,640 ft) from water, but are typically within 100 m (328 ft) of water (Bulger *et al.* 2003). During periods of wet weather, starting with the first rains of fall, some individuals may make overland excursions through upland habitats, and between 11 and 22 percent of breeding adults migrate annually (Bulger *et al.* 2003). Most of these overland movements occur at night. Dispersing adult California red-legged frogs in northern Santa Cruz County traveled distances from 0.4 km (0.25 mile) to more than 3.2 km (2 miles) without apparent regard to topography, vegetation type, or riparian corridors (Bulger *et al.* 2003). Translocated California red-legged frogs in San Luis Obispo County traveled distances between 0.2 km (656 feet) and 2.8 km (1.7 miles), to return to their home ponds (Rathbun and Schneider 2001). The distances dispersing juveniles are capable of traveling is likely to be dependent upon rainfall and moisture levels during and immediately following dispersal events, as well as being dependent on habitat availability and environmental variability. Two juveniles transported 380 meters (1,246 feet) away from a pond in San Luis Obispo County, returned repeatedly to the pond (Rathbun and Schneider 2001), although greater distances have not been tested. There is mortality associated desiccation when individual frogs attempt to return to their home pond (Rathbun and Schneider 2001).

Reasons for Decline and Threats to Survival
Habitat loss and alteration, over-exploitation, and introduction of exotic predators were significant factors in the species' decline in the early to mid-1900s. Reservoir construction, expansion of introduced predators, inappropriate grazing, and prolonged drought fragmented and eliminated many of the Sierra Nevada foothill populations. Red-legged frogs are currently threatened by human activities, many of which operate synergistically and cumulatively with each other and with natural disturbances (*i.e.*, droughts and floods). Current factors associated with declining populations of the red-legged frog include degradation and loss of its habitat through agriculture, urbanization, mining, overgrazing, recreation, timber harvesting, non-native plants, impoundments, water diversions, degraded water quality, and introduced predators. These factors have resulted in the isolation and fragmentation of habitats within many watersheds, often precluding dispersal between sub-populations and jeopardizing the viability of metapopulations. The fragmentation of existing habitat and the continued colonization of existing habitat by non-native species may represent the most significant current threats to red-legged frogs. Red-legged frog populations are usually threatened by more than one factor.

Several researchers in central California have noted the decline and eventual local disappearance of California and northern red-legged frogs (*Rana aurora aurora*) in systems supporting bullfrogs (*Rana catesbiena*) (Hayes and Jennings 1986, Twedt 1993). Other non-native species that suppress California red-legged frog populations are the red swamp crayfish (*Procambarus clarkii*), signal crayfish (*Pacifastacus leniusculus*), and several species of warm water fish including sunfish (*Lepomis* spp.), goldfish (*Carassius auratus*), common carp (*Cyprinus carpio*), and mosquito fish (*Gambusia affinis*). Establishment of bullfrogs has a notably destructive effect on red-legged frog populations, because they impact red-legged frogs during all life stages and in multiple ways. Cook (*in litt.* 2000) documented bullfrog predation of a large adult red-legged frog. Larval bullfrogs enter their carnivorous stage during the spring, concurrent with the early stages of red-legged frog larval development, at a time when red-legged frog larvae are small and non-carnivorous. In addition to predation, bullfrogs may have a competitive advantage over red-legged frogs: bullfrogs are larger, possess more generalized food habits (Bury and Whelan

1984), possess an extended breeding season (Storer 1933) where an individual female can produce as many as 20,000 eggs during a breeding season (Emlen 1977), and larvae are unpalatable to predatory fish (Kruse and Francis 1977). In addition to competition, bullfrogs also interfere with red-legged frog reproduction. Both California and northern red-legged frogs have been observed in amplexus with (mounted on) both male and female bullfrogs (Jennings and Hayes 1990, Twedt 1993). Thus, bullfrogs are able to prey upon and out-compete red-legged frogs.

Many pesticides and fertilizers have been shown to have deleterious effects on both red-legged frogs and treefrogs. Effects range from cardiac and abdominal edema, deformity, and death (Schuytema, and Nebeker 1999 (a), Schuytema and Nebeker 1999 (b)). Red-legged frog tadpoles are less sensitive to nitrates than other anurans, but respond to nitrites by reduced feeding, less vigorous swimming, disequilibrium, deformity, paralysis, and death (Marco *et al.* 1999). Direct mortality to tadpoles of several species has been documented from Roundup getting into pools (Williams 2005). Runoff of pesticides from golf courses (Odanaka *et al.* 1994, Ryals *et al.* 1998, Suzuki *et al.* 1998) may suppress California red-legged frogs by significantly eliminating their prey base and by direct, reduced fitness to individual frogs. Additional threats to the California red-legged frog are chytrid fungus and trematode infestations. The chytrid fungus attacks keratinized tissue (Mazzoni *et al.* 2003), which impairs foraging ability of tadpoles by digesting and deforming their mouthparts. Chytridiomycosis (chytrid infection) also disrupts metamorphosis by reducing keratin availability for structural changes. Chytridiomycosis has caused localized extinction in many anuran species (Daszak 2000, Scott 2001, Australian Government 2004, CSIRO 2004) and has been found in California red-legged frog populations (Padgett-Flohr, undated).

Parasitic infection from the trematode, *Ribeiroia ondatrae*, has been shown to result in limb deformations in the northern red-legged frog and in the Pacific treefrog. These deformations range from missing or partial limbs in 7 to 8 percent of infected individuals to additional limbs in 34 to 48 percent of individuals tested in northern California and Oregon (Johnson *et al.* 2002). Frogs with additional or missing limbs are unable to move about their ecosystem effectively, especially when their hind limbs are compromised.

Critical Habitat Status

Critical Habitat for the California red-legged frog was designated in April 2006 (71 FR 1943). A total of 450,288 acres in 20 California counties were designated as Critical habitat. The critical habitat is designated within 34 Units located in Alameda, Butte, Contra Costa, El Dorado, Kern, Los Angeles, Marin, Merced, Monterey, Napa, Nevada, San Benito, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Ventura, and Yuba counties, California. The extant occurrences of California red-legged frog within the critical habitat units comprise approximately 63 percent of known extant occurrences within the range of the subspecies.

Based on our current knowledge of the life history, biology, and ecology of the subspecies and the habitat requirements needed to sustain the essential life history functions of the subspecies, we have determined that the California red-legged frog's primary constituent elements (PCEs) are: (1) Aquatic Breeding Habitat. Standing bodies of fresh water (with salinities less than 7.0 parts per thousand), including: natural and manmade (e.g., stock) ponds, slow moving streams or

pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years. (2) Non-Breeding Aquatic Habitat. Fresh water habitats, that may or may not hold water long enough for the subspecies to hatch and complete its aquatic life cycle but that do provide for shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult California red-legged frogs. Other wetland habitats that would be considered to meet these elements include, but are not limited to: plunge pools within intermittent creeks; seeps; quiet water refugia during high water flows; and springs of sufficient flow to withstand the summer dry period. (3) Upland Habitat. Upland areas within 200 ft (60 m) of the edge of the riparian vegetation or dripline surrounding aquatic and riparian habitat and comprised of various vegetational series such as grasslands, woodlands, and/or wetland/riparian plant species that provides the frog shelter, forage, and predator avoidance. Upland features are also essential in that they are needed to maintain the hydrologic, geographic, topographic, ecological, and edaphic features that support and surround the wetland or riparian habitat. These upland features contribute to the filling and drying of the wetland or riparian habitat and are responsible for maintaining suitable periods of pool inundation for larval frogs and their food sources, and provide breeding, non-breeding, feeding, and sheltering habitat for juvenile and adult frogs (e.g., shelter, shade, moisture, cooler temperatures, a prey base, foraging opportunities, and areas for predator avoidance). Upland habitat can include structural features such as boulders, rocks and organic debris (e.g. downed trees, logs), as well as small mammal burrows and moist leaf litter. (4) Dispersal Habitat. Accessible upland or riparian dispersal habitat within designated units, and between occupied locations within 0.7 mi (1.2 km) of each other that allows for movement between such sites. Dispersal habitat includes various natural habitats and altered habitats such as agricultural fields, which do not contain barriers to dispersal. (An example of a barrier to dispersal is a heavily traveled road (Vos and Chardon 1998) constructed without bridges or culverts.) Dispersal habitat does not include moderate to high density urban or industrial developments with large expanses of asphalt or concrete, nor does it include large reservoirs over 50 ac (20 ha) in size, or other areas that do not contain those features identified in PCE 1, 2, or 3 as essential to the conservation of the subspecies.

Because not all life history functions require all the PCEs, not all areas designated as critical habitat will contain all the PCEs. Each of the units designated in this rule have been determined to contain sufficient PCEs to provide for one or more of the life history functions of the California red-legged frog. Units were designated based on sufficient PCEs being present to support California red-legged frog life processes. Some units contained all PCEs and supported multiple life processes. Some units contained only a portion of the PCEs necessary to support the California red-legged frog's particular use of that habitat. Where a subset of the PCEs were present (e.g., water temperature during migration flows), it has been noted that only PCEs present at designation will be protected. Section 10(a)(1)(B) of the ESA authorizes us to issue permits for the take of listed species incidental to otherwise lawful activities. An incidental take permit application must be supported by a HCP that identifies conservation measures that the permittee agrees to implement for the species to minimize and mitigate the impacts of the requested incidental take.

Environmental Baseline within the Action Area

Species Baseline

Most of the current range of the Californian red-legged frog is limited to the central coast of California. The current species range overlaps with the action area in western San Joaquin, Stanislaus, and Merced counties, and in a narrow band of far western Fresno, Kings, and Kern counties. There are only 10 extant occurrences for California red-legged frog in the 267,350-acre action area (CNDDB 2007). Nine of these occurrences are in San Joaquin County and one is in Stanislaus County. The extant occurrences for this species occupy approximately 44 acres of existing PG&E right-of-ways in the 276,350-acre action-area (CNDDB 2007).

California red-legged frogs may occupy upland grassland and woodland habitats, but the frog is generally restricted to the vicinity of aquatic habitat that is suitable for breeding. The HCP land-cover types utilized by red-legged frog are blue oak woodland, blue oak/foothill pine, coastal oak woodland, grassland, open water, and permanent freshwater wetland. California red-legged frog may also occupy vernal pools and other seasonal wetlands in the HCP grassland land-cover type. Because of the introduction of predatory species such as bullfrogs and certain fish, most of the open water, permanent wetland habitat, and much of the seasonal wetland habitat in the action area no longer supports the California red-legged frog. Although red-legged frogs may disperse into upland habitat during periods of soaking rains, they generally remain within 300 feet of aquatic habitat. Accordingly, the HCP considered upland areas more than 300 feet from suitable aquatic sites not to be preferred habitat for red-legged frog. The HCP did not expect Covered Activities to disrupt adult or juvenile red-legged frog dispersal. Consequently, the HCP estimated that only 5% of the woodland, grassland, and open-water land-cover types in the action area are suitable for red-legged frog occupancy, and 10% of the permanent freshwater wetland land-cover type is suitable for species occupancy. The HCP states that the estimated 10% of permanent freshwater-wetland cover type suitable for species occupancy is likely overestimated, in view of the limitations on species suitability discussed above.

Critical Habitat Baseline

The total area of California red-legged frog critical habitat within the 276,350-acre action area is approximately 188 acres. Of these 188 acres of designated Critical Habitat, approximately 183 acres are in PG&E electric transmission ROWs, 4 acres in electric distribution ROWs, and 0.4 acres are in gas distribution ROWs. Of the 34 designated critical habitat units for California red-legged frog, portions of 2 critical habitat units are within the 276,350-acre action area. These Units are MER-1A, MER1-B, and SLO1-B

MER-1, Pacheco Pass (12,176 acres): this unit includes two subunits, MER-1A and MER-1B; and is located in southwestern Merced County and a small portion of southeastern Santa Clara County, west of San Luis Reservoir. MER-1 is essential for the conservation of the subspecies because it contains aquatic habitat for breeding and non-breeding activities (PCE 1 and PCE 2), contains upland habitat for foraging and dispersal activities (PCE 3 and PCE 4), and is occupied by the subspecies. MER-1 is an area determined to be occupied since the time of listing and is currently occupied. The designation of this unit is expected to prevent further fragmentation of habitat in this portion of the subspecies' range. This is the only unit within the central coast range with drainages that flow into the Central Valley. The unit consists of private and State land and is mapped entirely from occurrence records subsequent to time of listing. Threats that

may require special management in this unit include overgrazing of aquatic and riparian habitat and predation by non-native species. Approximately 128 acres of existing PG&E right-of-way are within critical habitat unit MER-1.

SLO-1, Cholame (17,787 acres): This unit consists of two subunits, SLO-1A and SLO-1B; and is located in northeastern San Luis Obispo and northwestern Kern Counties; includes locations in the Cholame Creek watershed; and is mapped from occurrence records at the time of listing and subsequent to the time of listing. SLO-1 contains the following features that are essential for the conservation of the subspecies: Aquatic habitat for breeding and non-breeding activities (PCE 1 and PCE 2) and upland habitat for foraging and dispersal activities (PCE 3 and PCE 4). SLO-1 contains permanent and ephemeral aquatic habitats suitable for breeding and contains accessible upland areas for dispersal, shelter, and food. The unit is the only area within the southern Coast Range that drains into the Central Valley. The unit consists of private and Federal land (BLM). Threats that may require special management in this unit include highway construction, which may remove upland or aquatic habitat; overgrazing of aquatic and riparian habitats; and dewatering of aquatic habitats due to water diversions. Approximately 60 acres of existing PG&E right-of-way are within critical habitat unit SOL-1B.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to California red-legged frog upland and aquatic suitable-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities. The HCP estimates Covered Activities will disturb and temporarily remove 6 acres of suitable California red-legged frog habitat (including aquatic habitat and adjacent uplands) annually over the 30-year life of the project (180 acres over 30 years). Less than 0.05 acres of suitable habitat would be permanently destroyed and lost annually (1.5 acres over 30 years) from Covered Activities (total of 6.05 acres annually, or 181.5 acres over 30 years)

Of this 181.5 acre total over 30 years, PG&E estimates that 50 acres are aquatic habitat for the California red-legged frog, and 131.5 acres are upland habitat for California red-legged frog (B. Norton *in litt.* December 2007).

Implementation of AMMs would reduce the potential for direct effects of ground-disturbing covered-activities on this covered species. AMM 17 includes preconstruction surveys of suitable habitat (i.e. suitable aquatic breeding habitat and adjacent uplands) prior to Covered Activities involving excavation and establishment of an exclusion zone 50-feet around potentially occupied suitable habitat. Where establishing 50-foot work-exclusion zones are not possible, PG&E will establish a work exclusion zone of the maximum practicable distance. In infrequent cases where PG&E cannot maintain the established buffer distances during Covered Activities, the potential exists for direct temporary habitat loss, direct permanent loss of habitat, and direct take of individual red-legged frogs. Red-legged frogs could be subject to direct harm (mortality or injury) from ground-disturbing activities, from permanent loss of habitat, and from reduced habitat quality. Frogs could be subject to direct mortality from activities that could crush adults, juveniles, tadpoles, or eggs if equipment enters the aquatic habitat.

In addition to disturbance from ground-disturbing activities, HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming) will occur on 32 acres of suitable California red-legged frog habitat per year (960 acres of "other disturbance" over 30 years). Red-legged frog adults foraging (usually within 100 feet of aquatic habitat) could be crushed by Covered Activity equipment or by "other disturbance" from vehicles traveling off-road, however most red-legged frog foraging occurs at night when PG&E seldom conducts covered-activities. Dispersing adult and juvenile frogs travel relatively large distances (up to 1.7 miles) depending on rainfall and moisture levels, and they could be crushed by Covered Activity equipment or by "other disturbance" from vehicles traveling off-road. Individuals are likely to disperse widely over a relatively large area. While this dispersal ability makes a large area subject to potential for take, it also reduces the potential for direct mortality. Take of dispersing red-legged frogs is not expected from the majority of covered activities because most covered activities will be conducted during dry periods of the year. Red-legged frogs may aestivate during summer or dry months in upland areas, usually within 300feet of aquatic habitat, and could be crushed in their burrows by Covered Activity equipment or by "other disturbance" from vehicles traveling off-road. This potential effect would occur infrequently and would be localized. The general AMMs include minimizing the construction of new access roads, maintaining low speed limits, and parking vehicles in previously disturbed areas where practicable.

Covered Activities that reduce water quality during the wet season could indirectly affect individual frogs by temporarily degrading their aquatic habitat, or could lead to lower survivability of larval red-legged frogs. Implementation of the BMPs, including erosion control, and implementation of AMM10 will reduce or eliminate the indirect effects of Covered Activities on water and aquatic habitat quality.

Upland habitat for the red-legged frog could be degraded by invasion of weedy plants following ground-disturbing activities. Implementation of AMMs 10 will seed a non-native commercial seed mix on disturbed grassland land-cover larger than 0.25 acre to discourage introduction of weeds and reduce the potential of invasive weeds colonizing disturbance sites in suitable red-legged frog habitat.

Effects of Compensation Measures
Permanent loss of suitable habitat will be mitigated at 3:1 and temporary disturbance to suitable habitat will be mitigated at 0.5:1. PG&E anticipates annually providing 0.87 acre of red-legged frog compensation in the North San Joaquin Valley, 1.35 acres in the Central San Joaquin Valley, and 0.85 acre in the South San Joaquin Valley. Overall, PG&E estimates they will provide 3.07 acres of California red-legged frog compensation annually (an estimated 92 acres over 30 years).

Red-legged frog compensation areas will contain both suitable aquatic and terrestrial habitat, configured spatially so that it is appropriate for occupation of California red-legged frog. Preserves or restored habitat will have measures in place to minimize or eliminate populations of exotic aquatic predators such as bullfrog. Compensation areas will be located, when feasible, within dispersal distance to other suitable habitat, or other areas currently occupied by California red-legged frogs.

Effects on Critical Habitat
Of the approximately 188 acres of California red-legged frog critical habitat located within the existing PG&E right-of-ways, PG&E estimates that ground-disturbing Covered Activities will temporarily disturb 147 acres of critical habitat over 30 years (4.9 acres annually), and will permanently remove (hardscape) 0.6 acre over 30 years (0.02 acre annually).

PG&E also estimates that "other disturbance" covered activities (activities which do not disturb land-cover, such as tree trimming and off-road travel) will affect 19.8 acres of California red-legged frog critical habitat annually (593 acres over 30 years). These effects would be limited to the area of the existing PG&E rights-of-way within the designated critical habitat units. The area of PG&E right-of-way located within each red-legged frog critical habitat unit is a small percentage of the unit's total area (approximately 1.2% of unit MER-1, and approximately 0.4% of unit SLO-1).

The "minor construction" covered-activities will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries, and will require the acquisition of and establishment of additional right-of-way acres. PG&E cannot predict where these ground-disturbing line extensions will be constructed, and some could be constructed inside designated California red-legged frog critical-habitat. PG&E will confer with the USFWS prior to implementing any "minor construction" covered-activity or other medium or large covered-activities within a designated critical habitat unit. PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Activities that may destroy or adversely modify critical habitat are those that alter the PCEs to an extent that they influence the function and conservation role of the affected critical habitat unit. These include, but are not limited to: (1) Actions that significantly alter water chemistry or temperature. Such activities could include, but are not limited to: release of chemicals, biological pollutants, or heated effluents into the surface-water, or into connected groundwater at a point source, or by dispersed release (non-point source). These activities alter water conditions beyond the tolerances of the California red-legged frog and result in direct or cumulative adverse affects to individuals and their life cycles. (2) Actions that would significantly increase sediment deposition within the stream channel, or pond, or disturb upland foraging and dispersal habitat. Such activities could include, but are not limited to excessive sedimentation from livestock overgrazing; road construction; commercial or urban development; channel alteration; timber harvest; off-road vehicle or recreational use; and other watershed and floodplain disturbances. These activities could eliminate or reduce the habitat necessary for the growth and reproduction of the California red-legged frog by increasing the sediment deposition to levels that would adversely affect their ability to complete their life cycles. (3) Actions that would significantly alter channel/pond morphology or geometry. Such activities could include, but are not limited to channelization; impoundment; road and bridge construction; development; mining; dredging; and destruction of riparian vegetation. These activities may lead to changes to the hydrologic functioning of the stream or pond and alter the timing, duration, water flows, and levels that would degrade or eliminate the California red-legged frog and/or its habitat. These actions can also lead to increased sedimentation and degradation in water quality to levels that are beyond

the tolerances of the California red-legged frog. (4) Actions that eliminate upland foraging and/or aestivating habitat, as well as dispersal habitat, for the California red-legged frog. Such activities could include, but are not limited to road construction; commercial or urban development; timber harvest; off-road vehicle or recreational use; and other watershed and floodplain disturbances. (5) Introducing, spreading, or augmenting non-native aquatic species in stream segments or ponds used by California red-legged frog. Possible actions could include, but are not limited to introduction of chytrid fungus or other diseases; fish or bullfrog stocking for sport; aesthetics; biological control; or other related actions. These activities could affect the growth and reproduction of the California red-legged frog by subjecting eggs, larvae, tadpoles, and adult California red-legged frogs to increased predation pressure, which would adversely affect the California red-legged frog's ability to complete its life cycle. We consider all of the units designated as critical habitat to contain features essential to the conservation of the California red-legged frog. All designated units are within the geographic range of the subspecies, all were occupied by the subspecies at the time of or since listing, and all are likely to be used by the California red-legged frog.

Conclusion

We anticipate that the proposed action will directly and indirectly affect the California red-legged frog as described in the analysis above, including the disturbance of 6 acres of suitable California red-legged frog habitat annually (approximately 180 acres of habitat disturbance over 30 years), and the permanent loss (hardscape) of less than 0.05 acre of suitable California red-legged frog habitat annually (1.5 acres over 30 years)(total of 6.05 acres annually, or 181.5 acres over 30 years, with a maximum or 50 acres of California red-legged frog aquatic habitat).

Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these ground-disturbing impacts the California red-legged frog. Compensation will be provided for all direct and indirect impacts to suitable habitat, providing 3.07 acres of California red-legged frog compensation annually (an estimated 92 acres over 30 years). The area of impact expected in individual critical habitat units is a small proportion of the total area in that unit; these effects are not expected to change the current ability of the primary constituent elements to support the function and conservation role of that critical habitat unit.

The Service also anticipates take in the form of harm and harassment from off-road travel and "other disturbance" of an undetermined number of California tiger salamander individuals within 32 acres of suitable upland salamander habitat each year (960 acres over 30 years). With the application of the general AMMs, the "other disturbance" effects of vehicle travel through 32 acres of suitable upland habitat annually are likely to be insignificant and discountable.

Ground-disturbing Covered Activities will disturb and temporarily remove 147 acres of designated critical habitat over 30 years (4.9 acres annually), and will permanently remove (hardscape) 0.6 acre of critical habitat over 30 years (0.02 acre annually).

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the California red legged frog or adversely modify its designated critical habitat.

We reached this conclusion because the impact to this species habitat, when viewed in conjunction with the compensation measures long-term protection and management of suitable California red-legged frog habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take.
The Service expects that most incidental take of the California red-legged frog will be difficult to detect or quantify. The cryptic nature of individuals aestivating in upland habitat makes the finding of a dead specimen unlikely. The species occurs in aquatic habitat which makes the finding of a dead specimen unlikely. Due to the difficulty in quantifying the number of California red-legged frog that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as based upon the acres of suitable California red-legged frog habitat disturbed annually.
The Service also anticipates take in the form of harm and harassment of an undetermined number of California red-legged frog individuals within 6.05 acres of suitable upland and aquatic habitat each year of the proposed permit (181.5 acres over 30 years, with no more than 50 acres of suitable aquatic habitat effected)).

The Service also anticipates take in the form of harm and harassment from off-road travel and "other disturbance" of an undetermined number of California tiger salamander individuals within 32 acres of suitable upland salamander habitat each year (960 acres over 30 years).

In the above Opinion, the Service determined that this level of anticipated take is not likely to result in the jeopardy of the California red-legged frog or the adverse modification of its critical habitat.

WILDLIFE - REPTILES

Endangered blunt-nosed leopard lizard (*Gambelia sila*)
The blunt-nosed leopard lizard is a relatively large lizard with a long regenerative tail; long powerful hind limbs; and a short, blunt snout. Blunt-nosed leopard lizard is endemic to the San Joaquin Valley, inhabiting open, sparsely vegetated areas of low relief on the Valley floor and the surrounding foothills at elevations below 800 meters (2,600 feet).

Status of the Species
Listing Status
The lizard was federally listed as an endangered species on March 11, 1967 (32 **FR** 4001). The blunt-nosed leopard lizard was listed as endangered by the state of California on June 27, 1971 and is a fully protected species under Section 5050 of the California Fish and Game Code. A recovery plan for blunt-nosed leopard lizard was first prepared in 1980 and revised in 1985 (USFWS 1985). In 1998, the Service finalized the recovery plan for upland species of the San Joaquin Valley, which includes the blunt-nosed leopard lizard (USFWS 1998). No Critical Habitat has been designated for the blunt-nosed leopard lizard.

Life History, Reproductive Ecology
Males are highly combative when establishing and maintaining territories. Male and female home ranges often overlap. The mean home range size varies from 0.25 to 2.7 acres for females and 0.52 to 4.2 acres for males. Density estimates range from 0.1 to 4.2 lizards per acre. Population densities in marginal habitat generally do not exceed 0.2 blunt-nosed leopard lizards per acre. There are no current overall population size estimates for the species.

Breeding activity begins within a month of emergence from dormancy and lasts from the end of April to the end of June. Male territories may overlap those of several females, and a given male may mate with several females. Two to six eggs are laid in June and July and the number of eggs is correlated with the size of the female. Under adverse conditions, egg laying may be delayed 1 or 2 months or reproduction may not occur at all. Females typically produce only one clutch of eggs per year, but some may produce three or more under favorable environmental conditions. After about 2 months of incubation, young hatch from late July through early August, rarely to September.

Seasonal above ground activity is correlated with weather conditions, primarily temperature. Lizards are active on the surface when air temperatures are between 73□ and 104□F and surface soil temperatures are 71□ and 122□F. Most activity occurs when ground temperatures are between 71□ and 97□F or slightly higher. Smaller lizards and young have a wider activity range than the adults.

Habitat Affinities
Blunt-nosed leopard lizards feed primarily on insects and occasionally other lizards or plant material (Quad Consultants 1995). Leopard lizards use small rodent burrows for shelter from predators and temperature extremes. Burrows are usually abandoned ground squirrel tunnels or occupied or abandoned kangaroo rat tunnels. Blunt-nosed leopard lizards also use abandoned badger dens and the burrows of gophers. The size of a local blunt-nosed leopard lizard population is thought to depend to some extent on how many mammal burrows are available (Hansen *et al.* 1994, USFWS 1998). Each lizard uses several burrows without preference, but avoids those occupied by predators or other leopard lizards. Predators include snakes, predatory birds, and most carnivorous mammals. In areas of low mammal burrow density, lizards construct shallow, simple tunnels in earth berms or under rocks.

Blunt-nosed leopard lizards are generally absent from areas of steep slopes, high clay content soils, dense vegetation, or areas subject to seasonal flooding (Montanucci 1965, Lowe in litt. 2006). Optimal blunt-nosed leopard lizard habitat consists of 15-30% ground cover while greater than 50% ground cover is unsuitable (Chesemore 1980). Habitat includes semi-arid grasslands, alkali flats, and washes. Blunt-nosed leopard lizards are found in mostly flat areas. They usually are not found in hills with slopes greater than 30 degrees (The Wildlife Society 2003).

Historical and Current Range, Distribution, Dispersal, Species Status
Although the boundaries of its original distribution are uncertain, blunt-nosed leopard lizards probably occurred in the San Joaquin Valley from Stanislaus County in the north to the

Tehachapi Mountains of Kern County in the south, and from the Coast Range Mountains, Carrizo Plain, and Cuyama Valley in the west to the foothills of the Sierra Nevada in the east. However, due to widespread agricultural development of natural habitat in the San Joaquin Valley beginning in the 1960s, the current distribution of blunt-nosed leopard lizards is restricted to less than 15% of its historic range.

Blunt-nosed leopard lizards are currently confined to a few areas scattered from southern Merced County south to western Kern and southeastern San Luis Obispo County at elevations of 100-2,400 feet. In the remaining habitat that exists, blunt nosed leopard lizard occur in alkali sink scrub, saltbush (*Atriplex* sp.) scrub, and grasslands on the San Joaquin Valley floor and in saltbush scrub (*Ephedra* scrub) and non-native grasslands in the surrounding foothills areas (Montanucci 1965, Stebbins 2003). There are approximately 291 extant occurrences of the blunt-nosed leopard lizard (CNDDB 2007) occurring in ten California counties: Merced (6), Madera (30), Fresno (41), Kings (26), Tulare (19), Kern (144), and San Luis Obispo (21), Santa Barbara (7), San Benito (9) and Ventura (4). Extant populations are known to occur near Liberty Farms in western Madera County; the Panoche, Tumey, and Ciervo Hills, and the Anticline Ridge, Pleasant Valley, Coalinga areas in western Fresno County; on the Pixley National Wildlife Refuge and near Allensworth in southwestern Tulare County; the Antelope Plains and Kern National Wildlife Refuge in northwestern Kern County; north of Bakersfield around Poso Creek, the Elk Hills and Tupman Essential Habitat Areas around the towns of Maricopa, McKittrick, and Taft; and the Carrizo and Elkhorn plains in southeastern San Luis Obispo County. The largest and most stable populations of blunt-nosed leopard lizards are thought to be at Semitropic Ridge Preserve in northwestern Kern County and Buttonwillow Ecological Reserve in western Kern County. However, the number of all lizards at Semitropic Ridge Preserve has been decreasing since 2003. Population surveys show that there is a one-year delay in the response of lizards to declining numbers of grasshoppers (Selmon in litt. 2006).

Long-term studies show the instability of blunt-nosed leopard lizard populations especially during years of above-average precipitation (Germano *et al.* 2005, Germano *et al.* 2004, Germano and Williams 2005, Germano in litt. 2006, Williams in litt. 2006). Therefore, based on this population instability and the continued degradation and fragmentation of habitat by agricultural, residential, and oil and gas exploration activities, the overall species status is judged to be decreasing. The Endangered Species Recovery Program has been monitoring a 20 acre plot on Deer Creek West in Pixley NWR in southwestern Tulare County since 1993 (Williams in litt. 2006). Spring surveys show a drastic population decline from over 80 adults in 1993-1994 to 25 in 1995 following several years of above average precipitation. The population density remained below 2 per hectare from 1996-2001 due to above average precipitation. In 1998, no adult blunt-nosed leopard lizards were observed on the plot due to flooding. In 2002-2004, the population rebounded during years of below average precipitation with 35 adults observed in 2004. In 2005-2006, the population density dropped again with an increase in precipitation, to below 2 per hectare. From 1997-2005, the number of blunt-nosed leopard lizards has been monitored during ten-day censuses of four grazed and four non-grazed 20 acre plots in the Lokern Natural Area located in western Kern County about 23 km (14.5 miles) south of the Semitropic Ridge Preserve (Germano *et al.* 2005). The number of blunt-nosed leopard lizards observed on the non-grazed plot was lower than that observed on the grazed plot during every year of the study except the first year 1997. The total number of blunt-nosed leopard lizards observed yearly on the non-

grazed plots ranged from 0-15 with no blunt-nosed leopard lizards observed during the years 2000 – 2003. The total number of blunt-nosed leopard lizards observed yearly on the grazed plots ranged from 2-49. No blunt-nosed leopard lizards have ever been observed in Section 21 of the grazing study. The total number of blunt-nosed leopard lizards observed yearly during all surveys (e.g. plot censuses, radio tracking, driving roads, and late summer sessions to trap squirrels) on the non-grazed plots ranged from 0-18 and on the grazed plots ranged from 2-80 (Germano *et al.* 2005). Road surveys in the Lokern area in May-June 2005 reported an average of 32.7 blunt-nosed leopard lizards per 82 km (51-mile) survey (Warrick 2006).

Reasons for Decline and Threats to Survival
Loss of habitat is the primary contributing factor to the decline of the blunt-nosed leopard lizard. Habitat loss, fragmentation, and degradation occur through cultivation and agricultural conversion to row crops, urban development, off-road vehicle use, and oil exploration activities. Since 1870, 95 per cent of suitable natural communities have been lost in the Central Valley of California. Between 1977 and 1985, over 74,000 acres of Valley-floor habitat were destroyed.

Causes of direct mortality include road-kill, off-road vehicle mortality, crushing during construction activities and drowning in open pools of oil. Indirect causes of mortality include loss of cover and collapsing by cattle of rodent burrows used as refugia, changes in agricultural use, and introduction of alien species. Overgrazing, pesticide application, agricultural conversion, and changes in plant community composition may also cause indirect mortality through a reduction in the prey base.

Environmental Baseline within the Action Area
Species Baseline
There are approximately 125 extant occurrences for blunt-nosed leopard lizards in the 276,350-acre action area (CNDDB 2007). Four of these occurrences are in Merced County, 13 in Madera, 18 in Fresno, 6 in Tulare, 11 in Kings, and 73 in the Kern County portions of the action area. The extant occurrences for this species occupy approximately 4,337 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007). The 125 occurrences located within the existing PG&E right-of-ways represent approximately 43% of the remaining occurrences for this species.

The HCP land-cover type utilized by blunt nosed leopard lizard is grassland. Blunt nosed leopard lizard also utilizes some upland scrub cover. The HCP concluded that 30% of the grassland and 10% of the upland-scrub cover type present in the action area are suitable for blunt nosed leopard lizard occupancy. The species can also occur in valley sink scrub and valley saltbush scrub land-cover-types, however, these scrub land-cover types make up only a small percentage of the shrub cover within the action area boundary and an even smaller percentage of cover type that intersects with PG&E facilities.

Effects of the Action - Blunt-nosed leopard lizard
Direct and Indirect Effects
The actual acres of impact to blunt-nosed leopard lizard suitable-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities.

The covered activities would result mainly in small amounts of disturbance at scattered locations throughout the blunt-nosed leopard lizard's range in the San Joaquin Valley. The HCP estimates that Covered Activities will temporarily disturb 23 acres of suitable blunt-nosed leopard lizard habitat annually (690 acres over 30 years), and will permanently destroy less than 0.3 acre annually (9 acres of habitat lost over 30 years)(699 acres total over 30 years). In addition, blunt-nosed leopard lizards may be passively displaced from worksites and adjacent occupied habitat by human activity and noise. Any such displacements would be temporary.

An undetermined portion of this temporary disturbance and permanent habitat loss would occur at PG&E pipeline or electric facilities located within or near the managed shoulder of paved roadways. The HCP did not consider such roadway shoulder areas to be suitable habitat for blunt-nosed leopard lizards because of frequent disturbances and the likelihood that direct mortality from vehicles on adjacent roads would largely preclude blunt-nosed leopard lizard occupation of the roadway shoulders.

Effects to blunt-nosed leopard lizard will be avoided by implementing AMM 24 for blunt-nosed leopard lizard and by following the process outlined in HCP Figure 4-2. Under AMM 24, qualified PG&E staff and, if necessary, a PG&E biologist will conduct appropriate pre-activity surveys for all activities that disturb any area that is likely to be occupied blunt-nosed leopard lizards. If activities take place in habitat likely to be occupied by blunt-nosed leopard lizards (i.e., areas within the species range and outside the managed shoulder of a paved road), qualified PG&E staff will determine whether burrows are present and whether burrows can be avoided. If the work cannot avoid burrows, a qualified biologist will evaluate the site for occupancy and stake and flag a work-exclusion zone of 50 feet around the burrows prior to conducting a ground-disturbing Covered Activity at the work site. Where establishing 50-foot work-exclusion zones are not possible, PG&E will establish a work exclusion zone of the maximum practicable distance.

In cases where the required buffer distance of 50-feet cannot be maintained by PG&E during Covered Activities, the potential exists for direct temporary habitat loss and take of blunt-nosed leopard lizards. The HCP assumes that any burrows present on the managed shoulder of any paved roads are not in suitable habitat for blunt-nosed leopard lizard. Therefore, PG&E does not intend to evaluate road shoulder burrows for occupancy, PG&E does not intend to avoid those burrows, and PG&E does not intend to flag work exclusion zones or apply AMM 24 to burrows located on the shoulder of a paved roadway. Consequently, some potential may exist for temporary habitat loss and direct take (by death, injury, and harassment) of blunt-nosed leopard lizard from PG&E vehicles or covered-activity equipment working from the shoulder of paved roads in Merced, Madera, Fresno, Tulare, Kings, and Kern County portions of the action area.

Blunt-nosed leopard lizard in burrows could be crushed at any time of the year by covered activity equipment implementing "other disturbance" activities (i.e. tree trimming, patrols, or by PG&E vehicles traveling off-road, etc.). HCP Table 3-11 indicates that the "other disturbance" covered activities will affect 131 acres of suitable blunt-nosed leopard lizard habitat per year (cumulatively, approximately 3,930 acres of "other disturbance" in suitable blunt-nosed leopard lizard habitat over 30 years).

The potential effects from all covered activities, including the "other disturbance" covered activities, will be reduced by PG&E's implementation of the general AMMs (AMMs 1-6, 8, 10, 29, and 30). The "general" AMMs include limiting the speed of off-road vehicles to 15 mph, minimizing the construction of new access roads, and parking vehicles in previously disturbed areas where practicable. The general AMMs are intended to protect lizards on the ground surface or in burrows from injury or mortality from vehicles and equipment. These measures will limit direct mortality but will not eliminate potential for a small amount of take over the life of the project.

Potential indirect temporary habitat loss or degradation could result from temporary habitat disturbances that increase the likelihood of colonization by invasive weeds. PG&E's use of AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) may discourage introduction of weeds and may reduce the potential of invasive weeds colonizing suitable blunt-nosed leopard lizard habitat. The HCP concluded that any residual indirect effects after implementation of AMMs would not result in any indirect mortality or other harm to blunt-nosed leopard lizards.

Overall, the habitat loss resulting from covered activities will affect a small area annually and the effects are widely dispersed within the action area and within the range of the blunt-nosed leopard lizard. AMMs will be implemented to avoid and minimize these effects, and effects will be compensated.

Effects of Compensation Measures
Permanent loss of suitable habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 5.47 acres of blunt-nosed leopard lizard compensation in the Central San Joaquin Valley and 6.65 acres of compensation in the South San Joaquin Valley annually. Overall, PG&E will provide approximately 12 acres of blunt-nosed leopard lizard compensation annually (360 acres over 30 years). To compensate fully for the potential take expected from the first 5 years of covered activity effects, PG&E will initially protect 60.6 acres of habitat occupied by blunt-nosed leopard lizard. Additional mitigation will be provided in 5-year increments and will stay ahead of effects to the species.

Either the compensation areas will be occupied by blunt-nosed leopard lizard populations, or if desired, as part of recovery actions for the species (U. S. Fish and Wildlife Service 1998), lands suitable for habitat restoration and colonization from adjacent occupied lands will be targeted. Compensation lands will contain ground squirrel burrows or kangaroo rat tunnels that can be used by blunt-nosed leopard lizards for shelter, predator avoidance, and behavioral thermoregulation. To the extent feasible, compensation will occur in priority sites for blunt-nosed leopard lizard and other species identified in the San Joaquin Valley Recovery Plan (Service 1998). Compensation will provide permanent preservation and management of land to offset temporary habitat disturbances that are expected to last only a few years, thereby providing a net benefit over time. The compensation ensures that occupied or suitable habitat for blunt-nosed leopard lizard is protected into the future.

Conclusion

We anticipate that the proposed action will directly and indirectly affect the blunt-nosed leopard lizard as described in the analysis above, including the direct and indirect disturbance of 23 acres of blunt-nosed leopard lizard suitable-habitat annually (approximately 690 acres of habitat disturbance over the 30-year Permit term), and the permanent loss (hardscape) of 9 acres of blunt-nosed leopard lizard suitable-habitat over the 30-year Permit term (699 acres total over 30 years). Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts the blunt-nosed leopard lizard.

PG&E will provide compensation for all direct and indirect impacts to suitable habitat, providing approximately 12 acres of blunt-nosed leopard lizard compensation annually (an estimated 360 acres over 30 years).

With the application of the general AMMs, the "other disturbance" effects of vehicle travel through 131 acres of suitable habitat annually (3,930 acres over the 30-year Permit term) are individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the blunt-nosed leopard lizard. We reached this conclusion because the impact to this species habitat, when viewed in conjunction with the compensation measures long-term protection and management of suitable blunt-nosed leopard lizard, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take

The Service cannot authorize take in the form of harm (mortality or injury) for the blunt-nosed leopard lizard because the species is fully protected under California State law. However, direct or indirect harm to blunt nosed leopard lizard from covered activities is unlikely. The Service expects that incidental take of the blunt-nosed leopard lizard in the form of harassment will occur.

The Service expects that incidental take of blunt-nosed leopard lizard will be difficult to detect or quantify because of their relatively small size, their behavior patterns, and because the species occur in habitat that makes them difficult to detect. Due to the difficulty in quantifying the number of blunt-nosed leopard lizards that will be harassed as a result of the proposed action, the Service is quantifying incidental take as the acres of permanent, temporary, and "other" disturbance from covered-activities occurring in suitable blunt-nosed leopard lizard habitat.

We anticipate take in the form of harassment of an undetermined number of blunt-nosed leopard lizards inhabiting 23.3 acres of suitable habitat will occur each year from ground-disturbing covered activities (699 acres over 30 years).

We also anticipate take in the form of harassment of an undetermined number of blunt-nosed leopard lizards inhabiting 131-acres of suitable habitat will occur each year from the "other disturbance" activities including off-road travel (3,930 acres over 30 years).

In the above Opinion, the Service determined that this level of anticipated take is not likely to result in the jeopardy to the blunt-nosed leopard lizard.

Threatened giant garter snake (*Thamnophis gigas*)

The giant garter snake is one of the largest garter snakes, reaching a total length of at least 63 inches. Females tend to be slightly longer and proportionately heavier than males. Female giant garter snakes typically weigh 1-1.5 pounds. Garter snakes are in the family Colubridae, which includes most of the species of snakes found in the western United States. Dorsal background coloration varies from brownish to olive with a checkered pattern of black spots, separated by a yellow dorsal stripe and two light colored lateral stripes. Background coloration and prominence of a black checkered pattern and the three light stripes are geographically and individually variable.

Status of the Species

Listing Status

The giant garter snake was federally listed as threatened in October 1993 (58 FR 54053). No Critical Habitat for the giant garter snake has been designated. A detailed account of the taxonomy, ecology, and biology of the species is presented in the *Draft Recovery Plan for the giant garter snake (Thamnophis gigas)* (USFWS 1999b, 64 FR 36033) and in the final rule (58 FR 54053). No Critical Habitat has been designated for the giant garter snake.

Life History, Reproductive Ecology

The giant garter snake breeding season extends through March and April, and females give birth to live young from late July through early September (Hansen and Hansen 1990). Brood size is variable, ranging from 10 to 46 individual young, with a mean of 23 individuals (Hansen and Hansen 1990). At birth, young average about 8.1 inches (20.6 centimeters) snout-to-vent length and 3 to 5 grams. Although growth rates are variable, young typically more than double in size by one year of age, and sexual maturity averages three years in males and five years for females (Service 1993).

Habitat Affinities

Endemic to wetlands in the Sacramento and San Joaquin valleys, the giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, and other waterways and agricultural wetlands, such as irrigation and drainage canals, rice fields and the adjacent uplands (Service 2003). The snake feeds on small fishes, tadpoles, and frogs (Fitch 1941; Hansen 1988; Hansen and Brode 1980, 1993). Essential habitat components consist of: (1) wetlands with adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) upland habitat with grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for over-wintering habitat with escape cover (vegetation, burrows) and underground refugia (crevices and small mammal

burrows) (Hansen 1988). Snakes are typically absent from larger rivers and other bodies of water that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates (Hansen 1988; Hansen and Brode 1980; Rossman and Stewart 1987). Riparian woodlands do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations (Hansen 1988).

Giant garter snakes are the most aquatic garter snake species and are active foragers, feeding primarily on aquatic prey such as fish and amphibians (Fitch 1941). Predominant giant garter snake prey food items are now introduced species such as carp (*Cyprinus carpio*), mosquito fish (*Gambusia affinis*), and larval and sub-adult bullfrogs (*Rana catesbeiana*), and the native Pacific chorus frogs (*Pseudacris regilla*) (Fitch 1941; Hansen and Brode 1993; Rossman *et al.* 1996).

The giant garter snake is highly aquatic but also occupies a terrestrial niche (Service 2003; Wylie *et al.* 2004a). 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 in tules, cattails, saltbush, and shrubs over-hanging the water, patches of floating vegetation including waterweed, on rice checks, and on grassy banks (Service 2003). The snake typically inhabits small mammal burrows and other soil and/or rock crevices during the colder months of winter (*i.e.,* October to April) (Hansen and Brode 1993; Wylie *et al.* 1996; Wylie *et al.* 2003a). It also uses burrows as refuge from extreme heat during its active period (Wylie *et al.* 1997; Wylie *et al.* 2004a). While individuals usually remain in close proximity to wetland habitats, the Biological Resource Division of the U.S. Geological Survey (BRD) has documented snakes using burrows as much as 165 feet (50 meters) away from the marsh edge to escape extreme heat, and as far as 820 feet (250 meters) from the edge of marsh habitat for over-wintering habitat (Wylie *et al.* 1997). Snakes typically select burrows with sunny exposures along south and west facing slopes (Service 1993).

Historical and Current Range, Distribution, Dispersal
Giant garter snakes formerly occurred throughout the wetlands that were extensive and widely distributed in the Sacramento and San Joaquin Valley floors of California (Fitch 1940; Hansen and Brode 1980; Rossman and Stewart 1987). The historical range of the snake is thought to have extended from the vicinity of Chico, Butte County, southward to Buena Vista Lake, near Bakersfield, in Kern County (Fitch 1940; Fox 1948; Hansen and Brode 1980; Rossman and Stewart 1987). Early collecting localities of the giant garter snake coincide with the distribution of large flood basins, particularly riparian marsh or slough habitats, and associated tributary streams (Hansen and Brode 1980).

Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lake beds (Hansen 1980; Hansen and Brode 1980). By 1971, so much wetland habitat had been reclaimed, that the California Department of Fish and Game (CDFG) classified the giant garter snake as a rare animal and conducted a series of field surveys. The results of these surveys indicate that snake populations were distributed in marsh wetlands, tributary streams, and portions of the rice productions zones of the Sacramento Valley in Butte, Glenn, Colusa, Sutter, Yolo and Sacramento Counties, in the Delta region along the eastern fringes of

the Sacramento-San Joaquin River Delta in Solano, Contra Costa, Sacramento, and San Joaquin Counties, and in the San Joaquin Valley in San Joaquin, Stanislaus, Merced, Mendota, and Fresno Counties (Hansen 1988; Hansen and Brode 1980). There are presently 231 extant occurrences of the giant garter snake in 14 California counties: Butte (26), Colusa (24), Contra Costa (1), Fresno (10), Glenn (8), Kern (4), Madera (1), Merced (28), Sacramento (50), San Joaquin (7), Solano (3), Sutter (55), Yolo (13), and Yuba (1) (CNDDB 2007).

Upon Federal listing in 1993, the Service identified 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records (Service 1993). The 13 populations largely coincide with historical flood basins and tributary streams throughout the Central Valley. These are the Butte Basin population, the Colusa Basin population, the Sutter Basin population, the American Basin population, the Yolo Basin/Willow Slough population, the Yolo Basin/Liberty Farms population, the Sacramento Basin population, the Badger Creek/Willow Creek population, the Caldoni Marsh/White Slough population, the East Stockton-Diverting Canal & Duck Creek population, the North and South Grasslands population, the Mendota population, and the Burrel/Lanare population. A population is a group of organisms that interbreed and share a gene pool. The boundaries of a population, both in space and time, are generally not discrete and, in practice, as usually defined by the researcher (Krebbs 1994). The gene pool and breeding patterns of the 13 giant garter snake populations identified in the final rule remain unstudied and unknown. What was described as "13 populations" should, therefore, be described more accurately as sub-populations and occurrences that note observations of individuals about which much remains unknown (Service 2003).

Since 1995, BRD has been studying life history and habitat requirements of the giant garter snake within a few of the "13 populations" identified in the 1993 listing. BRD has studied snake sub-populations at the Sacramento, Delevan, and Colusa NWRs and in the Colusa Basin Drain within the Colusa Basin, at Gilsizer Slough within the Sutter Basin, at the Badger Creek area of the Cosumnes River Preserve within the Badger Creek/Willow Creek area of the Delta Basin, and in the Natomas Basin within the American Basin (Hansen 2003, 2004; Wylie 1998a, 1998b, 2003; Wylie *et al.* 1996; Wylie *et al.* 2002; Wylie *et al.* 2003a, 2004a; Wylie *et al.* 2003b, 2004b). These areas contain the largest extant giant garter snake sub-populations. Outside of protected areas, however, snakes are still subject to all threats identified in the final rule. The other sub-populations are distributed discontinuously in small, isolated patches, and are vulnerable to extirpation by stochastic environmental, demographic, and genetic processes (Goodman 1987).

Surveys over the last 25 years suggest that sub-populations of giant garter snake in the northern parts of its range (*i.e.*, Butte, Colusa, and Sutter Counties) are relatively large and stable (Wylie *et al.* 1997; Wylie *et al.* 2003a, 2004a). Habitat corridors connecting sub-populations, however, are either not present or not protected, and urban encroachment increases as a serious threat (Service 2003). Sub-populations in Yolo, Sacramento, Solano, and San Joaquin Counties areas are small, fragmented, and threatened by urbanization (Hansen 2004; Service 2003). Those sub-populations in the San Joaquin Valley, however, are most vulnerable having suffered near-devastating declines and possible extirpations over the last two decades (including populations in Stanislaus, Merced, Madera, and Fresno Counties) (Dickert 2002, 2003; Hansen 1988; Williams and Wunderlich 2003). The southern sub-populations are extremely small, distributed

discontinuously in isolated patches, and, therefore, are highly vulnerable to extinction by random environmental, demographic, and genetic processes (Goodman 1987).

In studies of marked snakes in the Natomas Basin, snakes moved about 0.25 to 0.5 miles (0.4 to 0.8 kilometers) per day (Hansen and Brode 1993). Home range (area of daily activity) averages about 0.1 mile^2 (25 hectares) in both the Natomas Basin and the Colusa National Wildlife Refuge (NWR) (Wylie 1998a; Wylie *et al.* 2002). Total activity, however, varies widely between individuals; individual snakes have been documented to move up to 5 miles over a few days in response to dewatering of habitat (Wylie *et al.* 1997) and to use up to more than 8 miles (12.9 kilometers) of linear aquatic habitat over the course of a few months, and to have a home range as large as 14.5 miles^2 (3744 hectares) (Wylie and Martin 2004).

In agricultural areas, snakes were documented using rice fields in 19-20 percent of the observations, marsh habitat in 20-23 percent of observations, and canal and agricultural waterway habitats in 50-56 percent of the observations (Wylie 1998b). In the Natomas Basin, habitat used consisted almost entirely of irrigation ditches and established rice fields (Wylie 1998a; Wylie *et al.* 2004b). In the Colusa NWR, snakes were regularly found on or near edges of wetlands and ditches with vegetative cover (Wylie *et al.* 2003a). Telemetry studies also indicate that active snakes use uplands extensively; more than 31 percent of observations were in uplands (Wylie 1998b). Snakes observed in uplands during the active season were consistently near vegetative cover, particularly where cover exceeded 50 percent in the area within 1.6 feet (0.5 meter) of the snake (Wylie 1998b).

Snakes will move into restored habitat after two years. At the Colusa NWR, after two years, restoration area population estimates increased from 30 snakes per kilometer to 59-95 snakes per kilometer (Wylie *et al.* 2004a). At the Colusa Basin Drainage Canal, snakes were given three upland restoration treatments, 1) soil planted with native grasses over rock riprap, 2) soil planted with native grasses without rock, and 3) rock riprap only; snakes were most commonly found at the soil over rock riprap treatment (Wylie and Martin 2004).

Reasons for Decline and Threats to Survival

The current distribution and abundance of the giant garter snake is much reduced from former times (Service 2003). Less than 10 percent, or approximately 319,000 acres , of the historic 4.5 million acres of Central Valley wetlands remain (U.S. Department of Interior 1994), of which very little provides habitat suitable for the giant garter snake. Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one-third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lakebeds (Hansen 1980; Hansen and Brode 1980). These lakebeds once supported vast expanses of ideal snake habitat, consisting of cattail and bulrush dominated marshes (Service 2003). Cattail and bulrush floodplain habitat also historically typified much of the Sacramento Valley (Hinds 1952). Prior to reclamation activities beginning in the mid- to late-1800s, about 60 percent of the Sacramento Valley was subject to seasonal overflow flooding providing expansive areas of snake habitat (Hinds 1952). Valley flood wetlands are now subject to cumulative effects of upstream watershed modifications, water storage and diversion projects, as well as urban and agricultural development.

The Central Valley Project (CVP), planned by the State of California, and built and operated by the Federal Bureau of Reclamation, is the largest water management system in California. CVP and the historic water development activities that preceded it have not only resulted in the loss of all but approximately 10 percent of wetlands, they have created an ecosystem altered to such an extent that remaining wetlands, like agriculture, depend on managed water (U.S. Department of Interior 1994). The historic disturbance events associated with seasonal inundation that occur naturally in dynamic riverine, riparian, and wetland ecosystems have been largely eliminated. In addition to the highly managed water regimes, implementation of CVP has resulted in conversion of native habitats to agriculture, and has facilitated urban development through the Central Valley (Service 2003). In 1992, Congress enacted the Central Valley Project Improvement Act (CVPIA), the concerns of which include pricing and management of Central Valley water and attempting to mitigate for project impacts on fish, wildlife, and associated habitat. CVPIA, however, has been largely ineffective thus far, addressing primarily only the water needs of publicly owned wetlands, which account for less than one-fourth of the wetlands in the Central Valley (Service 2003).

Residential and commercial growth with the Central Valley is consuming an estimated 15,000 acres of Central Valley farmland each year (American Farmland Trust 1999). In the future, this transformation is expected to accelerate. Rice fields have become important habitat for giant garter snakes, particularly associated canals and their banks for both spring and summer active behavior and winter hibernation (Hansen 2004). While within the rice fields, snakes forage in the shallow water for prey, utilizing rice plants and vegetated berms dividing rice checks for shelter and basking sites (Hansen and Brode 1993). The loss of rice land resulting from residential and commercial growth compounds the impact of direct habitat loss resulting from development itself.

Ongoing maintenance of aquatic habitats for flood control and agricultural purposes eliminates or prevents the establishment of habitat characteristics required by snakes (Hansen 1988). Such practices can fragment and isolate available habitat, prevent dispersal of snakes among habitat units, and adversely affect the availability of the snake's food items (Hansen 1988; Brode and Hansen 1992). For example, tilling, grading, harvesting, and mowing may kill or injure giant garter snakes (Service 2003; Wylie *et al.* 1997). Biocides applied to control aquatic vegetation reduce cover for the snake and may harm prey species (Wylie *et al.* 1996). Rodent control threatens the snake's upland estivation habitat (Wylie *et al.* 1996; Wylie *et al.* 2004a). Restriction of suitable habitat to water canals bordered by roadways and levee tops renders snakes vulnerable to vehicular mortality (Wylie *et al.* 1997). Materials used in construction projects (e.g., erosion control netting) can entangle and kill snakes (Stuart *et al.* 2001). Livestock grazing along the edges of water sources degrades water quality and can contribute to the elimination and reduction of available quality snake habitat (Hansen 1988). Fluctuation in rice and agricultural production affects stability and availability of habitat (Wylie and Casazza 2001; Wylie *et al.* 2003b, 2004b).

Other land use practices also currently threaten the survival of the snake. Non-native predators, including introduced predatory game fish, bullfrogs, and domestic cats, can threaten snake populations (Dickert 2003; Wylie *et al.* 1996; Wylie *et al.* 2003c). Non-native competitors, such as the introduced water snake (*Nerodia fasciata*) in the American River and associated tributaries

near Folsom, may also threaten the giant garter snake (Stitt *et al.* 2005). Recreational activities, such as fishing, may disturb snakes and disrupt basking and foraging activities. While large areas of seemingly suitable snake habitat exist in the form of duck clubs and waterfowl management areas, water management of these areas typically does not provide the summer water needed by the species. Degraded water quality continues to be a threat to the species both on and off refuges.

Giant garter snakes are eaten by a variety of predators, including raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginiana*), bull frogs (*Rana catesbiana*), hawks (*Buteo* sp.), egrets (*Casmerodius albus, Egretta thula*), and great blue herons (*Ardea herodias*) (Dickert 2003; Service 2003; Wylie *et al.* 2003c). Many areas supporting snakes have been documented to have abundant predators; however, predation does not seem to be a limiting factor in areas that provide abundant cover, high concentrations of prey items, and connectivity to a permanent water source (Hansen and Brode 1993; Wylie *et al.* 1996).

The disappearance of giant garter snakes from much of the west side of the San Joaquin Valley was approximately contemporaneous with the expansion of subsurface drainage systems in this area, providing circumstantial evidence that the resulting contamination of ditches and sloughs with drainwater constituents (principally selenium) may have contributed to the demise of giant garter snake populations. Dietary uptake is the principle route of toxic exposure to selenium in wildlife, including giant garter snakes (Beckon *et al.* 2003). Many open ditches in the northern San Joaquin Valley carry subsurface drainwater with elevated concentrations of selenium. Green sunfish (*Lepomis cyanellus*) in this drainwater have been found to have concentrations of selenium ranging from 12 to 23 µp/g (Saiki 1998), within the range of concentrations associated with adverse affects on predator aquatic reptiles (Hopkins *et al.* 2002). Since 1996, subsurface drainwater has been discharged, via the Grassland Bypass Project into Mud Slough North, where selenium concentrations in small fish, including mosquito fish, frequently reach 10-15 µp/g (Beckon *et al.* 2003).

Environmental impacts associated with urbanization include loss of biodiversity and habitat, alternation of natural fire regimes, fragmentation of habitat from road construction, and degradation due to pollutants (Service 2003). Rapidly expanding cities within the snake's range include Chico, Yuba City, the Sacramento area, Galt, Stockton, Gustine, and Los Banos.

Status with Respect to Recovery

The revised draft recovery criteria require multiple, stable sub-populations within each of the three recovery units, with sub-populations well connected by corridors of suitable habitat. This entails that corridors of suitable habitat between existing snake sub-populations be maintained or created to enhance sub-population interchange to offset threats to the species (Service 2003).

The revised draft recovery plan for the giant garter snake subdivides its range into three proposed recovery units (Service 2003): (1) Northern Sacramento Valley Recovery Unit; (2) Southern Sacramento Valley Recovery Unit; and (3) San Joaquin Valley Recovery Unit. One goal of the recovery plan is to protect the long-term viability of all extant populations within each recovery unit.

Currently, only the Northern Sacramento Valley Recovery Unit is known to support relatively large, stable giant garter snake populations. Habitat corridors connecting sub-populations, even in the Northern Sacramento Valley Recovery Unit, are either not present or not protected. Overall, the future availability of habitat in the form of canals, ditches, and flooded fields are subject to market-driven crop choices, agricultural practices, and urban development, and are, thus, uncertain and unpredictable. The Northern Sacramento Valley Unit at the northern end of the species' range contains sub-populations in the Butte Basin, Colusa Basin, and Sutter Basin (Service 2003). Protected snake habitat is located on State refuges and refuges of the Sacramento National Wildlife Refuge (NWR) Complex in the Colusa and Sutter Basins. Suitable snake habitat is also found in low gradient streams and along waterways associated with rice farming.

The Southern Sacramento Valley Unit includes sub-populations in the American Basin, Yolo Basin, and Delta Basin (Service 2003). The status of Southern Sacramento Valley sub-populations is very uncertain; each is small, highly fragmented, isolated, and threatened by urbanization (Hansen 2004; Service 2003; Wylie *et al.* 2004b). The American Basin sub-population, although threatened by urban development, receives protection from the Metro Air Park and Natomas Basin Habitat Conservation Plans, which share a regional strategy to maintain a viable snake sub-population in the basin.

The San Joaquin Valley Unit includes sub-populations in the San Joaquin Basin and Tulare Basin. The San Joaquin Valley Unit formerly supported large snake populations, but numbers have severely declined, and recent survey efforts indicate numbers are extremely low compared to Sacramento Valley sub-populations (Dickert 2002, 2003; Wylie 1998a). Giant garter snakes currently occur in the northern and central San Joaquin Basin within the Grassland Wetlands, Mendota Area, and Burrel/Lanare Area. Agricultural and flood control activities are presumed to have extirpated the snake from the Tulare Basin (south portion of the San Joaquin Valley) (Hansen 1995); however, comprehensive surveys for this area are lacking and where habitat remains, the giant garter snake may be present (Service 2003).

The proposed project is located within the San Joaquin Basin snake sub-population, in the San Joaquin Valley Recovery Unit (Service 2003). Thirty-six CNDDB (2005) records are known from the San Joaquin Basin. These records include Los Banos Creek, Agatha Canal, Mud Slough, Fresno Slough, Volta Wildlife Area, Mendota Wildlife Area, and other locations within the area. Until recently, there were no post-1980 sightings of giant garter snakes from Stockton southward, and surveys of historic localities conducted in 1986 did not detect any snakes (Hansen 1988). Since 1995, however, surveys conducted by CDFG in cooperation with BRD around Los Banos and the Volta Wildlife Area in the Grasslands, and Mendota Wildlife Area have detected snakes, but in small numbers and much lower than those found in Sacramento Valley sub-populations. Snakes neither as small nor large as those found in the Sacramento Valley were captured in the San Joaquin Basin. This may be due to the much smaller population size, or could reflect a true scarcity of these size classes in the northern San Joaquin Valley sub-populations.(Dickert 2002, 2003; Williams and Wunderlich 2003; Wylie 1998a). The total Mendota catch was only 14 garter snakes in Fresno Slough. Five of the 14 snakes had lumps on their bodies suggestive of a parasitic nematode infection; further study is underway (Dickert 2002, 2003). The estimated total population size for the Volta Wildlife Area is 45 individuals,

approximately only 5.6 snakes per mile (3.5 snakes per kilometer). Such low numbers are illustrative of a tenuously small snake population. In addition, one-third of the giant garter snakes found had lumps on their bodies suggestive of a parasitic nematode infection (Dickert 2003); further study is underway. Such low snake numbers are illustrative of a tenuously small population, much smaller than found in Sacramento Valley. Ten of the 31 snakes found in 2003, however, weighed less than 40 grams indicating that giant garter snakes have been breeding at the Volta Wildlife Area. These results demonstrate that giant garter snakes are still extant in the northern San Joaquin Valley, but probably in extremely low numbers/densities. All sub-populations are isolated from each other with no protected dispersal corridors. Few opportunities for re-colonization of small sub-populations that may become extirpated exist given the isolation from larger populations and lack of dispersal corridors between them.

Recent genetic work on giant garter snake population structure indicates three genetic entities within the species which follow the pattern of subdivision revealed by the mitochondrial DNA and color pattern variants: north, central, and south (Paquin 2001). The southern proposed management unit, analogous to the San Joaquin Basin, was found to have very low snake numbers and severely degraded habitat (*i.e.* 60% of sites which supported giant garter snakes in the 1970s have now been replaced by inadequate habitat). Paquin (2001) proposes that concordance of the mitochondrial marker showing genetic isolation of southern populations and unique color pattern should afford giant garter snake populations in the southern extent of their range greater protection. She suggests that Federal and state management agencies responsible for the protection of threatened and endangered species should consider elevating the protection status of San Joaquin Basin giant garter snakes to endangered.

Los Banos Creek, Agatha Canal, Mud Slough, Fresno Slough, Volta Wildlife Area, and Mendota Wildlife Area are important as snake habitat and movement corridors for the animal. The recovery strategy for the snake includes maintenance and/or creation of habitat corridors between existing sub-populations to enhance population interchange and offset threats to the species (Service 2003). Much of the land use within the San Joaquin Valley Recovery Unit is dominated by agriculture and is not suitable for the giant garter snake. Establishment of non-native predators, such as the bullfrog (*Rana catesbiana*), human alteration of water regimes, and outright habitat destruction such as wetland draining, as well as stream channelization, have reduced giant garter snake populations (Wylie *et al.* 2003c). Water pollution in the form of agricultural runoff and drift from aerial application of pesticides and herbicides as well as subsurface agricultural draining, which carries toxic loads of selenium, may also affect snake sub-populations in the San Joaquin Valley (Service 2003). Remaining waterways and associated wetlands, therefore, provide vital permanent aquatic and upland habitat for snakes in an otherwise very limited habitat. The scarcity of remaining suitable habitat, flooding, stochastic processes, and continued threats of habitat loss pose a severe and imminent threat to snakes in the San Joaquin Basin.

Factors Affecting the Snake within the San Joaquin Valley

A number of State, local, private, and unrelated Federal actions have occurred affecting the environmental baseline of the species. Some of these projects have been subject to prior section 7 consultation. These actions have resulted in both direct and indirect effects to snake habitat within the region. Projects affecting the environment around the action area include the

Monument 3D Seismic Prospect project, the Riparian Brush Rabbit Re-introduction Program, and operation and maintenance of CVP facilities in the south-central California area.

The San Joaquin Basin is largely rural, but has not escaped the effects of recent California development in the rapidly developing areas of Gustine and Los Banos. Urban and commercial development results in direct habitat loss and also may expose snakes to secondary effects including water pollution from urban run-off and increased vehicular mortality, both of which act in concert with rapid habitat loss and degradation to further threaten the snake in the San Joaquin Basin. Also, urban and commercial development promote road widening and bridge replacements, such as those authorized under section 7, which result in direct alteration of snake habitat.

Ongoing agricultural and flood control activities in the San Joaquin Basin may decrease and degrade the remaining habitat affecting the environmental baseline for the snake. Such activities are largely not subject to section 7 consultation. Although rice land and some agricultural waterways can provide habitat for the snake, agricultural activities such as waterway maintenance, weed abatement, rodent control, and discharge of contaminants into wetlands and waterways can degrade snake habitat and increase the risk of snake mortality (Service 2003). On-going maintenance of agricultural waterways can also eliminate or prevent establishment of snake habitat, eliminate food resources for the snake, and fragment existing habitat and prevent dispersal of snakes (Service 2003).

Flood control and maintenance activities, which can result in snake mortality and degradation of habitat, include levee construction, stream channelization, and rip-rapping of streams and canals (Service 2003). Flood control programs are administered by the U.S. Army Corps of Engineers (Corps), and the Corps has typically consulted on previous projects and is expected to continue to do so for future projects. The ongoing nature of these activities and the administration under various programs, however, makes it difficult to determine the continuing and accumulative effects of these activities.

In addition to projects already discussed, projects affecting the environment around the action area include transportation projects with Federal, county, or local involvement. The Federal Highway Administration and/or the Corps have consulted with the Service on the issuance of wetland fill permits for several transportation-related projects within the San Joaquin Basin that affected snake habitat. The direct effect of these projects is often small and localized, but the effects of transportation projects, which improve access and therefore indirectly affect snakes by facilitating further development of habitat in the area and by increasing snake mortality via vehicles, are not quantifiable.

Environmental Baseline within the Action Area

There are approximately 36 extant occurrences for giant garter snake in the 276,350-acre action area. Five of these occurrences are in San Joaquin County, 20 in Merced County, 8 in Fresno County and 3 in the Kern County portions of the action area. The three Kern County occurrences were last observed prior to 1986 and are mapped as non-specific. The current habitat quality rank at the Kern County occurrences is unknown. The extant occurrences for this species occupy approximately 1,746 acres of existing PG&E right-of-ways in the 276,350-acre

action area (CNDDB 2007). The 36 extant occurrences in the existing PG&E right-of-ways represent approximately 16% of the remaining occurrences for this species.

Giant garter snakes occupy freshwater marshes, ditches, and canals that support dense emergent vegetation; they use upland areas adjacent to suitable aquatic areas for basking and aestivation. They do not occur in areas of dense riparian vegetation. The HCP land-cover types utilized by giant garter snake are Agricultural Field, Grassland, Open Water, and Permanent Freshwater Wetland. The HCP concluded that only a small proportion of the Permanent Freshwater Marsh (10%), Open Water (5%), Grassland (5%), and Agricultural (5%) land-cover types might support areas of emergent marsh that provide the necessary aquatic components for giant garter snake, and are suitable for giant garter snake occupancy.

Effects of the Action on Giant Garter Snake

Direct and Indirect Effects

The actual acres of impact to giant garter snake suitable habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities.

Covered Activities would disturb and temporarily remove approximately 3 acres of potentially occupied giant garter snake habitat (land-cover suitable for giant garter snake occupancy) each year (i.e. 90 acres of habitat disturbance over the 30-year life of the project). This area of temporary disturbance will occur as many small disturbances scattered at locations in San Joaquin, Stanislaus, Merced, and Fresno counties over this extended period. Less than 0.1 acre of the destruction and permanent loss of suitable habitat will result annually (i.e. 3 acres of habitat lost over 30 years). In total, approximately 93 acres of suitable giant garter snake suitable habitat will be adversely affected over the 30-year term of the permit. Of this 93-acre total, PG&E estimates that 9 acres are aquatic habitat for the giant garter snake, and 84 acres are upland habitat for giant garter snake (B. Norton *in litt.* December 2007).

Effects to giant garter snake will be avoided and minimized by implementing the General AMMs and AMM 16 and 17. If suitable habitat for giant garter snake is present, work exclusion zones will be flagged 250-feet around the habitat prior to the Covered Activities, and work will be avoided during the winter inactive period (October 1–May 1). Where establishing 250-foot work-exclusion zones are not possible, PG&E will establish a work exclusion zone of the maximum practicable distance. The establishment of buffers around suitable habitat and scheduling work outside of the winter inactive period will reduce habitat disturbance and direct and indirect mortality to giant garter snakes. Still, a small potential exists for take to occur. In cases where the established buffer distances cannot be maintained or Covered Activities must occur during the inactive period, the potential exists for direct harm of individual giant garter snakes and direct temporary lost of habitat. Giant garter snakes could be subject to direct harm from ground-disturbing activities (i.e., snakes could be crushed by vehicles and equipment operating in occupied habitat).

There is some chance that migrating or foraging giant garter snakes could be crushed or harmed by vehicles and equipment implementing the "other disturbance" activities (i.e. tree trimming, patrols, PG&E vehicles traveling off-road, etc.). HCP Table 3-11 indicates that the "other

disturbance" will affect 54 acres of giant kangaroo rat habitat per year (cumulatively, 1,620 acres of "other disturbance" in suitable habitat over 30 years).

Potential indirect effects could result from Covered Activities disturbances that reduce water quality during the wet season. Disturbance of adjacent areas could degrade the quality of the habitat or result in a temporary loss of suitable habitat, and lead to lower survivability of giant garter snakes. Implementation of PG&E's water quality BMPs and the General AMMs will reduce indirect effects of Covered Activities on water and habitat quality for the giant garter snake. Aquatic and upland habitat for the giant garter snake could be degraded by invasion of weedy plants following ground-disturbing activities. Implementation of AMMs 10 will seed a non-native commercial seed mix on disturbed grassland land-cover larger than 0.25 acre to discourage introduction of weeds and reduce the potential of invasive weeds colonizing disturbance sites in giant garter snake upland suitable-habitat.

HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming) will occur on 54 acres of suitable upland giant garter snake habitat each year. Over the 30-year Permit term, "other disturbance" will occur on 1,620 acres of suitable giant garter snake habitat. The potential effects from all covered activities, including the "other disturbance" covered-activities will be reduced by PG&E's implementation of the general AMMs (AMMs 1-6, 8, 10, 29, and 30). The "general" AMMs include limiting the speed of off-road vehicles to 15 mph, parking vehicles in previously disturbed areas when practicable, and minimizing the construction of new access roads. These general AMM will limit direct mortality from "other disturbance" activities, but will not eliminate potential for a small amount of take over the life of the project.

Effects of the Compensation Measures

Permanent loss of suitable habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 0.77 acre of giant garter snake compensation in the North San Joaquin Valley, 0.94 acre of compensation in the Central San Joaquin Valley, and no compensation in the South San Joaquin Valley annually. Overall, PG&E will provide approximately 1.7 acres of giant garter snake compensation annually (approximately 54 acres over 30 years). PG&E initial compensation will protect acres that supports giant garter snake habitat for the first 5 years of habitat effects. Additional mitigation will be provided in 5-year increments. By providing compensation in 5-year increments, compensation will occur before the actual species effect.

Compensation areas for giant garter snake will permanently protect cover and foraging habitat, basking areas, and protected hibernation sites for the species. Selected compensation areas will contain small mammal burrows and other small crevices in upland habitat for giant garter snake. Compensation areas will be occupied by the species. Grassland habitat proposed for compensation must include (or be within ¼ mile of a permanent or semi-permanent wetland or water source). Compensation will provide permanent preservation and management of land to offset temporary habitat disturbances that are expected to last only a few years, thereby providing a net benefit to the species over time. The compensation ensures that occupied habitat for giant garter snake in the San Joaquin Valley is protected into the future.

Conclusion

We anticipate that the proposed action will directly and indirectly affect the giant garter snake as described in the analysis above, including the direct and indirect disturbance and temporary removal of 3 acres of suitable giant garter snake habitat annually from ground-disturbing covered activities (approximately 90 acres of habitat disturbance over the 30-year Permit term), the permanent loss (hardscape) of 3 acres of suitable giant garter snake habitat over the 30-year Permit term. In total, approximately 93 acres of suitable giant garter snake suitable habitat will be adversely affected over the 30-year term of the permit. Of this 93-acre total, PG&E estimates that up to 9 acres are aquatic habitat for the giant garter snake, and 84 acres are upland habitat for giant garter snake (B. Norton *in litt.* December 2007).

Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts the giant garter snake. Compensation will be provided for all direct and indirect impacts to suitable habitat, providing 1.7 acres of giant garter snake compensation annually (an estimated 52 acres over 30 years).

With the application of the general AMMs, we anticipate that the "other disturbance" effects of vehicle travel through 54 acres of giant garter snake suitable-habitat annually (1,620 acres over 30 years) will be individually small, widely dispersed within a small portion of the existing range of the species, and therefore, likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the giant garter snake.

We reached this conclusion because the impact to this species habitat, when viewed in conjunction with the compensation measures long-term protection and management of suitable giant garter snake habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take.

The Service anticipates that incidental take of the giant garter snake will be difficult to detect or quantify for the following reasons: snakes are cryptically colored, secretive, and known to be sensitive to human activities. Snakes may avoid detection by retreating to burrows, soil crevices, vegetation, and other cover. Individual snakes are difficult to detect unless they are observed, undisturbed, at a distance. Most close-range observations represent chance encounters that are difficult to predict. It is not possible to make an accurate estimate of the number of snakes that would be harassed or harmed during ground-disturbing activities, including the covered-activity site, access areas, and roads carrying PG&E vehicles. In instances when take is difficult to detect, the Service may estimate take in numbers of species per acre of habitat lost or degraded as a result of the action.

Therefore, the Service anticipates that an undetermined number of snakes within 3.1 acres of suitable upland and aquatic habitat may be subject to incidental take (harm and harassment) each year from ground-disturbing activities. In total, approximately 93 acres of suitable giant garter

snake suitable habitat will be adversely affected over the 30-year term of the permit. Of this 93-acre total, not more than 9 acres will be aquatic habitat for the giant garter snake.

In addition, the Service anticipates that an undetermined number of snakes within 54 acres of suitable upland habitat will be harmed and harassed annually from "other disturbance" activities, including off-road travel (1,620 acres over 30 years).

In the above Opinion, the Service determined that this level of anticipated take is not likely to result in the jeopardy to the giant garter snake.

WILDLIFE - BIRDS

Swainson's hawk (*Buteo swainsoni*)

The Swainson's hawk is a medium-sized hawk with relatively long, pointed wings and a long, square tail. Adult females weigh 28 to 34 ounces and males 25 to 31 ounces.

Status of the Species

Listing Status

The Swainson's hawk has no status under the Federal ESA, but is listed as threatened under the CESA. Swainson's hawk is protected under the Federal MBTA. An ad-hoc group of researchers called the Swainson's hawk Technical Advisory Committee (TAC) is currently developing a draft of a recovery plan for the species. Despite the lack of a recovery plan, actions that may lead to recovery have been ongoing since the state listing in 1983.

Life History, Reproductive Ecology

Swainson's hawks are entirely diurnal. Adults arrive at breeding areas from early March to early April. Courtship and nest construction begin immediately upon arrival. One to four eggs are usually laid in early to mid-April; incubation lasts 34–35 days until mid-May when young begin to hatch. The brooding period typically continues through early to mid-July when young begin to fledge (England et al. 1997). Nestlings fledge at an average of 43 days (range 38–46 days) (Olendorff 1973; Fitzner 1980). Studies conducted in the Sacramento Valley indicate that one or two (occasionally three) young typically fledge from successful nests, with an average of 1.6 young per successful nest (England et al. 1995; Estep in prep.). After fledging, young remain near the nest and are dependent on the adults for approximately 4 weeks, after which they permanently leave the adult's breeding territory (Anderson et al. in prep.).

Swainson's hawks are territorial during the breeding season; however, away from the nest site adults are more tolerant of conspecifics and other raptors. During the pre-nesting period, adults are highly aggressive around the nest as they reestablish their territorial boundaries. During most of the breeding season (March–August), nesting pairs maintain a relatively small defended territory around the nest and conduct regular foraging bouts during the day. During the incubation and brooding phases of the nesting cycle (April–June), the male does the majority of the foraging and provisions the female, who provides the primary care of young during incubation and brooding (Fitzner 1980; Estep 1989). Foraging bouts are generally conducted

alone; however, inter- and intra-specific foraging groups may form away from the defended territory. Adults generally roost at or near the nest site during inactive periods.

Adults become more gregarious later in the breeding season once young have fledged (July). By mid-August, breeding territories are no longer defended. Approximately 4 weeks following fledging, the young leave the breeding territory and join premigratory groups. The adults also join premigratory groups that remain loosely intact during migration and throughout the wintering season (Anderson et al. in prep.; Bradbury et al. in prep.). During communal foraging events and from post fledging through migration and wintering periods, adults are gregarious and tolerate conspecifics as well as other raptor species (Fitzner 1978; Estep 1989; England et al. 1997)

Swainson's hawks breeding in California may spend the winter in Mexico and South America. Central Valley birds appear to winter in Mexico and Columbia and hawks from northeastern California have been satellite-transmitter tracked to Argentina.

Habitat Affinities
In California, Swainson's hawk habitat generally consists of large, flat, open, undeveloped landscapes that include suitable grassland or agricultural foraging habitat with abundant prey in association with suitable and sparsely distributed trees for nesting (England et al. 1997). Swainson's hawks usually nest in large native trees such as valley oak (*Quercus lobata*), cottonwood (*Populus fremontia*), and willows (*Salix* spp.), although non-native trees, such as eucalyptus (*Eucalyptus* spp.), are occasionally used. Valley oak, Fremont cottonwood, walnut, and large willow with an average height of about 58 feet, and ranging from 41 to 82 feet, are the most commonly used nest trees in the Central Valley. Nests occur in riparian woodlands, roadside trees, trees along field borders, isolated trees, small groves, trees in windbreaks, and the edges of remnant oak woodlands. In some locales, urban nest sites have been recorded (England et al. 1995). Stringers of remnant riparian forest along drainages contain the majority (87%) of known nests in the Central Valley (England et al. 1997; Schlorff and Bloom 1984). Nests are constructed using materials from the nest tree or nearby trees, are up to 60 centimeters (24 inches) in diameter, and are usually constructed as high as possible in the tree, providing optimal protection and visibility (England et al. 1997).

Historically, the species used grass-dominated and desert habitats throughout most of lowland California. Over the past century, conversion of much of the historic range to agricultural uses has shifted the nesting distribution into agricultural areas that mimic grassland habitats or otherwise provide suitable foraging habitat. Suitable agricultural crop patterns include a mixture of hay, grain, and row crops with low-lying vegetation that support adequate rodent prey populations.

The diet of the Swainson's hawk is varied with the California vole (*Microtus californicus*) being the staple in the Central Valley. During the breeding season, Swainson's hawks feed primarily on small rodents, including voles (*Microtus* sp.), deer mice (*Peromyscus* sp.) house mice (*Mus musculus*), and pocket gophers (*Thomomys* sp.). Food items less frequently taken include reptiles, birds, and insects.

Suitable foraging areas include native grasslands or lightly grazed pastures, alfalfa and other hay crops, and certain grain and row croplands. Swainson's hawks typically forage in large fields that support low vegetative cover (to provide access to the ground) and provide the highest densities of prey (Bechard 1982; Estep 1989). In agricultural regions, these habitats include fields of hay and grain crops; certain row crops, such as tomatoes and sugar beets; and lightly grazed pasturelands. Crop fields lacking adequate prey populations (e.g., flooded rice fields) or those that are inaccessible to foraging birds (e.g., vineyards and orchards) are rarely used (Estep 1989; Babcock 1995). Unsuitable foraging habitat includes crops such as vineyards, orchards, most row crops, rice, corn and cotton crops.

Swainson's hawks forage in open country. The usual foraging technique involves searching for prey from a low-altitude soaring flight 98-295 feet above the ground and attacking prey by stooping toward the ground (Dunston et al. 1978; Estep 1989). Occasionally, Swainson's hawks hunt from perches (e.g., fence posts, utility poles). In agricultural habitats, foraging home ranges are highly variable depending on crop patterns and crop phenology, and accordingly exhibit substantial annual and seasonal variation (Bechard 1982; Estep 1989). Seasonal and annual foraging ranges are dependent on changes in vegetative height and density that fluctuate with the pattern of crop maturity and harvest. Reported mean home ranges in the Central Valley range from 6,820 acres (Estep 1989) to 9,978 acres (Babcock 1995). In other portions of the species' range where there is less dependence on agricultural habitats, the reported home ranges are smaller (Fitzner 1978; Anderson 1995). Under optimal conditions, individual nesting pairs require a minimum of approximately 741 acres of suitable foraging habitat; however, foraging ranges are geographically and temporally variable and are dependent largely on cover-type, phenology, and their relationship to prey availability (Fitzner 1978; Bechard 1982; Estep 1989; Babcock 1995).

Throughout their range, Swainson's hawks are known to exploit prey made available through ground-disturbing activities, particularly in agricultural areas. Swainson's hawks are regularly observed on the breeding and wintering grounds hunting behind farm machinery (Estep 1989; Bradbury et al. in prep.). Bent (1937) first reported this phenomenon in southern California; Caldwell (1986) later studied it with respect to prey capture success.

Management needs of the Swainson's hawk are fairly well known for the Central Valley breeding population. These include ensuring the availability of suitable nesting and foraging habitat through preservation of riparian systems and groves of and lone mature trees in agricultural fields, and the maintenance of compatible (with the Swainson's hawk) agricultural practices in grasslands, pastures, and croplands. Compatible agriculture is essential to the maintenance of current Swainson's hawk populations.

Historical and Current Range, Distribution, Dispersal

The status of populations, particularly with respect to juvenile survivorship, remains unclear. Swainson's hawks inhabit grasslands, sage-steppe plains, and agricultural regions of western North America during the breeding season, and winter in grassland and agricultural regions from Central Mexico to southern South America (Woodbridge et al. 1995a; England et al. 1997; Bradbury et al. in prep.). The North American breeding range extends north from California to British Columbia east of the Sierra Nevada and Cascade ranges, east to Saskatchewan, and south

to northern Mexico. Several disjunct populations occur throughout the breeding range, including populations in Alaska, western Missouri, and the Central Valley of California (England et al. 1997).

Swainson's hawks were once found throughout lowland California and were absent only from the Sierra Nevada, north Coast ranges and Klamath Mountains, and portions of the desert regions of the State. Today, Swainson's hawks in California are restricted to portions of the Central Valley and Great Basin regions where suitable nesting and foraging habitat is still available. Central Valley populations are centered in Yolo, Solano, Sacramento, and San Joaquin counties. Other nesting distribution includes Great Basin sage-steppe communities and associated agricultural valleys in extreme northeastern California, isolated valleys in Mono and Inyo Counties, and at least one known isolated breeding site in the Mojave Desert.

The Central Valley population extends from Tehama County southward to Tulare and Kings Counties and is isolated from the rest of the species' range. Extensive banding (Estep 1989) suggests that no movement occurs between the Central Valley breeding population and other populations. Results of satellite radio-telemetry studies of migratory patterns further suggest little to no interaction between the Central Valley population and other populations of Swainson's hawks (Bradbury et al. in prep.).

During historical times (ca. 1900), Swainson's hawks may have maintained a population in excess of 17,000 pairs. Based on a study conducted in 1994, the statewide population is estimated to be approximately 800 pairs. Since 1980, on the basis of nesting records alone, populations in California appear relatively stable. However, continued agricultural conversion and practices, urban development, and water development have reduced available habitat for Swainson's hawks throughout their range in California; this habitat reduction could result in a long-term declining trend. There are 1,603 extant occurrences of Swainson's hawk in 27 California counties: Butte (20), Colusa (56), Contra Costa (10), Fresno (34) Glenn (32) Inyo (7), Kern (7), Kings (5), Lassen (15), Los Angeles (5), Madera (20), Merced (62), Modoc (33), Mono (3), Napa (1), Nevada State (1), Placer (7), Sacramento (183), San Bernardino (1), San Joaquin (266), Siskiyou (94), Solano (246), Stanislaus (34), Sutter (115) Tehama (8), Tulare (16), Yolo (450), and Yuba (26) (CNDDB 2007).

A high degree of nest site fidelity has been noted in Swainson's hawks in California. Individuals often use the same nest, the same tree, or a nearby tree in subsequent years. In the Sacramento Valley, mean inter-territory adult movement was approximately 100 meters (328 feet). (Estep in prep.) Woodbridge et al. (1995b) noted an average dispersal distance of 8.8 kilometers (5.5 miles) between natal site and subsequent breeding site in northeastern California. In the Sacramento Valley, two birds banded as nestlings and subsequently re-sighted as breeding adults nested within 3.5 kilometers (2.2 miles) of their natal site (Estep 1989). Much greater dispersal distances from natal sites have been observed in other parts of the range, most notably distances up to 310 kilometers (193 miles) in Saskatchewan (Houston and Schmutz 1995).

Swainson's hawks breeding in California may spend the winter in Mexico and South America. Central Valley birds appear to winter in Mexico and Columbia and hawks from northeastern California have been satellite-transmitter tracked to Argentina. In California, Swainson's hawks

begin their fall migration from late August to mid-September (Bloom 1980; Estep 1989; England et al. 1997). Satellite radiotelemetry studies from 1995 to 2001 have identified migratory routes, timing, and wintering grounds (Woodbridge et al. 1995a; Bradbury et al. in prep.). Based on these and other telemetry studies, all but the Central Valley population migrates along the eastern edge of Mexico through Central and South America to winter in the La Pampa region of Argentina. The Central Valley population winters primarily in Central Mexico and, to a lesser extent, throughout portions of Central and South America (Bradbury et al. in prep.).

Reasons for Decline and Threats to Survival
Early accounts described the Swainson's hawk as one of the most common raptors in California, occurring throughout much of lowland California (Sharp 1902). Since the mid-1800s, native habitats have undergone a gradual conversion to agricultural uses. Today, native grassland habitats are virtually nonexistent in the state, and only remnants of the once vast riparian forests and oak woodlands still exist (Katibah 1983). This habitat loss has caused a substantial reduction in the breeding range and the size of the breeding population in California (Bloom 1980; England et al. 1997). Swainson's hawks are also sensitive to habitat fragmentation (Estep and Teresa 1992).

The state currently supports between 700 and 1,000 breeding pairs (Swainson's Hawk Technical Advisory Committee file data), which represents less than 10% of the historic population (Bloom 1980). The loss of agricultural lands to various residential and commercial developments is a serious threat to Swainson's hawks throughout California. Additional threats are habitat loss due to riverbank protection projects, conversion from agricultural crops that provide abundant foraging opportunities to crops such as vineyards and orchards which provide fewer foraging opportunities, shooting, pesticide poisoning of prey animals, and hawks on wintering grounds, competition from other raptors, and human disturbance at nest sites.

Recent die-offs of several thousand Swainson's hawks and other raptors attributed to pesticide use at agricultural fields in Argentina have prompted intense interest and actions on the part of scientists, industry, and governments to alleviate the problem. In partnership with chemical companies and landowners, initial efforts of raptor researchers have resulted in certain chemical compounds known to cause hawk mortality being replaced with what are hoped to be less dangerous substitutes. Monitoring will continue to detect and ensure against further hawk die-offs.

There is no information on predation of adult Swainson's hawks; however, nestlings are susceptible to predation by great horned owls (*Bubo virginianus*), American crows (*Corvus brachyrhynchos*), and various mammalian predators (Dunkle 1977; Woodbridge 1991; Estep in prep.).

Environmental Baseline within the Action Area
There are approximately 208 extant occurrences for Swainson's hawk in the 276,350-acre action area. Approximately 155 of these occurrences are in San Joaquin County, 3 in Stanislaus County, 26 in Merced County, 8 in Madera County, 11 in Fresno County, 1 in Kings County, and 2 in the Kern County portions of the action area. The extant occurrences for this species occupy approximately 689 acres of existing PG&E right-of-ways in the 276,350-acre action area

(CNDDB 2007). The 208 extant occurrences within the existing PG&E right-of-ways represent approximately 13% of the occurrences for this species in California.

The HCP land-cover types utilized by Swainson's Hawk are Blue Oak Woodland, Valley Oak Woodland, Woody Riparian, Grassland, Seasonal Wetlands (including vernal pools), and Agricultural Fields,. The HCP concluded that 10% of Blue Oak Woodland, 10% of Valley Oak Woodland, 50% of Woody Riparian, 25% of Grassland, 25% of Seasonal Wetlands (including vernal pools), and 25% Agricultural Field land-cover present in the action area are suitable for Swainson's hawk occupancy.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to Swainson's hawk suitable foraging and nesting habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities. .

The HCP estimated that the direct disturbance and temporary removal of suitable Swainson's hawk habitat (nesting and foraging) would be 28 acres annually (840 acres over the 30-year life of the project) as a result from implementation of Covered Activities. Less than 1 acre (0.9 acre) of destruction and permanent removal of suitable habitat would occur annually (27 acres over 30 years). The total amount of foraging habitat temporarily disturbed is small relative to the amount used by the species. Furthermore, the disturbances would be temporarily, distributed in small, disjunct areas, and each disturbance would represent a negligible amount of the average area of foraging habitat used by individual Swainson's hawks (750 to 7,000 acres). Accordingly, temporary land-cover disturbance of foraging habitat will have little or no affect individual foraging Swainson's hawks.

Some disturbance of individuals could occur from noise and equipment use immediately adjacent to active nest sites. Effects to nesting Swainson's hawk habitat will be avoided and minimized by implementing AMMs 19, 22, and 30. Implementation of AMMs will establish work-exclusion buffers around all active nest sites and train workers to recognize sensitive nesting situations, reducing the potential for effects. Pre-activity surveys will identify known and newly established active Swainson's hawk nests in the vicinity of a medium or large covered activity site. PG&E's review of the MapBook will identify known Swainson's hawk nests in the vicinity of small-disturbance covered activity sites. An unoccupied Swainson's hawk nest or nest tree shall be considered active if it was used in any of the previous three nesting seasons. As specified in AMM 19, if a Swainson's hawk nest is within 0.25 mile of a planned covered-activity worksite, a qualified PG&E biologist will evaluate the effects of the planned covered activity in consultation with the local CDFG representative. If the biologist and the local CDFG representative determine that the activity could disrupt nesting, an appropriately sized work-exclusion or setback buffer will be established, and a limited operation period during the nesting season (March 15–June 30) will be implemented.

PG&E has also adopted a program to prevent any direct harm or harassment of nesting migratory birds and their eggs and young during implementation of the vegetation management covered-activities (G13, E10a-d). The nest protection program was developed as a part of the PG&E's

Migratory Bird Protection Program (HCP Appendix E) and complies with the Migratory Bird Treaty Act. The nest-protection program will track known Swainson's hawk nest sites and identify them as sensitive areas for purposes of vegetation management activities. Minimum work exclusion buffers and seasonal restrictions will be used to avoid impacts on nesting birds. As specified in AMM 22, trained pre-inspectors will review the most current data from the CDFG, the CNDDB, and use their professional judgment to determine whether active Swainson's hawk nests are located within 0.25 miles of the proposed worksite. If pre-inspectors identify a Swainson's hawk active nest within 0.25 miles of a proposed worksite, they will prescribe measures to avoid nest abandonment and other types of harm or harassment, including working the electric line another time of year, maintaining a minimum 500-foot setback, or if the line is in need of emergency pruning, contacting HCP Administrator. PG&E will annually submit the resumes of the trained pre-inspectors to the Service and CDFG. Work crews will be educated regarding nest protection requirements and will follow the nest protection protocol to avoid nests of this species, other raptors, and other migratory birds during vegetation management. These measures are expected to avoid any direct take (harm and harassment) of nesting Swainson's hawk from vegetation management Covered Activities.

Through the implementation of AMM 19, AMM 22, and other measures discussed here, the HCP has addressed Swainson's hawk "as if" it were listed pursuant to section 4 of the ESA, and has included measures for this unlisted species that satisfy the permit issuance criteria under section 210(a)(1)(B) of the ESA.

Where removal of a Swainson's hawk active nest is necessary for purposes of public safety, it will take place only during the non-nesting season, absent emergency conditions, such as an imminent fire threat. Any necessary removal of a Swainson's hawk, white-tailed kite, golden eagle, bald eagle shall be performed in consultation with the Service and the CDFG.

HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming) will affect 466 acres of suitable Swainson's hawk habitat each year. Over the 30-year Permit term, "other disturbance" will occur in 113,980 acres of suitable Swainson's hawk foraging and nesting habitat.

The foraging or nesting habitat disturbances from Covered Activities will be small and dispersed, and are not expected to have measurable effects on habitat quality or on individuals of Swainson's hawks in the action area.

Effects of Compensation Measures
Permanent loss of suitable habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 3.96 acres of Swainson's hawk compensation in the North San Joaquin Valley, 55.1 acres of compensation in the Central San Joaquin Valley, and 5.73 acres of compensation in the South San Joaquin Valley annually. Overall, PG&E will provide approximately 14.8 acres of Swainson's hawk compensation annually (approximately 495 acres over 30 years). The HCP proposes no direct compensation for Swainson's hawk. The compensation for Swainson's hawk will include grassland foraging habitat that will be obtained as part of the compensation for other grassland species including the San Joaquin kit fox... If destruction of any Swainson's hawk nest

or active nest tree is necessary for public safety or cannot be avoided for any other reason, PG&E will confer with the Service and CDFG within 1 year and prior to effects to develop an adaptive management solution that can be incorporated into the HCP. While the small and dispersed habitat disturbances resulting from covered activities are not likely to adversely affect foraging habitat quality or individuals of Swainson's hawks, the compensation ensures that suitable Swainson's hawk foraging habitat is protected into the future. PG&E will protect more than 82.5 acres of grassland foraging habitat in conjunction with compensation for other grassland species including the San Joaquin kit fox for the first 5 years of effects. Additional mitigation will be provided in 5-year increments and will stay ahead of effects to the Swainson's hawk.

Conclusion

We anticipate that the proposed action will directly and indirectly affect the Swainson's hawk as described in the analysis above, including the direct and indirect disturbance of 28 acres of suitable Swainson's hawk nesting and foraging habitat annually (approximately 840 acres of habitat disturbance over the 30-year Permit term), the permanent loss of 12 to 27 acres of suitable Swainson's hawk foraging or nesting habitat over the 30-year Permit term. Implementation of the avoidance and minimization measures included in the HCP will greatly reduce these impacts to the Swainson's hawk. Compensation will be provided for all direct and indirect impacts to suitable habitat and effects to individual birds by providing 14.8 acres of Swainson's hawk compensation annually (an estimated 444 acres over 30 years).

The "other disturbance" activities will occur on 466 acres of suitable foraging and nesting habitat each year (113,980 acres over 30 years). With the application of the general AMMs, the "other disturbance" effects of vehicle travel through 466 acres of suitable foraging habitat annually (113,980 acres over 30 years) are individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Swainson's hawk. We reached this conclusion because of the relatively small amount of temporary disturbance to Swainson's hawk foraging habitat, an almost a complete lack of permanent habitat removal, and implementation of the AMMs. The impact to this species habitat, when viewed in conjunction with the avoidance and minimization measures and the compensation measures' long-term protection and management of suitable Swainson's hawk foraging habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take

With the implementation of AMMs, the Service anticipates that the proposed action will not directly or indirectly harm (will not kill, injure, or modify habitat to the point essential behavior patterns are significantly impaired) individuals of Swainson's hawk, including their eggs and young. We anticipate that zero (0) Swainson's hawk nests, zero (0) eggs, and zero (0) active nest trees will be taken as a result of the proposed action. However, for some individuals, foraging or reproduction may be disrupted from effects of disturbance and take in the form of harassment. Because of the large area included in the action area, it will be difficult to quantify the number of

birds harassed over the 30-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of habitat that will be disturbed. We anticipate that an undetermined number of adult birds using approximately 29 acres of foraging habitat each year (870 acres in 30 years) will be harassed from ground-disturbing activities.

We also anticipate that an undetermined number of adult birds using approximately 466 acres of foraging and nesting habitat will be harassed each year from "other disturbance" activities including off-road travel and tree trimming (13,980 acres over 30 years). In total, an undetermined number of birds using 495 acres of suitable foraging habitat will be harassed each year (14,850 acres over 30 years).

In the above Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the Swainson's hawk.

White-tailed kite (*Elanus leucurus*)

The white-tailed kite is a medium-sized, graceful, long-winged hawk with pointed wings, a long, squared-off tail, and a short hooked beak. Adults are mostly white with a pale gray back and flight feathers darkening toward the outer wing. It often hovers and soars with wings held a dihedral.

Status of the Species

Listing Status

The white-tailed kite has no status under the Federal ESA, and is not listed under the CESA. The white-tailed kite is protected under the federal MBTA. It has been a fully protected under California Fish and Game Code since the 1950s, when populations were low. White-tailed kites have recovered from near extinction in the 1930's to being common throughout most of California today. Possible declines in some areas since the 1980s is a concern.

Life History, Reproductive Ecology

White-tailed kite is a monogamous species. White-tailed kites nests in communal roosting sites. Nest building occurs January through August (Dunk 1995). Egg laying begins in February and probably peaks in March and April. The breeding season lasts through late May. Peak fledging probably occurs in May and June with most fledging complete by October (Erichsen 1995). The female incubates the clutch of four or five eggs for 28 days. Females usually produce only one brood per breeding season but may produce two. Estimates of mean reproductive success range from 1.6 to 3.2 young per successful nest. The maximum-recorded life span is 5 years 11 months for a banded bird that was shot (Dunk 1995.). Kite populations fluctuate greatly with cycles of prey abundance, which correlate significantly with rainfall (Pruett-Jones et al. 1980).

Habitat Affinities

White-tailed kites generally inhabit low-elevation grassland, savannah, oak woodland, wetland, agricultural, and riparian habitats. Some large shrubs or trees are required for nesting and for communal roosting sites. Vegetation structure and prey populations appear to be more important than plant associations in determining suitability. Nest trees range from small, isolated shrubs and trees to trees in relatively large stands. (Dunk 1995.)

Average territory size: is 4.0 - 53 acres (Dunk and Cooper 1994), 47-128.5 ha with a mean of 72 acres (Waian 1973), and 42 - 297 acres (Henry 1983). Territory size is regulated ultimately by prey abundance, though kites may respond more directly to the abundance of interspecific and intraspecific competitors (Dunk 1995). Some ranges may overlap, and foraging may be limited to a small portion of the total area (Henry 1983). Home range for non-breeders is difficult to determine since communal roosts may be tens of kilometers away (Dunk 1995).

Information on the effects of large-scale management actions is not available. However, in northern California, white-tailed kite densities increased substantially when the California Department of Fish and Game bought previously grazed grasslands and largely removed them from grazing, which resulted in a substantial increase in the density of California voles (*Microtus californicus*) (Dunk 1995.)

Historical and Current Range, Distribution, Dispersal
At the turn of this century, the white-tailed kite may have been widespread throughout the lowlands of California, but during the early 1900s, the population severely declined and its range was reduced to western California, from the Sacramento Valley to San Diego (May 1935). Causes of this decline were likely habitat loss, shooting, and possible egg collecting (Pickwell 1930, Waian and Stendell 1970). During the 1930s, extinction was predicted for this species in California (Pickwell 1930). From the 1940s to the 1970s, populations and distribution increased (Fry 1966, Waian and Stendall 1970, Eisenmann 1971), due to protection from shooting and an increase in agricultural development, which may have increased rodent habitat (Eisenmann 1971, Small 1994).

California contains the largest number of white-tailed kites in North America. It is found in virtually all lowlands of California west of the Sierra Nevada range and the southeast deserts. It is common in the Central Valley and along the entire California coast (Dunk 1995). Breeding occurs primarily in the Central Valley and along the length of the California coast. There are approximately 109 extant occurrences of the white-tailed-kite in 27 California counties: Alameda (5), Colusa (1), Contra Costa (6), Del Norte (0), Kern (1), Los Angeles (1), Marin (1), Monterey (2) Napa (1), Orange (1), Placer (2), Riverside (8), Sacramento (28), San Benito (4), San Diego (9), San Joaquin (1), San Luis Obispo (5), San Mateo (3), Santa Barbara (1), Santa Clara (5), Santa Cruz (1), Solano (9), Sonoma (3), Tehama (2), Ventura (1), Yolo (5), Yuba (1) (CNDDB, 2007).

Outside California, breeding has been regularly documented since 1976 in western Oregon and since the 1980s in southwestern Washington. White-tailed kites breed commonly in southern Texas, and a small population of regular breeders has been present in southern Florida since at least 1986. Outside the United States, white-tailed kites are found along the coastal areas of Mexico, Panama, the Caribbean slope, Colombia, Venezuela, Guyana, Brazil, Paraguay, Uruguay, and northern Argentina (Dunk 1995.).

Although probably a resident through most of its breeding range, dispersal occurs during the non-breeding season, leading to winter range expansion that includes most of California (Small 1994, Dunk 1995, Sauer, et al. 1999). This kite is probably not migratory. Stendell (1972)

considered white-tailed kites to be residents that became nomadic during periods of low abundance of California voles. The idea that kites are nomadic is supported by the dramatic range expansion over the last 40 years (Dunk 1995) and the close correlation between kite populations and California vole abundance documented in northern California (Dunk and Cooper 1994).

Reasons for Decline and Threats to Survival
White-tailed kite populations have fluctuated greatly over the past century. Grinnell and Miller (1944) stated that this species was common and widespread in valley and foothill territories before 1895, but by the 1930s, it was rare or entirely gone from many areas and some authors predicted extinction in California (Pickwell 1930; Bent 1937). From the 1940s through the 1980s, kite populations increased and their range expanded north into Oregon, south into Central America, and east into Texas (Dunk 1995). Although Breeding Bird Survey Data for several regions and time periods have shown significant declines (Dunk 1995), more recent data for the period 1980-2000 indicate no significant declining trends in California (Sauer et al. 2001).

Declines during the early part of the century were probably the result of habitat loss, shooting (this kite was considered a pest species), and egg collecting (Dunk 1995). Kite populations fluctuate greatly with cycles of prey abundance, which, in turn, are significantly correlated with rainfall (Pruett-Jones et al. 1980). These fluctuations make determination of long-term population trends difficult.

Degradation and loss of breeding and foraging habitat is probably the most important threat still facing this species (Dunk 1995). Loss of nest trees, increased human disturbance, and disturbance of communal roosting trees has all been identified as threats to the species.

Environmental Baseline within the Action Area
There are 2 extant occurrences for white-tailed kite in the 276,350-acre action area. One occurrence in from San Joaquin County and one is from Kern County. These two occurrences are possible nesting sites. The extant occurrences for this species occupy approximately 7.2 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007). The two extant occurrences within the action area represent only 2% of the known white-tailed kite occurrences in California.

White-tailed kites nest in isolated trees, stands, and woodlands that are associated with grassland, row crop, and pasture habitats. Suitable nesting habitat is therefore scattered throughout grassland and agricultural land-cover types. This species occurs in low densities in drier foothill annual grasslands and in oak woodlands. The HCP land-cover types utilized by white-tailed kite are Blue Oak Woodland, Valley Oak Woodland, Woody Riparian, Grassland, and Seasonal Wetlands and Agricultural Field. The HCP concluded that 10% of Blue Oak Woodland, 10% of Valley Oak Woodland, 15 % of Woody Riparian, 10% of Grassland, 10% of Seasonal Wetlands, and 10% of Agricultural Field land-cover present in the action area are suitable for white-tailed kite occupancy.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact will be quantified for each land-cover type during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities.

The HCP estimated that direct disturbance to potentially-occupied white-tailed kite habitat (nesting and foraging) would be estimated at 15 acres respectively annually over the 30-year life of the project (450 acres over 30 years). Less than 0.4 acres of permanent removal of habitat would occur annually for white-tailed kite as a result from implementation of Covered Activities (less than 12 acres permanently lost over 30 years). The total amount of foraging habitat that would be temporarily disturbed is small relative to the area of foraging habitat used by individual white-tailed kites. Furthermore, the total area of disturbance would be distributed in small disjunct areas, and each would represent a negligible amount of the average area of foraging habitat used by individual kites. Accordingly, temporary land-cover disturbance of foraging habitat will have little or no affect on individual foraging white-tailed kites. HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming) will affect 213 acres of suitable white-tailed kite habitat each year. Over the 30-year Permit term, "other disturbance" will occur in 6,390 acres of suitable white-tailed kite habitat.

Some disturbance of individuals could occur from noise and equipment use immediately adjacent to active communal nest-sites. Effects to nesting birds will be avoided and minimized by implementing AMMs 19, 22, and 30. Implementation of AMMs will establish work-exclusion buffers around nest sites and train workers to recognize sensitive nesting situations, reducing the potential for effects. Pre-activity surveys will identify known and newly established active white-tailed kite communal nest sites in the vicinity of a medium or large covered activity site. PG&E's review of the MapBook will identify known white-tailed kite nest sites in the vicinity of small-disturbance covered activity sites. An unoccupied white-tailed kite nest or communal nest site shall be considered active if it was used in any of the previous three nesting seasons. If white-tailed kite nests are known to be within 0.25 mile of a planned worksite, a qualified PG&E biologist will evaluate the effects of the planned covered activity in consultation with the local CDFG representative. If the biologist and the local CDFG representative determine that the activity could disrupt nesting, an appropriately sized work-exclusion or setback buffer will be established, and limited equipment operation period (beginning in the middle part of the white-tailed kite nesting season (March 15-June 30) per AMM 19), will be implemented.

PG&E has also adopted a program to prevent any direct harm or harassment of nesting migratory birds and their eggs and young during implementation of the vegetation management covered-activities (G13, E10a-d). The nest protection program was developed as a part of the PG&E's Bird Protection Program (HCP Appendix E) and complies with the Migratory Bird Treaty Act. The nest-protection program will track known white-tailed kite nest sites and identify them as sensitive areas for purposes of vegetation management activities. Minimum work exclusion buffers and seasonal restrictions will be used to avoid impacts on nesting birds. As specified in AMM 22, trained pre-inspectors will review the most current data from the CDFG, the CNDDB, and use their professional judgment to determine whether active white-tailed kite nests are located within 0.25 miles of the proposed worksite. If pre-inspectors identify a white-tailed kite active nest within 0.25 miles of a proposed worksite, they will prescribe measures to avoid nest

abandonment and other types of harm or harassment, including working the electric line another time of year, maintaining a minimum 500-foot setback, or if the line is in need of emergency pruning, contacting HCP Administrator. PG&E will annually submit the resumes of the trained pre-inspectors to the Service and CDFG. Work crews will be educated regarding nest protection requirements and will follow the nest protection protocol to avoid nests of this species, other raptors, and other migratory birds during vegetation management. These measures are expected to avoid any direct or indirect take (harm and harassment) of the white-tailed kite active nests from vegetation management Covered Activities.
Through the implementation of AMM 19, AMM 22, and other measures discussed here, the HCP has addressed white-tailed kite "as if" it were listed pursuant to section 4 of the ESA, and has included measures for this unlisted species that satisfy the permit issuance criteria under section 210(a)(1)(B) of the ESA.

Where removal of a white-tailed kite active nest is necessary for purposes of public safety, it will take place only during the non-nesting season, absent emergency conditions, such as an imminent fire threat. Any necessary removal of a Swainson's hawk, white-tailed kite, golden eagle, bald eagle shall be performed in consultation with the Service and the CDFG.
The foraging or nesting habitat disturbances from Covered Activities will be small and dispersed, and are not expected to have measurable effects on habitat quality or on individuals of white-tailed kite in the action area.

The HCP has addressed bank swallow "as if" it were listed pursuant to section 4 of the ESA, and has included measures for this unlisted species that satisfy the permit issuance criteria under section 210(a)(1)(B) of the ESA.

Effects of Compensation Measures
Permanent loss of suitable habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 1.78 acres of white-tailed kite compensation in the North San Joaquin Valley, 3.0 acres of compensation in the Central San Joaquin Valley, and 3.26 acres of compensation in the South San Joaquin Valley annually. Overall, PG&E will provide approximately 8.04 acres of white-tailed kite compensation annually (approximately 241 acres over 30 years). The HCP proposes no direct compensation for white-tailed kite. The compensation for white-tailed kite will include grassland foraging habitat that will be obtained as part of the compensation for other grassland species including the San Joaquin kit fox. If destruction of any white-tailed kite nests or active nest trees are necessary for public safety or cannot be avoided for any other reason, PG&E will confer with the Service and CDFG within 1 year and prior to effects to develop an adaptive management solution that can be incorporated into the HCP.

While the small and dispersed habitat disturbances resulting from covered activities are not likely to adversely affect foraging habitat quality or individuals of white-tailed kite, the compensation ensures that suitable white-tailed kite foraging habitat is protected into the future. PG&E will protect more than 82.5 acres of grassland foraging habitat in conjunction with compensation for other grassland species including the San Joaquin kit fox for the first 5 years of effects. Additional mitigation will be provided in 5-year increments and will stay ahead of effects to the white-tailed kite.

Conclusion

We anticipate that the proposed action will directly and indirectly affect the white-tailed kite as described in the analysis above, including the direct and indirect disturbance of 15 acres of suitable white-tailed kite nesting and foraging habitat annually (approximately 450 acres of habitat disturbance over the 30-year Permit term), the permanent loss of less than 12 acres of suitable white-tailed kite habitat over the 30-year Permit term, and the "other disturbance" of 213 acres of habitat each year (6,390 acres over 30 years). Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts the white-tailed kite. Compensation will be provided for all direct and indirect impacts to suitable habitat and effects to individual birds by providing 8.04 acres of white-tailed kite compensation annually (an estimated 241 acres over 30 years). With the application of the AMMs, the "other disturbance" effects of vehicle travel through 213 acres of suitable foraging habitat annually (6,390 acres over 30 years) are individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the white-tailed kite. We reached this conclusion because of the relatively small amount of temporary disturbance to white-tailed kite foraging habitat, an almost a complete lack of permanent habitat removal, and implementation of AMMs. The impact to this species habitat, when viewed in conjunction with the avoidance and minimization measures and the compensation measures long-term protection and management of suitable white-tailed kite foraging habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take

The Service cannot authorize take in the form of harm (mortality or injury) for the white-tailed kite because the species is fully protected under California State law. However, direct or indirect harm to white-tailed kite from covered activities is very unlikely. With the implementation of AMMs, the Service anticipates that the proposed action will directly or indirectly not harm (will not kill, injure, or modify habitat to the point essential behavior patterns are significantly impaired) individuals of the white-tailed kite, including their eggs and young. We anticipate that zero (0) white-tailed kite nests, zero (0) eggs, and zero (0) nest trees will be taken as a result of the proposed action.

However, for some individuals, take in the form of harassment could occur. Because of the large area included in the action area, it will be difficult to quantify the number of individual white-tailed kites harassed over the 30-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of habitat that will be disturbed. We anticipate that an undetermined number of adult birds using approximately 15.4 acres of suitable foraging habitat (462 acres in 30 years) will be harassed from ground-disturbing activities. We anticipate that an undetermined number of adult birds using approximately 213 acres of foraging and nesting habitat will be harassed each year (6,390 acres over 30 years) from "other disturbance" activities

including off-road travel and tree trimming. In the above Opinion, the Service determined that this level of anticipated take is not likely to result in the jeopardy to the white-tailed kite.

Golden eagle (*Aquila chrysaetos*)

Status of the Species

Listing Status

Golden eagle has no status under the Federal ESA or the CESA. It is federally protected under the Bald and Golden Eagle Protection Act. Golden eagle is a Fully Protected Species under the California Fish and Game Code. In 1978, the California Department of Fish and Game classified the golden eagle as a Bird Species of Special Concern in California

Life History, Reproductive Ecology

Nest building can occur almost any time of year (Brown 1976). Golden eagles prefer to locate their nests on cliffs or trees near forest edges or in small stands near open fields (Bruce et al. 1982, Hunt et al. 1995, 1998). Mating occurs from late January through August, with peak activity in March through July. Golden eagles lay eggs from early February to mid-May. Clutch size varies from 1 to 4 eggs, but a clutch of 2 eggs is most common (Brown 1976, Johnsgard 1990, Hunt et al. 1995). Incubation lasts 43-45 days (Beebe 1974), and the fledging period is about 72–84 days (Johnsgard 1990). The young usually remain dependent on their parents for as long as 11 weeks. Breeding success tends to vary with local prey abundance.

In a 15-year study of golden eagles in Oregon, Thompson et al. (1982) calculated a mean of 1.08 young fledged per breeding territory, 1.7 young fledged per successful nest, and 51% overall nesting success. In Idaho, Beecham and Kochert (1975) showed a similar average of 1.1 young fledged per nesting attempt, 1.8 young fledged per successful nest, and 65% overall nesting success. There are no published reports of the longevity of Golden Eagles in the wild. Captive Golden Eagles have lived to 48 years, but it unlikely that they live that long in the wild (Brown and Amadon 1968).

Habitat Affinities

Golden eagles use nearly all terrestrial habitats of the western United State except densely forested areas. Secluded cliffs with overhanging ledges and large trees are used for nesting and cover. Nest trees include several species of oak (*Quercus* spp.), foothill pine (*Pinus sabianiana* and *P. coulteri*), California bay laurel (*Umbellularia californica*), eucalyptus (*Eucalyptus* spp.), and western sycamore (*Plantanus racemosa*) (Hunt et al. 1998). Preferred territory sites include those that have a favorable nest site, a dependable food supply (medium to large mammals and birds), and broad expanses of open country for foraging. Hilly or mountainous country where takeoff and soaring are supported by updrafts is generally preferred to flat habitats (Johnsgard 1990). Deeply cut canyons rising to open mountain slopes and crags are considered ideal habitat (Beebe 1974).

Breeding densities are directly related to territorial spacing and foraging requirements for the species. Territory size has been estimated to average 124 square kilometers (30,640 acres) in northern California (Smith and Murphy 1973) but can vary largely with habitat conditions. Hunt

et al. (1998) report an 820-sq km (202,622 acres) area near Livermore, California supporting at least 44 pairs of golden eagles, with a density of 1 pair per 19 sq km (4,695 acres). This density is among the highest reported for the species.

Historical and Current Range, Dispersal
The Golden Eagle is distributed worldwide throughout the Northern Hemisphere. Golden eagles are typically associated with the plains of the western United States and are fairly common in our western states, Alaska and western Canada.

In North America, migratory breeding populations are found in northern Alaska east to the Northwest Territories and through parts of the northeastern U.S. The wintering range of migratory populations encompasses much of the central and eastern U.S. Year-round residents are found throughout the western United States (Johnsgard 1990).

Breeding golden eagles in central California are mostly resident, and juveniles may remain in the vicinity of their natal area until evicted by the parents. Floater non-breeding birds (adults without breeding territories) commonly move about regionally until they find a suitable vacant territory or are able to evict a territorial owner (Brown 1969, Hunt et al. 1995, 1998). Some migrants may temporarily move into areas used by resident birds during the winter. There are 115 extant occurrences of nesting golden eagle in 28 California counties: Alameda (6) Colusa (2), Contra Costa (9), El Dorado (1), Fresno (3), Humboldt (12), Kern (3), Lake (3), Lassen (14), Los Angeles (3), Madera (2), Merced (2), Modoc (11), Mono (1), Monterey (2), Napa (4), Orange (2), Riverside (5), Sacramento (1), San Bernardino (2), San Diego (15), San Luis Obispo (1), Santa Clara (2), Siskiyou (2), Solano (2), Stanislaus (1), Trinity (2), Ventura (2) (CNDDB 2007).

Reasons for Decline and Threats to Survival
This species was once a common permanent resident throughout the open areas of California; numbers are now reduced near human population centers. During the 1950's, an estimated 20,000 eagles were destroyed by ranchers, particularly sheep farmers who perceived them to be a threat. In the northeastern states, remnant populations declined drastically. Golden eagles have been protected in the United States since 1963. The golden eagle is thought to be stable in most areas of the western United States but declining in southern California. It is presumably stable elsewhere in California.

Existing threats to the golden eagle in California include loss of both foraging and nesting habitat; human disturbance of nesting birds; and direct fatalities from wind-turbine strikes, electrocution, and poisoning. An analysis of the fatalities of 61 radio-tagged golden eagles recovered in the Diablo Range between January 1994 to December 1997 showed that 37% of all fatalities resulted from turbine strikes, 16% by electrocution, and 5% by lead poisoning (Hunt et al. 1998). Of the remaining fatalities, causes included fledging mishaps (10%) car strikes (5%), territorial fights with other eagles (5%), collision with fences (3%), shootings (2%), botulism (2%), and unknown factors (15%)

Golden-eagle management and conservation generally includes habitat management, population enhancement, hazard management, control of human activity in sensitive areas, and education.

Cattle ranching can benefit the golden eagle if grazing is maintained at moderate levels that stimulate growth of herbaceous foods used by primary prey species, including ground squirrels and rabbits (Hunt et al. 1995). Hazard-management efforts to reduce wind-turbine strikes include replacement of turbine models with fewer larger, but slower, turbines that are less likely to strike soaring or hunting eagles. PG&E and other utilities have implemented extensive measures to reduce incidence of electrocution.

Golden eagles are top avian predators. They may directly compete with ferruginous hawks and other smaller hawks for small mammals. Territorial interactions with other golden eagles may result in some fatalities.

Environmental Baseline within the Action Area

There are approximately 3 extant occurrences (nesting) for golden eagle in the 276,350-acre action area. Two occurrences are in Merced County and one occurrence is in Fresno County. The extant occurrences for this species occupy approximately 34 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007). The three extant occurrences in the action area represent only 3% of the species known golden eagle nest-occurrences within California.

Golden eagles forage in grasslands, oak woodlands, and shrub habitats. They nest in prominent structures, large trees, and cliffs near suitable foraging habitat; these conditions are most common in the inner Coast ranges or foothills. The HCP land-cover type utilized by golden eagle are Blue Oak Woodland, Valley Oak Woodland, Grassland, and in alkali desert scrub habitat associations, Upland Scrub. Because of fragmentation of habitat in the San Joaquin Valley, the HCP considered only a small proportion of the Grassland cover type to be suitable for occupancy by golden eagles. The HCP concluded that only 10% of Blue Oak Woodland, 10% of Valley Oak Woodland, 10% of Grassland and 5% of Upland Scrub cover type present in the action area are suitable for golden eagle occupancy.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to suitable golden eagle foraging habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities.

The HCP estimated that the direct temporary ground disturbance to potentially-occupied golden eagle habitat (nesting and foraging) would be 16 acres annually (480 acres over the 30-year life of the project) as a result from implementation of Covered Activities. Less than 0.2 acre of permanent removal of habitat would occur annually (less than 6 acres over 30 years). HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will affect 94 acres of suitable golden eagle habitat each year. Over the 30-year Permit term, "other disturbance" will occur in 2,820 acres of suitable golden eagle foraging habitat. The total amount of foraging habitat temporarily disturbed is small relative to the large home ranges of individual golden eagles. Effects to foraging and perching habitat in grassland, riparian, and oak woodland habitats would be limited and widely dispersed and would represent a very small fraction of the total areas

suitable for and used by golden eagles. The temporary disturbances would be distributed in small, disjunct areas and each disturbance would represent a negligible amount of the average area of foraging habitat used by individual golden eagles. Accordingly, temporary disturbance of foraging habitat will have little or no affect on individual foraging golden eagles. Covered activity noise, minor construction activity, or patrols could displace golden eagles from perch sites used during foraging or roosting, but with AMMs, these effects would occur infrequently inside the action area.

Although few pairs of golden eagles are known to nest in the 276,350-acre action area, populations could increase over the term of the Permit in response to population recovery from the DDT era and availability of new habitat at reservoirs. Some disturbance of individuals could occur from noise and equipment use immediately adjacent to active nest sites. Effects to nesting golden eagle hawk habitat will be avoided and minimized by implementing AMM 22. Implementation of AMMs will establish work-exclusion buffers around all active nest sites and train workers to recognize sensitive nesting situations, reducing the potential for effects. Pre-activity surveys will identify known and newly established active golden eagle nests in the vicinity of a medium or large covered activity site. PG&E's review of the MapBook will identify known golden eagle nests in the vicinity of small-disturbance covered activity sites. An unoccupied golden eagle nest or nest tree shall be considered active if it was used in any of the previous three nesting seasons. As specified in AMM 19, if a nest is within 0.25 mile of a planned covered-activity worksite, a qualified PG&E biologist will evaluate the effects of the planned covered activity in consultation with the local CDFG representative. If the biologist and the local CDFG representative determine that the activity could disrupt nesting, an appropriately sized work-exclusion or setback buffer will be established, and a limited operation period during the nesting season will be implemented. Potential loss of active golden eagle nest sites in trees during vegetation management is unlikely to occur. As specified in AMM 22, PG&E has also adopted a program to prevent any direct harm and harassment to nesting migratory birds, their eggs, and young during implementation of the vegetation management covered-activities (G13, E10a-d). The nest protection program was developed as a part of the PG&E's Migratory Bird Protection Program (HCP Appendix E) and complies with the Migratory Bird Treaty Act. The nest-protection program will track known golden eagle nest sites and identify them as sensitive areas for purposes of vegetation management activities. Implementing this procedure will avoid disturbance of nest trees during the nesting season and prevent removal of active eagle nests during the non-nesting period. . Noise and disturbance could affect nesting success of golden eagles in the unlikely event that covered-activities occur close to golden eagle nests. To avoid effects to nests and nesting birds, trained vegetation management pre-inspectors will evaluate potential nest sites and then establish minimum 500-foot work exclusion zones around active nest sites prior to Covered Activities during the nesting period (March 15–August 15). If the line is in need of emergency pruning, the trained pre-inspectors will contact the HCP Administrator. These spatial buffers and seasonal restrictions will be used to avoid disturbance of nest trees during the nesting season and avoid removal of eagle nests during the non-nesting period

As specified in AMM 22, trained pre-inspectors will review the most current data from the CDFG and the CNDDB, and use their professional judgment to determine whether active Swainson's hawk, white-tailed kite, golden eagle or, bald eagle nests are located within 0.5 miles of the proposed worksite. If pre-inspectors identify a golden eagle nest within 0.5 miles of a

proposed worksite, they will prescribe measures to avoid nest abandonment and other types of harm or harassment, including working the line another time of year, maintaining a minimum 500-foot setback, or if the line is in need of emergency pruning, contacting HCP Administrator. PG&E will annually submit the resumes of the trained pre-inspectors to the Service and CDFG. Work crews will be educated regarding nest protection requirements and will follow the nest protection protocol to avoid nests of golden eagle, other raptors, and other migratory birds during vegetation management. These measures are expected to avoid any direct take (harm and harassment) of the golden eagle from vegetation management Covered Activities.

Where removal of a nest is necessary for purposes of public safety, it will take place only during the non-nesting season, absent emergency conditions, such as an imminent fire threat. Any necessary removal of a Swainson's hawk, white-tailed kite, golden eagle, bald eagle shall be performed in consultation with the Service and the CDFG.

The HCP has addressed golden eagle "as if" it were listed pursuant to section 4 of the ESA, and has included measures for this unlisted species that satisfy the permit issuance criteria under section 210(a)(1)(B) of the ESA.

Effects of Compensation Measures
Permanent loss of suitable golden eagle foraging habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 1.97 acres of golden eagle compensation in the North San Joaquin Valley, 2.90 acres of compensation in the Central San Joaquin Valley, and 3.28 acres of compensation in the South San Joaquin Valley annually. Overall, PG&E will provide approximately 8.2 acres of golden eagle compensation annually (approximately 244.5 acres over 30 years). The HCP proposes no direct compensation for golden eagle. The compensation for golden eagle will include grassland foraging habitat that will be obtained as part of the compensation for other grassland species including the San Joaquin kit fox.

If disturbance of any nesting golden eagle or any golden eagle nest by Covered Activities cannot be avoided, PG&E will consult with the Service and CDFG within 1 year and prior to effects to develop an adaptive management solution that can be adaptively incorporated into the HCP. While the small and dispersed foraging habitat disturbances resulting from covered activities are not likely to adversely affect foraging habitat quality or individuals of golden eagle, the compensation ensures that suitable golden eagle foraging habitat is protected into the future. PG&E will protect more than 82.5 acres of grassland foraging habitat in conjunction with compensation for other grassland species including the San Joaquin kit fox for the first 5 years of effects. Additional mitigation will be provided in 5-year increments and will stay ahead of effects to the golden eagle.

Conclusion
We anticipate that the proposed action will directly and indirectly affect the golden eagle as described in the analysis above, including the direct and indirect disturbance of 16 acres of suitable golden eagle nesting and foraging habitat annually (approximately 480 acres of habitat disturbance over the 30-year Permit term), the permanent loss of 6 acres of suitable golden eagle habitat over the 30-year Permit term, and the "other disturbance" of 94 acres of habitat each year

(2,820 acres over 30 years). Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to the golden eagle. Compensation will be provided for all direct and indirect impacts to suitable habitat and effects to individual birds by providing 8.2 acres of golden eagle compensation annually (an estimated 244.5 acres over 30 years). With the application of the AMMs, the "other disturbance" effects of vehicle travel through 244.5 acres of suitable foraging habitat annually (113,980 acres over 30-years) will be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the golden eagle. We reached this conclusion because of the relatively small amount of temporary disturbance to golden eagle foraging habitat, an almost a complete lack of permanent habitat removal, and the implementation of AMMs. The impact to this species habitat, when viewed in conjunction with the avoidance and minimization measures and the compensation measures' long-term protection and management of suitable golden eagle foraging habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The Service cannot authorize take in the form of harm (mortality or injury) for the golden eagle because the species is fully protected under California State law. However, direct or indirect harm to white-tailed kite from covered activities is unlikely. With the implementation of AMMs, the Service anticipates that the proposed action will not directly or indirectly harm (kill, injure, or modify habitat to the point essential behavior patterns are significantly impaired) individual golden eagles, including eggs and young. We anticipate that zero (0) golden eagle active nests, zero (0) eggs, and zero (0) nest trees will be taken as a result of the proposed action over the 30-year permit term.

However, for some individuals, foraging or reproduction may be disrupted from effects of disturbance and the resulting take in the form of harassment. Because of the large area included in the action area, it will be difficult to quantify the number of birds harassed over the 30-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of habitat that will be disturbed. We anticipate that an undetermined number of adult birds using approximately 16.2 acres of suitable foraging habitat each year (486 acres over 30 years) will be harassed from ground disturbing activities. We anticipate that an undetermined number of adult birds using 94 acres of foraging and nesting habitat will be harassed each year (2,820 acres over 30 years) from "other disturbance" activities including off-road travel, tree trimming, and other actions that do not disturb ground surfaces . In the above Opinion, the Service determined that this level of anticipated take is not likely to result in the jeopardy to the golden eagle.

Bald eagle (*Haliaeetus leucocephalus*)

The bald eagle is a large raptor with a wingspread of about 7 feet. Adults have a dark brown body and wings, white head and tail, and a yellow beak. Juveniles are mostly brown with white mottling on the body, tail, and undersides of wings. Adult plumage usually is obtained by the

6th year. In flight, the bald eagle often soars or glides with the wings held at a right angle to the body.

Status of the Species

Listing Status

The bald eagle was listed as endangered in March 1967 (32 FR 4001). The bald eagle was reclassified as threatened in all of the lower 48 state in July 1995 (60 FR 35999). In July 1999, the Service proposed to remove the bald eagle in the lower 48 states from the list of endangered and threatened wildlife (64 FR 36453). The Fish and Wildlife Service removed the bald eagle from the list of threatened and endangered species, effective August 8, 2007 (72 FR 37346). The Bald eagle remains federally protected under the Bald and Golden Eagle Protection Act. No Critical Habitat for the bald eagle has been designated. A detailed account of the taxonomy, ecology, and biology of the species is presented in the *Recovery Plan for the Pacific bald eagle* (USFWS 1986). The bald eagle is listed as Endangered under the CESA and is a Fully Protected Species under California Fish and Game Code 3511.

Life History, Reproductive Ecology

Bald eagles are monogamous and thought to mate for life. Courtship displays and nest building begin up to 3 months prior to egg laying. Breeding occurs in open areas near water. They often select the largest tree in a stand to build a stick platform nest. The nest may be a massive structure, up to twelve feet high, eight and a half feet across, with a wet mass of decaying vegetation in the center weighing many hundred pounds (Brown and Amadon 1968). The nest is typically located 16-61 meters (50-200 ft) above ground, usually below the tree crown. The species of tree used for nesting is less relevant than the height and size of the tree. The nest is usually located near a permanent water source. In California, 87 percent of bald-eagle nest sites were within 1.6 kilometers (1 mile) of the water. Individuals have been known to use the same nest for up to 35 years.

The bald eagle breeds from February through July, with a peak in activity from March to June. The clutch size of the bald eagle is usually two but can vary from one to three, and eggs are laid once annually. Incubation lasts for approximately 35 days and the semi-altricial young hatch asynchronously (Ehrlich, et al. 1988). The young fledge at about 11-12 weeks, but parental care may extend for another 4-11 weeks.

Habitat Affinities

Bald eagles are mostly found along shorelines of lakes, reservoirs, rivers and streams with an adequate food base, perching areas, and nesting sites (Gerrard and Bortolotti 1988). Perching sites tend to be large trees or snags with heavy limbs or broken tops. Nest sites are always near bodies of water, usually lakes and rivers that support abundant fish, waterfowl, or other waterbird prey. In some cases, the distance to water is not as critical as the quality of the foraging area defined by diversity, abundance, and vulnerability of the prey base, structure of aquatic habitat, and absence of human development or disturbance (Buehler 2000). In California, bald eagles nest in trees that usually have an unobstructed view of water bodies and are typically the dominant or co-dominant trees in their surrounding stands Lehman et al. (1980) and Anthony et al. (1982) reported that the mean diameter of nest trees in California and Oregon was 104-117 centimeters (41-46 inches) at breast height. Wintering bald eagles sometime forage

in grassland areas of California, especially where they can scavenge on lamb carcasses and other carrion.

In the San Joaquin Valley, migrant bald eagles may occur in small numbers principally along waterways with well-developed riparian corridors. Specific habitats include cottonwood riparian forest, valley oak riparian forest, willow scrub, and freshwater marsh with associated with migrating waterfowl. Nesting has recently been reported in lowland riparian habitat in Merced County.

Historical and Current Range, Distribution, Dispersal
The bald eagle occurs throughout most of North America with isolated breeding populations in Baja California and northern Mexico. Breeding birds in California are resident, but the winter population is supplemented by migrants from northern areas. Individuals breeding in California may move in search of food. In the San Joaquin Valley, birds occur almost exclusively as wintering migrants between October and March. There are approximately 230 extant occurrences of bald eagle in 38 California counties: Alameda (1), Alpine (1), Butte (5), Calaveras (1), Colusa (1), Contra Costa (1), Del Norte (1), El Dorado (3), Fresno (3), Glenn (1), Humboldt (6), Inyo (1), Kern (2), Lake (4), Lassen (24), Los Angeles (4), Madera (4), Mendocino (2), Merced (2), Modoc (18), Mono (1), Monterey (1) Napa (4), Nevada (3), Placer (1), Plumas (23), Riverside (7), San Bernardino (3), San Luis Obispo (4), Santa Barbara (1), Shasta (54), Sierra (3), Siskiyou (18), Stanislaus (3), Tehama (4), Trinity (15), Tuolumne (3), and Yuba (2) (CNDDB 2007).

Upon leaving the nest site, most juveniles migrate a few hundred miles to wintering areas (Service 1999). However, there is little information on dispersal in bald eagles because of the length of time (4-5 years) between fledging and sexual maturity. Juvenile marked in northern California migrated north in the fall following to Alaska, where they fed on salmon carcasses. Most juveniles that were marked in the greater Yellowstone ecosystem were subsequently found breeding within that system. However, two males nested up to 328 kilometers (204 miles) from their natal sites. A mark-recapture study of a breeding population in Texas concluded that birds fledged there might disperse to breeding communities throughout the southern United States.

Reasons for Decline and Threats to Survival
Bald eagle populations were decimated in the 1950s and 60s by the indiscriminate use of pesticides, principally DDT. With the banning of DDT in 1972 and with the species' listing in the lower 48 states, populations have rebounded throughout most of the species range. In addition to a constant upward trend in population, productivity data for the past 10 years show that the target for productivity identified in the recovery plan has been met and remains relatively constant. Although not all species goals have been reached, most population objectives set in the recovery plan have been met or exceeded (64 FR 36454). In 1994, populations were estimate at approximately 4,450 occupied breeding areas with 1.16 young produced per occupied area. This estimate reflected a 462% increase over 1974 estimates. In 1998, the population was estimated at 5,748.

In California, the breeding population is continuing to increase in numbers and range. Productivity averaged between 0.97 and 1.1 young produced per occupied territory from 1996 to

1999. Thirty-two new breeding territories were reported in the state between 1996 and 1998. The breeding range has expanded from portions of eight of California's 58 counties in 1981 to 28 counties currently.

Certain areas within the bald eagle's range continue to have problems with DDT contamination including the Great Lakes, Maine, the Columbia River, and portions of southern California. Other continuing threats include shooting, habitat destruction, electrocution on power poles, human disturbance, or poisoning (by pesticides other than DDT). A study of nests in Oregon identified the following causes of nest failures: pesticides (32 percent), proximity to nearest-neighbor breeding pairs (11 percent), infertile eggs (7 percent), nestling mortality (3 percent), human disturbance (2 percent), changes in members of a pair (1 percent) and unknown causes (21 percent).

In Washington, studies found that the vast majority of wintering bald eagles tolerated human activities at a distance of 300 meters (985 feet), and only half-tolerated activity at a distance of 150 meters (492 feet) (Stalmaster and Newman 1978; Buehler 2000). The most disturbing human activity appears to be boating, although hiking and car traffic are also significant disturbances (Buehler 2000).In the San Joaquin Valley, principal threats to wintering migrants are probably loss of habitat and human disturbance (Anthony et al. 1994).

Status with Respect to Recovery
The Pacific States Bald Eagle Recovery Plan (USFWS 1986) covers seven western states including California. The recovery plan calls for at least 800 nesting pairs in the Central Valley, breeding populations in 80% of the management zones with nesting , productivity averaging 1.0 young per occupied nest with an average success rate of 65% per occupied site, and stable or increasing wintering populations. The San Joaquin Valley (Recovery Zone 29) was not assigned a target for number of nesting pairs in recognition of the lack of suitable nesting habitat available in the region. The proposed management direction for this recovery zone was maintenance of the limited wintering habitat that occurs in the Central Valley.

Environmental Baseline within the Action Area
There are approximately four extant nesting occurrences for bald eagle in the 276,350-acre action area. Two occurrences are in Merced County, one occurrence is in Madera County, and one occurrence is in Kern County portion of the action area. The extant nesting occurrences for this species occupy approximately 15.3 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007). The four extant occurrences within the action area represent only 2% of the species extant nesting occurrences within California.

Bald eagles typically forage over large open water areas, including rivers, lakes, or reservoirs that support abundant fish or water-bird prey, and nest within 1 mile of large water bodies. These conditions are lacking in large areas of the central and southern San Joaquin Valley. The HCP land-cover types that could be utilized by the bald eagle are Blue Oak Woodland, Blue Oak/Foothill Pine, Coastal Oak Woodland, Conifer, Grassland, Open Water, Permanent Freshwater Wetland, Seasonal Wetland, Upland Scrub, Valley Oak Woodland, and Woody Riparian. Because of specific habitat requirements and overall species population size, the HCP considered only a small proportion of these land-cover types to be suitable for occupancy by bald

eagles. The HCP concluded that 2% of Blue Oak Woodland, 2% of Blue Oak/Foothill Pine, 2% of Coastal Oak Woodland, 2% of Conifer, 5% of Grassland, 10% of Open Water, 10% of Permanent Freshwater Wetland, 5% of Seasonal Wetland, 2% of Upland Scrub, 2% of Valley Oak Woodland, and 2% of Woody Riparian land-cover present in the action area are suitable for bald eagle occupancy.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to suitable bald eagle foraging habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities. .

The HCP estimated that covered activities would directly disturb approximately 7 acres of potentially-occupied bald eagle habitat (nesting and foraging) annually (210 acres of temporary disturbance over the 30-year life of the project). Less than 0.1 acre of suitable habitat would be permanently removed annually (less than 3 acres permanently lost over 30 years). The annual amount of foraging habitat temporarily-disturbed is small relative to the large home ranges of individual bald eagles. Effects to foraging and perching habitat in grassland, riparian, and oak woodland habitats would be limited and widely dispersed and would represent a very small fraction of the total areas suitable for and used by bald eagles. The temporary disturbances would be distributed in small, disjunct areas and each disturbance would represent a negligible amount of the average area of foraging habitat used by individual bald eagles. Accordingly, temporary disturbance of foraging habitat will have little or no affect individual foraging bald eagles. Covered activity noise, construction activity, or patrols could displace bald eagles from perch sites used during foraging or roosting, but with AMMs, these effects would occur very infrequently inside the action area. HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will affect 42 acres of suitable bald eagle foraging and nesting habitat each year. Over the 30-year Permit term, "other disturbance" will occur in 1,260 acres of suitable bald eagle foraging and nesting habitat.

Although few pairs of bald eagles are known to nest in the 276,350-acre action area, populations could increase over the term of the Permit in response to population recovery from the DDT era and availability of new habitat at reservoirs. Some disturbance of individuals could occur from noise and equipment use immediately adjacent to active nest sites. Effects to nesting bald eagle habitat will be avoided and minimized by implementing AMM 22. Implementation of AMMs will establish work-exclusion buffers around all active nest sites and train workers to recognize sensitive nesting situations, reducing the potential for effects. Pre-activity surveys will identify known and newly established active bald eagle nests in the vicinity of a medium or large covered activity site. PG&E's review of the MapBook will identify known bald eagle nests in the vicinity of small-disturbance covered activity sites. An unoccupied bald eagle nest or nest tree shall be considered active if it was used in any of the previous three nesting seasons. As specified in AMM 19, if a nest is within 0.25 mile of a planned covered-activity worksite, a qualified PG&E biologist will evaluate the effects of the planned covered activity in consultation with the local CDFG representative. If the biologist and the local CDFG representative determine that the activity could disrupt nesting, an appropriately sized work-exclusion or

setback buffer will be established, and a limited operation period during the nesting season will be implemented.

Potential loss of active bald eagle nest sites in trees during vegetation management is unlikely to occur. As specified in AMM 22, PG&E has also adopted a program to prevent any direct harm to nesting migratory birds, their eggs, and young during implementation of the vegetation management covered-activities (G13, E10a-d). The nest protection program was developed as a part of the PG&E's Migratory Bird Protection Program (HCP Appendix E) and complies with the Migratory Bird Treaty Act. Implementing this procedure will avoid disturbance of nest trees during the nesting season and prevent removal of active eagle nests during the nesting and non-nesting period. The nest-protection program will track known bald eagle nest sites and identify them as sensitive areas for purposes of vegetation management activities.

Covered-activity noise and disturbance could affect nesting success of bald eagles in the unlikely event that activities occur close to nests. To avoid effects to nests and nesting birds, trained vegetation management pre-inspectors will evaluate potential nest sites to determine whether minimum 500-foot exclusion zones should be established around active nest sites prior to Covered Activities during the period of March 15–August 15. These spatial buffers and seasonal restrictions will be used to avoid disturbance of nests and nest trees during the nesting season and prevent removal of eagle nests during the non-nesting period. Where establishing 500-foot work-exclusion zones are not possible, PG&E will establish a work exclusion zone of the maximum practicable distance. Work crews will be educated regarding nest protection requirements and will follow the nest protection protocol to avoid nests of bald eagles, other raptors, and other migratory birds during vegetation management. These measures are expected to eliminate direct mortality, other form of harm, and harassment of nesting eagles, their eggs, and young.
As specified in AMM 22, trained pre-inspectors will review the most current data from the CDFG and the CNDDB, and use their professional judgment to determine whether active Swainson's hawk, white-tailed kite, golden eagle or, bald eagle nests are located within 0.5 miles of the proposed worksite. If pre-inspectors identify a bald eagle nest within 0.5 miles of a proposed worksite, they will prescribe measures to avoid nest abandonment and other types of harm or harassment, including working the line another time of year, maintaining a minimum 500-foot setback, or if the line is in need of emergency pruning, contacting HCP Administrator. In this manner, (the implementation of AMM 19, AMM 22, and other measures), the HCP has addressed bald eagle "as if" it were listed pursuant to section 4 of the ESA, and has included measures for this unlisted species that satisfy the permit issuance criteria under section 210(a)(1)(B) of the ESA.

PG&E will annually submit the resumes of the trained pre-inspectors to the Service and CDFG. Work crews will be educated regarding nest protection requirements and will follow the nest protection protocol to avoid nests of this species, other raptors, and other migratory birds during vegetation management. These measures are expected to avoid any direct take (harm and harassment) of the bald eagle from vegetation management Covered Activities. Where removal of a nest is necessary for purposes of public safety, it will take place only during the non-nesting season, absent emergency conditions, such as an imminent fire threat. Any necessary removal of a bald eagle nest shall be performed in consultation with the Service and the CDFG.

The HCP has addressed golden eagle "as if" it were listed pursuant to section 4 of the ESA, and has included measures for this unlisted species that satisfy the permit issuance criteria under section 210(a)(1)(B) of the ESA.

Effects of Compensation Measures
Permanent loss of suitable habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 1.02 acres of bald eagle compensation in the North San Joaquin Valley, 1.32 acres of compensation in the Central San Joaquin Valley, and 1.36 acres of compensation in the South San Joaquin Valley annually. Overall, PG&E will provide approximately 3.7 acres of bald eagle compensation annually (approximately 111 acres over 30 years). The HCP proposes no direct compensation for bald eagle. The compensation for bald eagle will include grassland foraging habitat that will be obtained as part of the compensation for other grassland species including the San Joaquin kit fox.

If disturbance of any nesting bald eagle or a bald eagle nest by Covered Activities cannot be avoided, PG&E will consult with the Service and CDFG within 1 year and prior to effects to develop an adaptive management solution that can be adaptively incorporated into the HCP.

While the small and dispersed foraging habitat disturbances resulting from covered activities are not likely to adversely affect foraging habitat quality or individuals of bald eagle, the compensation ensures that suitable bald eagle foraging habitat is protected into the future. PG&E will protect more than 82.5 acres of grassland foraging habitat in conjunction with compensation for other grassland species including the San Joaquin kit fox for the first 5 years of effects. Additional mitigation will be provided in 5-year increments and will stay ahead of effects to the bald eagle.

Conclusion
We anticipate that the proposed action will directly and indirectly affect the bald eagle as described in the analysis above, including the direct and indirect disturbance of 7 acres of suitable bald eagle nesting and foraging habitat annually (approximately 210 acres of habitat disturbance over the 30-year Permit term), the permanent loss of 3 acres of suitable bald eagle habitat over the 30-year Permit term, and the "other disturbance" of 42 acres of habitat each year (1,260 acres over 30 years). Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to the bald eagle. Compensation will be provided for all direct and indirect impacts to suitable habitat and effects to individual birds by providing 3.7 acres of bald eagle compensation annually (an estimated 111 acres over 30 years). With the application of the AMMs, the "other disturbance" effects of vehicle travel through 42 acres of suitable foraging habitat annually (111 acres over 30 years) will be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the bald eagle. We reached this conclusion because of the relatively small amount of temporary

disturbance to bald eagle foraging habitat, an almost a complete lack of permanent habitat removal, and the implementation of AMMs. The impact to this species habitat, when viewed in conjunction with the avoidance and minimization measures and the compensation measures' long-term protection and management of suitable bald eagle foraging habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take

With the implementation of AMMs, the Service anticipates that the proposed action will not directly or indirectly harm (will not kill, injure, or modify habitat to the point essential behavior patterns are significantly impaired) individual bald eagles, including eggs and young. We anticipate that zero (0) bald eagle nests, zero (0) eggs and zero (0) nest trees will be taken as a result of the proposed action. However, for some individuals, foraging or reproduction may be disrupted from effects of disturbance and the resulting take in the form of harassment. Because of the large area included in the action area, it will be difficult to quantify the number of birds harassed over the 30-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of foraging and nesting habitat that will be disturbed. We anticipate that an undetermined number of adult birds using approximately 7 acres of suitable foraging habitat (210 acres over 30 years) will be harassed from ground-disturbing activities. We also anticipate that an undetermined number of adult birds using approximately 42 acres of foraging and nesting habitat will be harassed each year (1,260 acres over 30 years) from "other disturbance" activities including off-road travel, tree trimming, and other actions that do not disturb ground surfaces. In the above Opinion, the Service determined that this level of anticipated take is not likely to result in the jeopardy to the bald eagle.

Western burrowing owl (*Athene cunicularia hypugea*)

The burrowing owl is a small owl (19.5-25.0 cm, 150 g), with long slender tarsi. The head is rounded, lacks ear tufts, and is chocolate in color with white streaking or spotting. There are buffy-white margins around the eyes and a white throat patch. The wings are relatively long and rounded, the tail is short, and both are brown with buff-white barring. The undertail coverts are white. The belly of adults is buffy and heavily barred with brown on the sides. Juveniles are similar to adults but are un-streaked to lightly streaked, light to brownish buff below, and have more pale secondary coverts (Haug et al. 1993).

Status of the Species

Listing Status

Western burrowing owl is not listed under the Federal ESA or the California ESA. Burrowing owl is currently federally protected by the Migratory Bird Treaty Act in the United States and Mexico. They are listed as Endangered in Canada and Threatened in Mexico. At the national level, the western burrowing owl is listed by the Service as a National Bird of Conservation Concern (USFWS 2002b). It is also listed as a Bird of Conservation Concern in three Service regions [Region 1 (Pacific Region, mainland only), Region 2 (Southwest Region), and Region 6 (Mountain-Prairie Region)]; and in nine Bird Conservation Regions (BCRs) [BCR 9 (Great Basin), BCR 11 (Prairie Potholes), BCR 16 (S. Rockies/Colorado Plateau), BCR 17 (Badlands and Prairies), BCR 18 (Shortgrass Prairie), and U.S. Portions of BCR 32 (Coastal California),

BCR 33 (Sonoran and Mojave Deserts), BCR 35 (Chihuahuan Desert) and BCR 36 (Tamaulipan Brushlands)] (USFWS 2002b). At the state level, western burrowing owls are listed as a Species of Concern in California. It is given a Global Heritage Status Rank of G4 (apparently secure globally though it may be quite rare in parts of its range).

Life History, Reproductive Ecology
Like other owls, burrowing owls breed once per year in an extended reproductive period, during which most adults mate monogamously. Both sexes reach sexual maturity at 1 year of age. Clutch sizes vary, and the number of eggs laid is proportionate to prey abundance; the more prey that is available, the more eggs burrowing owls tend to lay. Clutches in museum collections in the western United States contain from one to 11 eggs. Average burrowing owl clutch size is usually five to six (Murray 1976; Baicich and Harrison 1997).

Burrowing owls in California typically begin pair formation and courtship in February or early March, when adult males attempt to attract a mate. Beginning in April, eggs are laid at least 1 day apart and are incubated by both adults for about 3-4 weeks. Young owlets are brooded underground for another 3-4 weeks, after which they may occasionally be seen at the burrow entrance in their natal-down plumage. Nestlings emerge asynchronously and tentatively in early June. Nestlings can range widely on foot even before they can fly. The adults guard their brood tenaciously, attacking intruders if provoked. Older nestlings or fledglings may move to nearby satellite burrows as the natal burrow becomes crowded.

During the breeding season, burrowing owls spend most of their time within 162-325 feet of their nest or satellite burrows during daylight hours (Haug and Oliphant 1990) and forage diurnally in the vicinity of the natal burrow, where they prey on insects in low, open vegetation. Inter-nest distances, which indicate the limit of individual owls' territories, have been found to average between 61 and 214 meters (198 and 695 feet) (Thomsen 1971; Haug and Oliphant 1990).

Depending on assumptions about emigration and immigration, the probability that juvenile burrowing owls will survive to 1 year of age (the age of first breeding) has been estimated between 23% and 93%, and annual adult survivorship between 42% and 93% (Johnson 1997). A wild burrowing owl was reported to survive to 8 years 8 months (Kennard 1975).

Essential Habitat Components
Burrowing owls require habitat with three basic attributes: open, well-drained terrain; short, sparse vegetation; and underground burrows or burrow facsimiles. Burrowing owls occupy grasslands, deserts, sagebrush scrub, agricultural areas (including pastures and untilled margins of cropland), earthen levees and berms, coastal uplands, and urban vacant lots, as well as the margins of airports, golf courses, and roads (Haug et al. 1993).

Throughout their range, burrowing owls rely on burrows excavated by fossorial mammals or reptiles, including prairie dogs, ground squirrels, badgers, skunks, armadillos, woodchucks, foxes, coyotes, and gopher tortoises (Karalus and Eckert 1987). Where the number and availability of natural burrows is limited (for example, where burrows have been destroyed or

ground squirrels eradicated), burrowing owls will occupy drainage culverts, cavities under piles of rubble, discarded pipe, and other tunnel-like structures.

Burrowing owls often form colonies, but variably exhibit territoriality based on the density of nesting burrowing owls within a given area (Haug et al. 1993). The spatial requirements of Burrowing owls are not well understood. Breeding pairs of western burrowing owls may require a minimum of 6.5 acres of contiguous grassland of high foraging quality to persist (California Department of Fish and Game 1995b).

Historical and Current Range, Distribution, Dispersal
The western burrowing owl is a grassland specialist distributed throughout western North America, primarily in open areas with short vegetation and bare ground in desert, grassland, and shrub-steppe environments. Burrowing owls are dependent on the presence of fossorial mammals (primarily prairie dogs and ground squirrels), whose burrows are used for nesting and roosting. Burrowing owls historically bred from south central and southwest Canada southward through the Great Plains and western United States and south to central Mexico. The western burrowing owl is a resident throughout most of its breeding range (American Ornithologists' Union 1998), and also winter in the southwest and south central United States, throughout Mexico, and occasionally as far south as Panama. The taxon occurs throughout California and the Central Valley (Grinnell and Miller 1944). There are approximately 806 extant occurrences of burrowing owl within 39 California counties: Alameda (55), Butte (5), Colusa (10), Contra Costa (42), Fresno (30), Glenn (3), Imperial (22), Inyo (2), Kern (113), Kings (16), Lassen (2), Los Angeles (22), Madera (4), Marin (5), Merced (27), Monterey (12), Napa (2), Orange (5), Placer (1), Riverside (58), Sacramento (37), San Benito (10), San Bernardino (39), San Diego (13), San Joaquin (59), San Luis Obispo (22), Santa Barbara (1), Santa Clara (48), Santa Cruz (2), Solano (81), Sonoma (6), Stanislaus (5), Sutter (1), Tehama (7), Tulare (28), Tuolumne (1), Ventura (4), Yolo (29), Yuba (1)(CNDDB 2007).

Although the historical breeding range is largely intact, range perditions have occurred primarily at peripheral regions, in south Canada, the northeast Great Plains, and parts of California and the Pacific Northwest. Populations of burrowing owls have declined in several large regions, notably in the northeast Great Plains of Canada. Local surveys have detected declining populations and/or range reductions in California, Iowa, Kansas, Minnesota, Nebraska, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Washington, and throughout the range of the species in Canada.

Most burrowing owls settle near natal areas to breed. There are reports of young dispersing alone and in family groups when leaving breeding areas. Burrowing owls are known to migrate, though little information on routes, time, or wintering areas is available (Haug et al. 1993).

Reasons for Decline and Threats to Survival
Western burrowing owl populations are declining across much of their range (Haug et al. 1993) as habitat destruction and improper use of pesticides affect chick survivorship and dispersal (Winchell 1994). Since the 1940s, Western burrowing owl numbers have declined significantly in most parts of California except the Imperial Valley (DeSante and Ruhlen 1995). The species is experiencing precipitous population declines throughout North America; it is also declining

throughout most of the western United States, and has disappeared from much of its historical range in California. Nearly 60% of California burrowing owl "colonies" that existed in the 1980s had disappeared by the early 1990s (DeSante and Ruhlen 1995; DeSante et. al. 1997). In the San Francisco Bay Area and the central portion of the Central Valley (from Yolo and Sacramento Counties to Merced County), the burrowing owl population has declined by at least 65% since 1986.

Recent studies of burrowing owl biogeography suggest that genetically induced problems may threaten the species. One study suggests that small burrowing owl populations may be genetically isolated from other populations (Johnson 1992). Another study found a population of burrowing owls near Sacramento to be inbred due to small population size rather than non-random mating (Johnson 1997).

An immediate threat to western burrowing owl is the conversion of grassland habitat to urban and agricultural uses and the loss of suitable agricultural lands to development. Equally important is the reduction of fossorial (i.e., digging) rodents such as prairie dogs (*Cynomys* spp.) and ground squirrels (*Spermophilus* spp.) across much of the owl's historical range. Eradication programs have decimated populations of these rodents and have in turn disrupted the ecological relationships burrowing owls depend on; because burrowing owls rely on other animals to dig their burrows, the loss of fossorial rodents limits the extent of year-round burrowing owl habitat. Another cause of population declines is thought to be pesticide use (especially organophosphates in southern Canada), but evidence does not clearly indicate that other contaminants are reducing populations (Gervais et al. 1997). Habitat fragmentation (Remsen 1978) probably increases foraging distances, making hunting less efficient and reducing reproductive success. Fragmentation may reduce the chances that individual male burrowing owls will attract mates which could, consequently, decrease reproductive success.

Mammalian predators, such as badger (*Taxidea taxus*), domestic cat (*Felis domestica*), opossum (*Didelphis virginianus*), weasel (*Mustela* spp.), striped skunk (*Mephitis mephitis*) and dogs (*Canis familiaris*), are known to feed on burrowing owl young and eggs. Birds that prey on burrowing owls include Cooper's Hawk (*Accipiter cooperii*), Swainson's hawk (*Buteo swainsoni*), ferruginous hawk (*Buteo regalis*), red-tailed hawk (*Buteo jamaicensis*), merlin (*Falco columbarius*), prairie falcon (*Falco mexicanus*), peregrine falcon (*Falco peregrinus*), great horned owl (*Bubo virginianus*), and American crow (*Corvus brachyrhynchos*) (Wedgwood 1978; Konrad and Gilmer 1984; Millsap and Bear 1988; Martell 1990). Burrowing owls respond to mammalian predators by aerial attack; they retreat into burrows when confronted with avian predators. Burrowing owls may chase or strike one another to displace intruding conspecifics. Songbirds harass burrowing owls by diving at them (Haug et al. 1993).

Environmental Baseline and Status within Action Area

There are approximately 105 extant occurrences of burrowing owl in the 276,350-acre action area. Approximately 38 occurrences are in San Joaquin County, 1 in Stanislaus County, 10 in Merced County, 1 in Madera, 12 in Fresno County, 3 in Kings County, 7 in Tulare and 33 in the Kern County portions of the action area. The extant occurrences for this species occupy approximately 506 acres of existing PG&E right-of-ways in the 276,350-acre action area

(CNDDB 2007). The 105 occurrences in the action-area right-of-ways represent approximately 13% of the remaining occurrences for this species.

Western burrowing owl occurs sporadically in the grassland land-cover type, in weedy habitats within grassland areas, and at the edges of developed areas. Burrowing owls sometimes use edges of croplands in the agricultural-fields land-cover type, but they are absent from most agricultural lands (e.g., vineyards, orchards, rice, row crops), presumably because of rodenticide use, ground disturbance, and other human activities that disrupt their habitat. Western burrowing owls make sporadic use of scrub habitats in the Valley (Upland Scrub). They are absent from chaparral and other dense or moderately dense shrub habitat. The HCP land-cover types utilized by western burrowing owl are Grasslands, Seasonal Wetland Upland Scrub, Agricultural Fields, and Other Disturbed or Developed Lands (ODD). The HCP concluded that 5% of Grasslands, 5% of Seasonal Wetland 5 % of Upland Scrub, 1% of Agricultural Fields, and 1% of ODD land cover present in the action area are suitable for western burrowing owl occupancy.

Burrowing owls are known to occur at several PG&E substation sites in the action area. The HCP states that these individuals are presumably attracted by the bare ground conditions created by vegetation management as well as by the presence of fencing and cover that offer protection from predators. The HCP states that burrowing owls in these situations often tend to be habituated to human activities.

Effect of the Action

Direct and Indirect Effects

The actual acres of impact will be quantified for burrowing owl nesting habitat during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities. The HCP considered the temporary disturbance of burrowing owl foraging-habitat from covered activities not to be detrimental to burrowing owls because of the small area of ground disturbance expected at any given covered-activity site and because ground disturbance may increase prey diversity and foraging opportunities for burrowing owls.

The HCP estimated that covered activities would directly disturb approximately 5 acres of burrowing owl suitable nesting-habitat each year (150 acres of temporary disturbance over 30 years). Less than 0.1 acre per year of burrowing owl nesting habitat is expected to be permanently lost each year (less than 3 acres permanently lost over 30 years). HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will affect 42 acres of suitable burrowing owl nesting habitat each year. Over the 30-year Permit term, "other disturbance" will occur in 1,260 acres of suitable burrowing owl foraging and nesting habitat.

Burrowing owls regularly nest in habitat areas subject to dust, noise, and other disturbance from farm equipment, highways, and other human activities. Nonetheless, some potential exists for burrowing owls to be affected by dust and noise from adjacent "minor construction" activities and from other medium and large ground-disturbing covered activities. Implementation of measures to conduct surveys, establish site-specific buffers, and restrict activities of maintenance crews will avoid or substantially minimize potential direct and indirect effects to nesting habitat. PG&E will avoid or minimize effects to breeding owls by conducting pre-activity surveys at

medium and large activity sites, and by establishing 250-foot buffers around each active nest. As described in AMM 18, PG&E will establish 160-foot buffers around nests during the non-nesting season (September to January). In the event that these buffers sizes are not possible and the species is present, PG&E will develop a site-specific plan to avoid effects to this species. The AMM will reduce potential habitat disturbance and if necessary, a site-specific plan will result in avoidance of direct harm (mortality or injury) to burrowing owls. For non-breeding owls, PG&E would use passive relocation techniques as needed to ensure that adult and juvenile owls move out of construction areas prior to ground disturbance.

Burrowing owls in burrows could be crushed at any time of the year by covered activity equipment implementing "other disturbance" activities (i.e. tree trimming, PG&E vehicles traveling off-road, etc.). HCP Table 3-11 indicates that the "other disturbance" covered activities will affect 42 acres of suitable burrowing owl habitat per year (cumulatively, approximately 1,260 acres of "other disturbance" in suitable burrowing owl habitat over 30 years). The potential effects from all covered activities, including the "other disturbance" covered-activities will be reduced by PG&E's implementation of the general AMMs (AMMs 1-6, 8, 10, 29, and 30). The "general" AMMs, including limiting the speed of off-road vehicles to 15 mph, minimizing the construction of new access roads, and parking vehicles in previously disturbed areas where practicable, may minimize direct impacts of the "other disturbance" covered activities on underground burrowing owls.

PG&E is working to develop a burrowing owl conservation program for PG&E facilities. This program will identify protection, management, and enhancement activities for burrowing owl populations that are adapted to covered-activities at PG&E substations and other facility sites. The program may lead to a separate MOU between PG&E and the CDFG for burrowing owl management, and may be adaptively incorporated into the HCP.

The HCP has addressed the western burrowing owl "as if" it were listed pursuant to section 4 of the ESA, and has included measures for this unlisted species that satisfy the permit issuance criteria under section 210(a)(1)(B) of the ESA.

Effects of the Compensation Measures
Permanent loss of suitable burrowing owl nesting habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable nesting habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 0.75 acres of burrowing owl compensation in the North San Joaquin Valley, 0.93 acres of compensation in the Central San Joaquin Valley, and 1.14 acres of compensation in the South San Joaquin Valley annually. Overall, PG&E will provide approximately 2.8 acres of burrowing owl compensation annually (approximately 85 acres over 30 years). PG&E will protect 14.0 acres of suitable burrowing owl habitat for the first 5 years of effects. Additional mitigation will be provided in 5-year increments and will stay ahead of effects.

The HCP states that compensation will be provided only for disturbance to occupied burrowing owl nesting habitat. Compensation may entail acquiring existing occupied burrowing owl habitat or enhancing lands near occupied burrowing owl habitat (i.e., at substations) with advance approval of the Service (see *Five Mechanisms for Compensation* above). Acquired

occupied land will contain three basic attributes: open, well-drained terrain; short, sparse vegetation; and underground burrows (created by ground squirrels or other fossorial mammals) or facsimiles. Such compensation lands will be managed to maintain compatibility with burrowing owl use, including restrictions on use of rodenticides. This compensation will provide permanently protected lands as compensation for temporary disturbance of the grassland-land cover type habitat or the other HCP land-cover types used by burrowing owls. Enhancement compensation would consist of constructing artificial nesting habitat or performing other management actions to enhance the burrowing owl population at existing occupied sites (i.e., PG&E substations). Enhancement actions on PG&E lands may be performed in advance of the impacts to occupied burrowing owl habitat, with the approval of the Service. PG&E would develop specific enhancement measures adaptively with the Service and CDFG.

Conclusion

We anticipate that the proposed action will directly and indirectly affect the burrowing owl as described in the analysis above, including the direct and indirect disturbance of 5 acres of suitable burrowing owl nesting habitat annually (approximately 150 acres of habitat disturbance over the 30-year Permit term), the permanent loss of 3 acres of suitable burrowing owl nesting habitat over the 30-year Permit term, and the "other disturbance" of 42 acres of habitat each year (1,260 acres over 30 years). Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to the burrowing owl. Compensation will be provided for all direct and indirect impacts to suitable nesting habitat and effects to individual birds by providing 2.8 acres of burrowing owl compensation annually (an estimated 84 acres over 30 years). With the application of the general AMMs, we anticipate that the "other disturbance" effects of PG&E vehicle travel through 42 acres of suitable burrowing owl foraging and nesting habitat annually (1,260 acres over 30 years) will be individually small, widely dispersed and, therefore, likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the burrowing owl. We reached this conclusion because of the relatively small areas of temporary disturbance to burrowing owl nesting habitat, that temporary habitat disturbances would be dispersed over a wide area, an almost a complete lack of permanent habitat removal, and the implementation of the general AMMS and implementation of AMM 18. The impact to this species habitat, when viewed in conjunction with the avoidance and minimization measures and the compensation measures' long-term protection and management of suitable burrowing owl nesting habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take

With the implementation of AMMs, the Service anticipates that the proposed action will not harm (kill or injure) individual burrowing owls, including eggs and young. We anticipate that zero (0) burrowing owls and zero eggs (0) will be taken as a result of the proposed action.

However, for some individuals, normal behavior patterns (breeding, feeding, and sheltering) may be disrupted, impaired, or life expectancy shorted from effects of disturbance and the resulting

take in the form of harm or harassment. Because of the large area included in the action area, it will be difficult to quantify the number of birds harassed over the 30-year permit term. Therefore, the Service is quantifying incidental take as the acres of nesting habitat that will be disturbed. We anticipate that an undetermined number of non-breeding burrowing owls utilizing 5.1 acres of occupied burrows and nesting habitat will be harmed (nesting habitat modified to the point that essential behavior patterns are significantly impaired) each year (153 acres in 30 years) due to ground-disturbing activities. We anticipate that an undetermined number of active burrows will be disturbed or removed annually on these 5.1 acres during the non-breeding season. We also anticipate that an undetermined number of non-breeding adult and juvenile burrowing owls will be harmed (impairment of normal feeding and sheltering behaviors) from PG&E's use of passive relocation techniques in the non-breeding season.

We also anticipate take in the form of harassment (disruption of normal breeding, feeding, or sheltering behaviors) of an undetermined number of breeding and non-breeding burrowing-owls within 42 acres of occupied nesting habitat each year (1,260 acres over 30 years) from "other disturbance" at any time of the year, including off-road travel, tree trimming, and other activities that do not disturb ground surface.

In the above Conference Report, the Service determined that this level of take is not likely to result in the jeopardy to the burrowing owl.

Bank swallow (*Riparia riparia*)

The bank swallow is the smallest swallow in North America. It is brown above and dull white below; with a breast crossed by distinct brown band and a notched tail. Bank swallows nest in steep, sandy riverbanks in colonies of from two or three pairs to a few thousand.

Status of the Species

Listing Status

Bank swallow has no status under the Federal ESA. It is federally protected under the MBTA. It is listed as Threatened under the CESA. A recovery plan for bank swallow was completed and adopted by the Fish and Game Commission in 1992, but the recommendations have not been implemented (California Department of Fish and Game 2000).

Life History, Reproductive Ecology

Bank swallows are migrants that breed primarily in the Central Valley of California and winter in South America. They arrive in California beginning in late March, with the majority of the birds arriving in late April and early May. Fall migration begins in early August (Garrison 2000).

Bank swallows typically nest in colonies ranging in size from 2 or 3 to more than 2,000 nests. Clutches of four to five eggs are laid in April; and three to four young are fledged by July each year. Typically, only one brood per year is raised. The adults and young of the year remain along the riverbanks until they migrate to South America in fall (Garrison 1999.). Estimates of annual mortality range from 57 to 60% for adults and from 60 to 80% for juveniles. There are two records of bank swallows living at least 9 years (Garrison 1999).

Habitat Affinities
Bank swallows in California are dependent on naturally occurring fluvial geomorphologic processes to create and maintain suitable nesting habitat. A key ecological relationship for bank swallow is its relationship with the bank strata needed for successful nesting. The suitability of this microhabitat depends greatly on criteria such as soil moisture, texture, orientation of the bank face, verticality of the bank face, and proximity to foraging areas.

In California, bank swallows nest in vertical banks, cliffs, and bluffs in alluvial, friable soils. These habitats occur primarily in lowland areas along ocean coasts, rivers, streams, lakes, and reservoirs. Heights of vertical banks at nesting colonies in California averaged 3.3 meters (range 1.3–7.3m, n=32). Banks must be vertical enough and tall enough to provide some protection from terrestrial predators. Outside California, bank swallows nest in artificial sites such as road cuts and sand and gravel quarries. Creation of artificial banks and enhancements at occupied banks has been tried with limited success. Creation of artificial burrows appears to be ineffective (Garrison 1999).

Foraging habitats around nest sites include wetlands, open water, agricultural areas, shrubland, and occasionally upland woodlands. In migration, bank swallows can be found in a variety of open and water-associated habitats (Garrison 1999).

Historical and Current Range, Distribution
Bank swallow has a holarctic breeding distribution. In the western hemisphere, the species occurs throughout the northern United States and Canada, and locally south to southern New Mexico and Texas (Garrison 1999). In California, bank swallows historically occurred along the larger lowland rivers in northern California, and along the coast and at the mouths of larger rivers (e.g., Los Angeles River) in southern California (Laymon et al. 1988; Garrison 1999). However, the species has been extirpated from southern California, and its statewide range has been reduced by approximately 50% since 1900 (Laymon et al. 1988; California Department of Fish and Game 2000). Currently, 75% of the California population is concentrated on the banks of Central Valley streams, including several colonies on the Sacramento River (California Department of Fish and Game 2000). There are approximately 189 extant occurrences of bank swallow within 31 California counties: Alameda (1), Butte (26), Colusa (25), Del Norte (2), El Dorado (1), Fresno (1), Glenn (23), Humboldt (1), Inyo (0), Lassen (4), Madera (1), Modoc (10), Mono (2), Monterey (4), Plumas (2), Sacramento (7), San Benito (1), San Diego (1), San Francisco (3), San Mateo (2), Santa Barbara (1), Santa Clara (1), Santa Cruz (1), Shasta (17), Siskiyou (9), Sonoma (1), Sutter (48), Tehama (22), Ventura (1), Yolo (19), and Yuba (15)(CNDDB 2007).

Reasons for Decline and Threats to Survival
Habitat degradation and loss from flood and erosion control projects is the primary threat to bank swallow populations in California (Garrison 1999; California Department of Fish and Game 1995c). Wave wash from boats, high winds, and rapidly fluctuating water levels from storms and reservoir releases can cause bank undercutting during the breeding season, possibly causing mortality of eggs and young in bank swallow colonies. Loss and modification of wetlands,

grasslands, and other open habitats used during migration and at wintering sites adversely affect bank swallows by reducing insect food resources and roosting habitat (Garrison 2000).

Bank swallows in California are dependent on naturally occurring fluvial geomorphologic processes to create and maintain suitable nesting habitat. Specifically, these processes are required to create and maintain suitable nesting habitat. Flood control projects, bank stabilization (i.e., riprap), and water management projects all tend to destroy or inhibit the creation and maintenance of suitable nesting habitat for bank swallows. Because these habitats are ephemeral by nature, bank swallows tend to exhibit low site fidelity. The combination of low site fidelity and the ephemeral nature of nesting habitat along rivers necessitate a large-scale, riparian ecosystem approach to habitat management for bank swallows (Garrison 2000).

Bank swallows are preyed upon by a number of species, including raptors, owls, snakes, chipmunks, skunks, and badgers. Predation levels appear to be influenced by habitat conditions (Garrison 2000).

Environmental Baseline within the Action Area

There is one extant occurrences of a bank swallow colony-site within the 276,350-acre action area. This occurrence is on the San Joaquin River near Mendota pool, in the Fresno County portion of the action area. This occurrence occupies 1.8 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007). The current size of the colony is unknown.

Bank swallow occurrence is highly localized in the San Joaquin Valley, presumably because of the lack of suitable eroded vertical bank habitat with sandy substrate along most San Joaquin Valley rivers and streams. This species occurs at the edges of areas mapped as open water and riparian woodland, but the availability of suitable bank habitat is extremely limited within these areas. The HCP land-cover types utilized by bank swallow are Open Water and Woody Riparian. The HCP concluded that 1% of Open Water and 2% of Woody Riparian cover present in the action area are suitable for bank swallow occupancy.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to bank swallow nesting-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities. .

The HCP estimated that covered activities would directly disturb less than 1 acre of suitable bank swallow nesting habitat each year (less than 30 acres of temporary disturbance over 30 years). Less than 0.01 acres of suitable nesting habitat is expected to be permanently lost each year (less than 0.3 acres permanently lost over 30 years). However, the HCP states that this level of habitat disturbance is unlikely because habitat for bank swallows is highly limited in the San Joaquin Valley and the covered activities typically do not disturb streamside banks. HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will affect less than one acre of suitable bank swallow habitat each year. Over the 30-year Permit term, "other disturbance" will occur on less than 30 acres of bank swallow habitat.

Implementation of AMMs specifying surveys of suitable habitat and the establishment of buffers wherever possible will prevent direct and indirect t effects to individual birds, eggs, or nests. .It is unlikely that individual bank swallows would be harmed due to burrow collapse from vibrations caused by ground-disturbing activities close to occupied habitat. The establishment of buffers and avoidance of covered activities during the nesting season would eliminate direct mortality to bank swallows. It is also unlikely that noise disturbance at the colony sites would occur or that birds would be harassed from covered activities. As described in AMM 23, colonies of bank swallow will be avoided. Pre-activity surveys will identify known and newly established active bank swallow colonies in the vicinity of a medium or large covered activity site. PG&E's review of the MapBook will identify known bank swallow nests in the vicinity of small-disturbance covered activity sites, including the Fresno County colony present within an existing PG&E right of way. If medium or large disturbance coved activities take place within 0.5 miles of an active breeding colony of bank swallows, or a small disturbance covered-activity takes place within 350 feet of an active breeding colony, a qualified PG&E biologist will establish a minimum work exclusion zone of 350 feet around the colony prior to medium and large covered activities, and covered activity work will not occur during the bank swallow nesting period (April 1–July 31). The size of the exclusion zone will be established based on site conditions, the specific covered activity planned, and the professional judgment of the qualified PG&E biologist, and will be greater than the minimum distance. PG&E will annually submit the resumes of the qualified biologists that implement AMMs for bank swallows and tricolored blackbirds to the Service and CDFG.
A very small potential exists for direct take of individual bank swallows if emergency actions are needed in occupied bank swallow habitats. In this unlikely event, PG&E will work adaptively with CDFG and the Service to develop a site-specific plan to avoid and minimize effects.

The HCP has addressed bank swallow "as if" it were listed pursuant to section 4 of the ESA, and has included measures for this unlisted species that satisfy the permit issuance criteria under section 210(a)(1)(B) of the ESA.

Effects of Compensation Measures
Compensation is proposed for bank swallow prior to the implementation of any covered activity causing the habitat disturbance. If needed, the exact location and amount of mitigation will be determined at that time because the covered activities are expected to have very minimal to no effects on bank swallow habitat or populations. However, compensation for projects impacts would be provided at 3:1 ratio for permanent effects and at 0.5:1 for temporary effects to nesting habitat. Advanced compensation is difficult to achieve for bank swallow because of the species' requirement for steep eroding riverbanks. If disturbance of any bank swallow nesting-habitat by covered activities cannot be avoided, PG&E will consult with the Service and CDFG.

Conclusion
Because of the implementation of AMMs, the potential for direct and indirect effects to bank swallow is considered low. We anticipate that the proposed action will have no direct or indirect affect on bank swallow colonies, as described in the analysis above.

Amount or Extent of Take

With the implementation of AMMs, the Service anticipates that the proposed action will not take (harm or harass) any individual bank swallows. The Service anticipates no take in the form of harm (kill, injure, or modify habitat to the point that essential behavior patterns are significantly impaired) of individual bank swallows, including eggs, young, and nests. We anticipate that zero (0) active bank swallow nests, zero (0) eggs and (0) nests will be taken as a result of the proposed action.

The Service anticipates take in the form of harassment of an undetermined number of adult bank swallow individuals using approximately 1.01 acres of nesting habitat annually (30.3 acres in 30 years) from ground-disturbing activities. The Service also anticipates take in the form of harassment of an undetermined number of adult bank swallows using approximately 1 acre of foraging and nesting habitat each year (30 acres over 30 years) from "other disturbance", including off-road travel, tree trimming, and other activities that do not disturb ground surface.

In the above Conference Report, the Service determined that this level of anticipated take is not likely to result in jeopardy to the bank swallow.

Tricolored blackbird (*Agelaius tricolor*)

The tricolored blackbird is a medium-sized bird, 7-9 inches long. Males are mostly a glistening black but with distinctive red and white stripes on the epaulets of their wings. The species tends to nest in very large groups.

Status of the Species

Listing Status

Tricolored blackbird is not listed under the Federal ESA or the CESA, but is afforded Federal protection under the MBTA. The tricolored blackbird is considered a national Bird of Conservation Concern and a national Bird of Management Concern by the Service and is a Species of Special Concern by the California Department of Fish and Game.

Life History, Reproductive Ecology

Female tricolored blackbirds breed in their first year, but most males apparently defer breeding until they are at least 2 years old (Payne 1969). Nest construction, performed exclusively by females, is usually highly synchronous and may be initiated as early as the day of arrival at the breeding colony (Neff 1937).

Tricolored blackbird nests are bound to upright plant stems from a few inches up to about 6 feet above water or ground (Baicich and Harrison 1997); however, nests in the canopies of willows and ashes may be more than 12 feet high (Beedy and Hamilton 1999). Tricolored blackbird nests are rarely built on the ground (Neff 1937).

Egg laying can begin as early as the second day after nest initiation but ordinarily starts about 4 days after the local arrival of tricolored blackbirds at breeding sites (Payne 1969). One egg per day is laid, and clutch size is typically three to four eggs (Payne 1969; Hamilton et al. 1995). Incubation lasts 11–14 days (Payne 1969). It begins before clutches are completed, and hatching

of eggs within individual nests is asynchronous. Both sexes are known to provision nestlings (Beedy and Hamilton 1999).

Tricolored blackbirds are opportunistic foragers (Beedy and Hamilton 1999). Animal matter, predominantly insects and spiders, comprises the bulk of the nestling and fledgling diet; adults tend to consume more animal matter in spring and summer, and more vegetable matter, such as seeds and cultivated grains, in fall and winter. Tricolored blackbirds often forage in croplands, pastures, grassy fields, flooded land, and along edges of ponds (Zeiner et al. 1990).

During the breeding season, tricolored blackbirds often exhibit itinerant breeding and move to new breeding locations following previous nesting attempts elsewhere Hamilton (1998). Most tricolored blackbirds probably move from the San Joaquin Valley and Sacramento County to the northern Sacramento Valley for second or third nesting attempts (Hamilton et al. 1995; Hamilton 2000).

In late March and early April, tricolored blackbirds vacate wintering areas in the Sacramento-San Joaquin River Delta and along coastal central California and arrive at breeding locations in Sacramento County and throughout the San Joaquin Valley (DeHaven et al. 1975).

Habitat Affinities
Tricolored blackbirds have three basic requirements for selecting their breeding colony sites: (1) open accessible water; (2) a protected nesting substrate, including either flooded or thorny/spiny vegetation; and (3) a suitable foraging space providing adequate insect prey within a few miles of the nesting colony (Hamilton et al. 1995; Beedy and Hamilton 1997, 1999).

Almost 93% of the 252 tricolored blackbird breeding colonies reported by Neff (1937) were in freshwater marshes dominated by tules (*Scirpus* sp.) and cattails (*Typha* sp.); the remaining colonies were in willows (*Salix* spp.), blackberries (*Rubus* sp.), thistles (*Cirsium* and *Centaurea* spp.), or nettles (*Urtica* sp.). In contrast, only 53% of the colonies reported during the 1970s were in cattails and tules (DeHaven et al. 1975). An increasing percentage of colonies in the 1980s and 1990s were reported in Himalaya blackberries (*Rubus discolor*) (Beedy et al. 1991; Cook 1996, 1999), and some of the largest recent colonies are in silage and grain fields (Hamilton et al. 1995; Beedy and Hamilton 1997; Hamilton 2000).

Tricolored blackbird foraging habitats in all seasons include annual grasslands; wet and dry vernal pools and other seasonal wetlands; agricultural fields (such as large tracts of alfalfa with continuous mowing schedules and recently tilled fields); cattle feedlots; and dairies. Tricolored blackbirds also forage occasionally in riparian scrub habitats and along marsh borders. Weed-free row crops and intensively managed vineyards and orchards do not serve as regular foraging sites (Beedy and Hamilton 1997, 1999).

Most tricolored blackbirds forage within 3 miles of their colony sites (Orians 1961b), but commute distances of up to 8 miles have been reported (Beedy and Hamilton 1999). Short-distance foraging (i.e., within sight of the colony) for nestling provisioning is also common.

Historical and Current Range, Distribution, Dispersal
The tricolored blackbird is largely endemic to California, with 95 per cent of the population occurring within the state. There are 352 extant occurrences of tricolored blackbird in California (CNDDB 2007). It has been found in 46 California counties, most numerous in the lowlands of the Central Valley, but also occurring in the foothills surrounding the Valley, and in southern and coastal California. Tricolored blackbird breeding colonies have been observed in all Central Valley counties. The vast preponderance of the population occurs in central California, with additional populations in coastal and inland southern California locations, as well as scattered sites in Oregon, Washington, western Nevada, and northwestern coastal Baja California, Mexico (Beedy and Hamilton 1997, 1999; Hamilton 2000.).

Long-term banding studies by DeHaven et al. (1975) demonstrated a major postbreeding season movement into the Sacramento Valley from other breeding locales. Large postbreeding roosts continue to develop in this area from late summer (August) into fall (Hamilton et al. 1995). A substantial but as yet unmeasured number of tricolored blackbirds also winter in the northern San Joaquin Valley (Beedy and Hamilton 1999).

Reasons for Decline and Threats to Survival
The first systematic, range-wide surveys of the species' population status and distribution were conducted by Neff (1937, 1942), who observed as many as 736,500 adults in a single year (1934) in just eight Central Valley counties. During a 5-year interval, he found tricolored blackbirds in 26 California counties; the largest numbers of breeding tricolored blackbirds were in the Central Valley. Neff found many large colonies, including one in Glenn County containing more than 200,000 nests (about 300,000 adults) covering almost 60 acres, and several others in Sacramento and Butte Counties that contained more than 100,000 nests (about 150,000 adults). Most of the large colonies were associated with freshwater emergent wetlands in rice-growing areas of California (Neff 1937). DeHaven et al. (1975) conducted population surveys and banding studies of tricolored blackbirds in the Central Valley from 1969 through 1972. They concluded that the species' geographic range and major breeding areas were unchanged in the 35 years since Neff's (1937) study. They observed an average of about 133,000 individuals per year, and estimated that the overall population size had declined by more than 50% since the 1930s. It is possible, however, that DeHaven et al. (1975) underestimated the total population size because they did not survey large portions of the southern San Joaquin Valley.

Local, regional, and statewide tricolored blackbird populations have experienced serious declines since 1994. These declines are especially alarming because approximately 99% of the global population of this species occurs in California (Beedy and Hamilton 1999). In some places, most historical tricolored blackbird breeding and foraging habitats have been eliminated, and there is currently little or no breeding effort where there once were large colonies (Orians 1961; Beedy et al. 1991). In recent years (and possibly historically as well), more than half of all observed nesting efforts by tricolored blackbirds occurred in a few large colonies (Hamilton et al. 1995; Beedy and Hamilton 1997). Concentrations of such a high proportion of the known population in a few breeding colonies increases the risk of major reproductive failures, especially if the colonies are situated in vulnerable habitats such as active agricultural fields. Predation is at present (i.e., 1985–1995) a major cause of complete nesting failure at some tricolored blackbird colonies (Hamilton et al. 1995; Beedy and Hayworth 1992).

Predation is a serious threat to this species. Historical accounts documented the destruction of nesting colonies by a diversity of predators, including, but not limited to, gray fox (*Urocyon cinereoargenteus*), skunks (*Mephitis mephitis, Spilogale gracilis*), opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), mink (*Mustela vison*), Swainson's hawk (*Buteo swainsoni*), Cooper's hawk (*Accipiter cooperii*), burrowing owl (*Athene cunicularia*), American crow (*Corvus brachyrhynchos*), and raven (*Corvus corax*) (Mailliard 1914; Evermann 1919; Neff 1937). More recently, Payne (1969) reported predation of tricolored blackbird nests by feral cat (*Felis cattus*), northern harrier (*Circus cyaneus*), barn owl (*Tyto alba*), short-eared owl (*Asio flammeus*), and yellow-billed magpie (*Pica nuttallii*). Merlins (*Falco columbarius*) may associate with flocks of wintering tricolored blackbirds and have been observed preying on adults. Black-crowned night-herons (*Nycticorax nycticora*) (Hamilton et al. 1995) and coyotes (*Canis latrans*) (Beedy and Hamilton 1999) have also been observed to predate on tricolored blackbirds, detrimentally affecting local populations.

Volunteer survey results (summarized by Hamilton et al. 1995, Beedy and Hamilton 1997, and Hamilton 2000) have identified several important distribution and population trends for tricolored blackbird:

- local, regional, and statewide populations and distributions vary from year to year;
- 60% of all tricolored blackbirds located in all years were found in the 10 largest colonies;
- 70% of all tricolored blackbird nests and 86% of all foraging by nesting birds were on private agricultural lands.

Neff (1942) considered poisoning to regulate numbers of blackbirds preying upon crops, especially rice, to be a major source of adult mortality. However, improved harvesting methods, earlier ripening rice varieties, and fewer blackbirds have resulted in few recent reports of blackbird crop depredation, and no control programs are currently operating (Beedy and Hamilton 1999). Tricolored blackbirds are sensitive to human disturbance of active nesting colonies.

Key conservation considerations for tricolored blackbird include conversion of suitable habitat and human disturbance. Management efforts could include maintaining known colony sites, limiting human disturbance at nest sites, restricting herbicide and pesticide use in areas occupied by this species, and preservation of areas exhibiting all appropriate characteristics of suitable habitat.

Environmental Baseline within the Action Area

There are 52 extant occurrences for tricolored blackbird colonies in the 276,350-acre action area (CNDDB 2007). Approximately 11 colony occurrences are in San Joaquin County, 14 in Stanislaus County, 11 in Merced County, 1 in Madera County, 6 in Fresno County, 7 in Kings County, and 7 in the Kern County portions of the action area. The extant occurrences for this species occupy approximately 1,443 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007). The 52 extant occurrences within the PG&E right-of-ways represents 15% of the extant occurrences for this species in California.

Tricolored blackbirds nest in highly localized colonies, in emergent wetlands, wet Himalaya blackberry patches in irrigated pastures, and grain fields. Tricolored blackbirds may use open grasslands for foraging during breeding season, but use is limited to areas within approximately 1 mile of nest sites. The HCP did not consider the more widespread winter use of agricultural land-cover by tricolored blackbird when determining the percentage of suitable habitat because the covered activity disturbance of agricultural fields was not considered sufficient to reduce the habitat value of these lands for any covered species. The HCP land cover types utilized by tricolor blackbird are Permanent Freshwater Wetland, Seasonal Wetland, Grassland, Agricultural Fields, and Blue Oak Woodland. The HCP concluded that 5% of Permanent Freshwater Wetland, 5% of Seasonal Wetland, 2% of Grassland, 1% of Agricultural Fields, and 5% of Blue Oak Woodland land-cover present in the action area are suitable for tricolored blackbird occupancy.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to tricolored blackbird nesting and foraging habitat will be quantified f during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities. .

The HCP estimated that covered activities would directly disturb approximately 4 acres of suitable nesting or foraging habitat each year (120 acres of temporary disturbance over 30 years), with most of this disturbance occurring in foraging habitat. Less than 0.1 acre per year of tricolor blackbird nesting habitat is expected to be permanently lost each year (less than 3 acres of nesting habitat permanently lost over 30 years). HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will affect 34 acres of suitable tricolored blackbird habitat each year. Over the 30-year Permit term, "other disturbance" will occur in 1,020 acres of suitable tricolor blackbird foraging or nesting habitat.

Tricolored blackbirds travel to forage over relatively large areas (i.e. usually within 3 miles of their colony sites). Temporary disturbances of tricolored blackbird grassland foraging-habitat by covered activities would be distributed in small, disjunct areas, and each disturbance would represent a small amount of the average foraging area used by individual blackbirds. Consequently, the HCP considered the effects of temporary disturbance to grassland foraging habitat to have little or no effect on foraging tricolor black birds.

Pre-activity surveys will identify known and newly established active tricolored blackbird nesting colonies in the vicinity of a medium or large covered activity site. PG&E's review of the MapBook will identify known tricolored blackbird nests in the vicinity of small-disturbance covered activity sites. Noise and human activity associated with Covered Activities conducted in areas adjacent to nesting colonies could cause nest abandonment and other forms of take in the form of harm, or take in the form of harassment. Because of the high sensitivity of tricolored nesting colonies to human disturbance, even at the small disturbance sites (<0.1 acre), PG&E has adopted protection measure AMM 23. PG&E will avoid direct and indirect harm of nesting tricolored blackbirds (i.e., impairment of essential behavior patterns including the abandonment of nests, eggs, or young in nests) from human activity, noise disturbance, or ground-disturbing

activities near an active nesting colony by the establishment of appropriate work exclusion zones around the colony. If medium or large disturbance coved activities take place within 0.5 miles of an active tricolor blackbird breeding colony, or a small disturbance covered-activity takes place within 350 feet of an active breeding colony, a qualified PG&E biologist will establish a minimum work exclusion zone of 350 feet around the colony prior to medium and large covered activities, and covered activity work will not occur during the tricolored blackbird nesting period (April 1–July 31). The size of the exclusion zone will be established based on site conditions, the specific covered activity planned, and the professional judgment of the qualified PG&E biologist, and will be greater than the minimum distance. PG&E will annually submit the resumes of the qualified biologists that implement AMMs for swallows and tricolored blackbirds to the Service and CDFG.

Establishment of buffers around active nesting areas will minimize impacts, except in the event of an emergency action needed near a nesting colony. In this unlikely event, PG&E will work adaptively with CDFG and the Service to develop a site-specific plan to avoid and minimize effects.
Disturbance of known nesting colony sites (e.g., blackberry patches) during the non-nesting season could harm tricolored blackbirds by reducing the quality of the habitat for nesting in subsequent nesting seasons, and would be considered to be an indirect effect of the covered activity. The impacts of this disturbance depend on a variety of factors, including the extent of nesting habitat at the site, the size of the nesting colony, the degree of disturbance, and the rate of vegetation recovery. PG&E will evaluate the effects of disturbing nesting habitat during the non-nesting period on a site-specific basis. PG&E will develop individual plans to minimize the disturbance, and to restore and enhance habitat onsite (to the degree possible under PG&E's access and easement agreements with landowners), and then compensate for disturbance effects. These plans will be coordinated with CDFG and the Service prior to conducting the covered activity in a tricolored blackbird nesting-colony during the non-nesting season.

Through the implementation of AMM 23 and other measures discussed here, the HCP has addressed tricolored blackbird "as if" it were listed pursuant to section 4 of the ESA, and has included measures for this unlisted species that satisfy the permit issuance criteria under section 210(a)(1)(B) of the ESA.

Effects of Compensation Measures
Permanent loss of suitable foraging or nesting habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 0.37 acres of tricolored blackbird compensation in the North San Joaquin Valley, 0.91 acres of compensation in the Central San Joaquin Valley, and 0.57 acres of compensation in the South San Joaquin Valley annually. Overall, PG&E will provide approximately 2.3 acres of tricolored blackbird compensation annually (approximately 69 acres over 30 years).

Lands protected as compensation for temporary or permanent disturbance of tricolored blackbird nesting habitat will consist of an active colony site or a suitable nesting site that contains accessible open water, a protected nesting substrate including both flooded or thorny/spiny

vegetation, and a suitable foraging space providing adequate insect prey within a few miles of the nesting colony.

Conclusion

We anticipate that the proposed action will affect the tricolored blackbird as described in the analysis above, including the direct and indirect disturbance of 4 acres of suitable tricolored blackbird nesting and foraging habitat annually (approximately 120 acres of habitat disturbance over the 30-year Permit term), the permanent loss of less than 30 acres of tricolored blackbird nesting habitat over the 30-year Permit term, and the "other disturbance" of 34 acres of suitable habitat each year (1,020 acres over 30 years). Implementation of the avoidance and minimization measures included in the HCP will greatly reduce these impacts to the tricolored blackbird. Compensation will be provided for all direct and indirect impacts to suitable foraging and nesting habitat and effects to individual birds by providing approximately 1.9 acres of tricolored blackbird compensation annually (an estimated 55.5 acres over 30 years). With the application of the general AMMs, the "other disturbance" effects of vehicle travel through 34 acres of suitable foraging habitat annually (1,020 acres over 30-years) are individually small, widely dispersed and, therefore, likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the tricolored blackbird. We reached this conclusion because of the relatively small amount of temporary disturbance to tricolored blackbird foraging and nesting habitat, an almost a complete lack of permanent habitat removal, and implementation of AMMs to identify and protect active nesting colony sites. The impact to this species habitat, when viewed in conjunction with the avoidance and minimization measures and the compensation measures' long-term protection and management of suitable tricolor blackbird nesting habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

With the implementation of AMMs, the Service anticipates that the proposed action will not directly harm (will not directly kill or injure) tricolored blackbirds, including eggs and young. We anticipate that zero (0) tricolor blackbirds, (0) active nests, and zero (0) eggs will be taken as a result of the proposed action. Abandonment of active nests is not permitted.

Covered activities may disturb 4 acres and permanently remove 0.1 acres of tricolored blackbird nesting habitat annually. Disturbance of a nesting colony site during the non-breeding season may impair or even prevent (impede) reproduction and other essential behavior patterns of birds returning to the colony site in the next breeding season. An undetermined number of individual birds could be harmed in this manner over the term of the permit. However, tricolored blackbirds often exhibit itinerant breeding and some of these individual birds may be able to move to new breeding locations. Take in the form of harassment may occur from PG&E vehicles conducting patrols, traveling off road, movement of covered activity equipment, and human activity in association with the "other disturbance" covered activities.

Because of the large area included in the action area, it will be difficult to quantify the number of individual birds harmed and harassed over the 30-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of suitable nesting and foraging habitat that will be disturbed. We anticipate that an undetermined number of adult tricolored blackbirds using 4.1 acres of nesting habitat will be harmed each year (123 acres over 30 years).

We also anticipate that an undetermined number of adult tricolored blackbirds using 34 acres of foraging habitat will be harassed each year from "other disturbance" activities, including off-road travel, tree trimming, and other activities that do not disturb ground surface.

In the above Conference Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the tricolored blackbird.

WILDLIFE - MAMMALS

Endangered Buena Vista Lake shrew (*Sorex ornatus relictus*) and its Critical Habitat

Shrews are primarily insectivorous mammals about the size of a mouse. The Buena Vista Lake shrew's back is predominantly black with a buffy-brown speckling pattern, its sides are more buffy-brown than the upper surface, and its underside is smoke-gray. The tail is faintly bicolor and blackens toward the end. The Buena Vista Lake shrew grows to around 4 inches in total length, including a tail of about 1.5 inch. Adults weigh 0.14-0.27 ounce.

Status of the Species and Critical Habitat

Listing Status

The Buena Vista Lake shrew was listed as an endangered species on March 6, 2002 (67 FR 10101). A detailed account of the taxonomy, ecology, and biology of the Buena Vista Lake shrew is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998) and in the final rule (67 FR 10101). Critical Habitat for the Buena Vista Lake shrew was designated on January 24, 2005 (70 FR 3438). The California Department of Fish and Game has designated the Buena Vista Lake shrew as a Species of Special Concern.

Life History, Reproductive Ecology

Shrews are active during the day and night but are rarely seen due to their small size and cryptic behavior. Though they can smell, feel, and see well, they orient partly by use of echolocation--making high-pitched clicking sounds and detecting the objects in their path from the echo s of those sounds. Long-tailed shrews (general name for shrews of the genus *Sorex*) do not store food in their burrows and must forage periodically day and night to maintain their high metabolic rate, though in the hottest months of the year, activity is mostly confined to the cooler hours of night. Some species of *Sorex* are known to have short periods of profound sleep during which their metabolic rate decreases. Shrews do not hibernate. Shrews have a high rate of metabolism because of their small size (Newman and Rudd 1978; McNab 1991). They lose heat rapidly from the surface of their small bodies, and are continually faced with the problem of getting enough food to maintain their body temperatures, especially in cold conditions (Aitchison 1987). Specific feeding and foraging habits of the Buena Vista Lake shrew are unknown. Other *Sorex* shrews feed indiscriminately on the available larvae and adults of several species of aquatic and

terrestrial insects, some of which are detrimental to agricultural crops (Ingles 1965; Newman 1970; Churchfield 1990). They are also known to consume spiders, centipedes, slugs, snails, and earthworms (Jamerson and Peeters 1988) on a seasonally available basis (Aitchison 1987).

Little is known about the reproduction or longevity of Buena Vista Lake shrews. Shrews, on the average, rarely live more than 12 months, and each generation is largely replaced annually (Rudd 1955b). For Buena Vista Lake shrews, the breeding season begins in February or March, and ends with the onset of the dry season in May or June, or may extend later in the year, based on habitat quality and availability of water (J. Maldonado, pers. comm., 1998; Paul Collins, Santa Barbara Museum of Natural History, in litt. 2000). It is likely that this subspecies, like other long-tailed shrews, can give birth to two litters of four to six young each per year; the number of litters is usually dependent on how early or late in the year the young are born, and how soon they become sexually active (Rudd 1955b; Owen and Hoffmann 1983).

Habitat Affinities

Buena Vista Lake shrews prefer moist habitat that has a diversity of terrestrial and aquatic insect prey (Kirkland 1991; Ma and Talmage 2001). During surveys conducted in 1988 and 1990 on the former Kern Lake Preserve (Kern Preserve) found that shrews were more abundant in moderately mesic (moister) habitats versus xeric (drier) habitats, with 25 animals being captured in the moister environments and none in the drier habitat. Maldonado (1992) also found shrews at the Kern Preserve to be closely associated with dense, riparian understories that provide food, cover, and moisture. Capture of two Buena Vista Lake shrews at the Kern National Wildlife Refuge occurred in a 1.13-acre area that contained the most undisturbed moist riparian habitat, with a mature tree overstory, abundant invertebrates, and ground cover totaling about 90%-95% (Maldonado *et al.,* 1998). Five shrews were captured at Goose Lake during the 2003 survey were located within approximately 6.5 ac of the sloughs that consisted of emergent vegetation (ESRP 2004). The preferred habitat of the shrew is along the margins of wet areas where emergent vegetation provides cover and foraging opportunities. Buena Vista Lake shrews have been found associated with mesophytic (moist vegetative) communities. Most recently, their habitat has been described as areas with a dense mesophytic cover and an abundant layer of litter. Plants associated with the more recent habitat description include Fremont cottonwood, willows, alkali heath, wild rye grass, and Baltic rush.

Historical and Current Range, Distribution, Dispersal

The Buena Vista Lake shrew formerly occurred in wetlands around Buena Vista Lake and presumably throughout the entire Tulare Basin (the southern part of the San Joaquin Valley in Fresno, Kings, Tulare and Kern counties) (Grinnell 1932b, 1933; Hall 1981; Williams and Kilburn 1984; USFWS 1998). The animals were likely distributed throughout the swampy margins of Tulare, Goose, Buena Vista, and Kern Lakes. By the time the first Buena Vista Lake shrews were collected and described, these lakes had already been drained and mostly cultivated with only sparse remnants of the original flora and fauna (Grinnell 1932b; Mercer and Morgan 1991; Griggs 1992; USFWS 1998)

Previously, what was known to be the only known extant population was located on the former Kern Lake Preserve (Kern Preserve) located on the old Kern Lake bed south of Bakersfield.

Kern Preserve is a privately owned property. This property totals about 83 acres and was presumed, at the time, to support the only surviving population of Buena Vista Lake shrews.

The Buena Vista Lake shrew is now known from five isolated populations along an approximately 113-kilometer (70-mile) stretch on the west side of the Tulare Basin. Four of the locations, which were known prior to the listing of the species in 2002, are the Kern Preserve, the City of Bakersfield's Kern Fan Water Recharge Area, the Cole Levee Ecological Preserve (Cole Levee) southwest of Bakersfield, and the Kern National Wildlife Refuge in northwest Kern County. A fifth population of shrews was found in 2003 within the Goose Lake slough bottoms area west of Wasco by the Endangered Species Recovery Program as part of a trapping program. Each population represents a cluster of discrete locality records. The five population clusters largely coincide with historical riverine flood basins and tributary streams within the Tulare Basin; all are in Kern County. These five populations are comprised of six extant occurrences and one possibly extirpated occurrence (CNDDB 2007). Other remnant patches of wetland and riparian communities within the Tulare Basin have not been surveyed and may support the Buena Vista Lake shrew.

Over the last 20 years, a number of surveys have taken place in other fresh water marshes or moist riparian areas on private and public lands throughout the range of the subspecies, and were all unsuccessful in capturing any Buena Vista Lake shrews. These surveys include: The Nature Conservancy's Paine Wildflower Preserve and the Voice of America site west of Delano in Kern County (Clark *et al.* 1982); along the Kern River Parkway in 1987, the Tule Elk State Reserve (Maldonado 1992); Kern Water District, Kern County (Germano and Tabor 1993); Pixley National Wildlife Refuge in Tulare County (Williams and Harpster 2001); Lake Woollomes in Kern County; and Buena Vista Lake Aquatic Recreation area at the northern portion of the former Buena Vista Lake bed, Kern County (ESRP 1999c; Williams and Harpster 2001).

Other remnant patches of wetland and riparian communities within the Tulare Basin have not been surveyed and may support the Buena Vista Lake shrew, including overflow channels of the Kern River, located 10 miles south of Kern National Wildlife Refuge, owned and managed by the Semitropic Water District as a ground water recharge basin (Germano and Tabor 1993); and the privately owned Creighton Ranch, located near the eastern shore of historical Tulare Lake in Tulare County (Williams and Harpster 2001). Other privately owned lands that may support Buena Vista Lake shrews are located around Sand Ridge flood basin, Buena Vista Slough, Goose Lake and Goose Lake Slough, and along the Kern River west of Bakersfield, California (Maldonado 1998, USFWS 1998; Williams and Harpster 2001). The small habitat patches within these areas are not likely to support a significant number of animals. In addition, these areas represent highly disjunct and fragmented habitat that may not be reconnected to other areas containing suitable habitat in the foreseeable future.

Due to the low amount of morphological variation in ornate shrew species, and the introgression with the southern California ornate shrew, genetic analysis of the Buena Vista Lake shrew specimens was completed. Tissue samples taken from shrews from the Kern Preserve and the Kern National Wildlife Refuge were genetically analyzed and found distinct from other ornate shrew populations from California and Baja California. These specimens were determined to be Buena Vista Lake shrews (Maldonado *et al.* 2001.

Due to the scarcity of Buena Vista Lake shrews, data about their home range size, breeding territory size, and population densities are lacking. Except for the breeding season, shrews in general are solitary. As juveniles, they establish their home range, which is a small area in which they nest, forage, and explore, and where they remain for most of their life (Churchfield 1990). Accurate estimation of home range size based on mark and recapture techniques requires that a minimal number of recaptures be made (Hawes 1977). This level of data has never been collected for Buena Vista Lake shrews and, therefore, their home range has not been determined. Ingles (1961) was able to calculate an average home range size in a closely related species, the vagrant shrew *(Sorex vagrans),* found in the Sierra Nevada of California. The average home range size was approximately 4,000 square feet (ft^2), with breeding males occupying larger territories than breeding females (Hawes 1977). The distribution, and size, of a shrew's territory varies, and is primarily influenced by the availability of food (Ma and Talmage 2001). In a study on population densities of vagrant shrews in western Washington, Newman (1976) calculated densities of 10.1 shrews/acre in the fall and winter, and 20.3 shrews/acre at the height of summer.

Reasons for Decline and Threats to Survival

The rapid agricultural, urban, and energy development beginning in the early 1900s have severely reduced and fragmented native habitats throughout the San Joaquin Valley (Mercer and Morgan 1991). Historically, the former Tulare, Buena Vista, Goose, and Kern Lakes, along with their respective overflow marshes, covered 19 percent of the Tulare Basin in the southern San Joaquin Valley (Werschkull *et al.* 1992). Around the turn of the 20th century, the Tulare Basin had 259,189 acres of valley fresh water marsh, 437,388 acres of valley mixed-riparian forests, and 260,283 acres of valley sink scrub, for a total of 956,860 acres of suitable Buena Vista Lake shrew habitat (USFWS 1986). By the early 1980s, the combined total had been reduced to 46,996 acres, or less than 5 percent of the original habitat (Service 1986; Werschkull *et al.* 1992). As of 1995, intensive irrigated agriculture comprised 3,064,000 acres or about 96 percent of the total lands within the Tulare Basin.

All of the natural plant communities in the Tulare Basin have been affected by the transformation of this area to agriculture and energy development Griggs 1992). As more canals were built, and more water was diverted for irrigation of the floodplains of the major rivers of the southern San Joaquin Valley, less water was available to keep the riparian forests alive, and less water reached the lakes. By the early 1930s, the former Tulare, Buena Vista, Goose, and Kern lakes were virtually dry and had been converted to agriculture (Griggs *et al* 1992).

Although no cases of disease related to Buena Vista Lake shrews have been documented, their small population size and restricted distribution increases their vulnerability to epidemic diseases. Buena Vista Lake shrews, like most small mammals, are host to numerous internal and external parasites, such as round worms, mites, ticks, and fleas, which may infest individuals and local populations in varying degrees with varying adverse effects (Churchfield 1990;). However, the extent of disease has not been documented for this species.

Most vertebrate carnivores of the Tulare Basin, such as coyotes *(Canis latrans*), foxes, long-tailed weasels (*Mustela frenata*), raccoons (*Procyon lotor*), feral cats (*Felis cattus*), and dogs

(*Canis familiaris*), as well as certain avian predators such as hawks, owls, herons, jays, and egrets, are all known predators of small mammals. While many predators find shrews unpalatable because of the distasteful secretion and offensive odor from their flank glands and feces, several of the avian predators, such as barn owls (*Tyto alba*), short eared owls (*Asio flammeus*), long-eared owls (*Asio otus*), and great homed owls (*Bubo virginianus*) have a poor sense of smell and are known to prey on shrews (Ingles 1965; Aitchison 1987), and probably Buena Vista Lake shrews. The overall impact that predation may have on the number of individuals and densities of the species remains unknown.

Selenium toxicity represents a serious threat to the continued existence and recovery of the Buena Vista Lake shrew, not only at the two known locations on the Kern Preserve and the Kern National Wildlife Refuge, but also at any location throughout the Tulare Basin. The soils on the western side of the San Joaquin Valley have naturally elevated selenium concentrations. Due to extensive agricultural irrigation, selenium has been leached from the soils and concentrated in the shallow groundwater along the western side of the San Joaquin Valley. Where this shallow groundwater reaches the surface or subsurface, selenium can accumulate in biota (flora and fauna) and result in adverse effects to growth, reproduction, and survival. The EPA's water quality criterion for the protection of aquatic species is currently 5 micrograms/liter (µg/L) but is being reevaluated by that agency (65 FR 31681). Some of the highest selenium levels in the western United States (greater than 1,100 µg/L) have been measured from groundwater within the southern San Joaquin Valley, and greater than 200 µg/L have been measured in drainwater evaporation ponds servicing the agricultural lands immediately surrounding the known populations of Buena Vista Lake shrews in the Tulare Basin (California Regional Water Quality Control Board (RWQCB) 1996; DWR 1997; Seiler et at 1999).

Buena Vista Lake shrews are exposed to the wide-scale use of pesticides throughout their range, because they currently exist on small remnant patches of natural habitat in and around the margins of an otherwise agriculturally dominated landscape. The animals could be directly exposed to lethal and sub-lethal concentrations of pesticides from drift or direct spraying of crops, canals and ditch banks, wetland or riparian edges, and roadsides where shrews might exist. Reduced reproduction in this listed species could be directly caused by pesticides through grooming, and secondarily from feeding on contaminated insects (Sheffield and Lochmiller 2001). Buena Vista Lake shrews could also die from starvation by the loss of their prey base (Ma and Talmage 2001; Sheffield and Lochmiller 2001). Laboratory experiments have shown that behavioral activities such as rearing, exploring for food, and sniffing can be depressed for up to 6 hours in the common shrew *(Sorex araneus)* from environmental and dietary exposure to sublethal doses of a widely used insecticide called dimethoate (Dell'Omo *et* at 1999). In their natural habitat, depression in such behavioral and motor activities could make the shrews more vulnerable to predation, and starvation. In addition, shrews may feed heavily on intoxicated arthropods after application of insecticides, and, therefore, ingest higher concentrations of pesticides than would normally be available (Stehn *et al.* 1976; Schauber *et* at 1997; Sheffield and Lochmiller 2001). Fresno, Kern, and Tulare counties are the three highest users of pesticides in California with 36,978,444 pounds (lb); 24,218,242 lb; and 16,671,512 lb of pesticide active ingredients used respectively in 1999 (Pesticide Board 2000).

The only known populations of Buena Vista Lake shrews are also vulnerable to environmental risks associated with small, restricted populations. Impacts to populations that can lead to extinction include the loss or alteration of essential elements for breeding, feeding, and sheltering; the introduction of limiting factors into the environment such as poison or predators; and catastrophic random changes or environmental perturbations, such as floods, droughts, or disease (Gilpin and Soulé 1986). Many extinctions are the result of a severe reduction of population size by some deterministic event, such as lowered birth rates, due to exposure to certain toxins such as selenium, followed by a random natural event such as a crash in insect populations from an extended drought which causes the extirpation of the species. The smaller a population is, the greater its vulnerability to such perturbations (Terbough and Winter 1980; Gilpin and Soulé 1986; Shaffer 1987). The elements of risk that are amplified in very small populations include: (1) the impact of high death rates or low birth rates; (2) the effects of genetic drift (random fluctuations in gene frequencies) and inbreeding; and (3) deterioration in environmental quality (Gilpin and Soulé 1986; Laride 1999). When the number of individuals in a population of a species or subspecies is sufficiently low, the effects of inbreeding may result in the expression of deleterious genes in the population (Gilpin 1987). Deleterious genes reduce individual fitness in various ways, most typically by decreasing survivorship of young. Genetic drift in small populations decreases genetic variation due to random changes in gene frequency from one generation to the next. This reduction of variability within a population limits the ability of that population to adapt to environmental changes (Lande 1999).

Status of designated Critical Habitat
A total of 84 acres of critical habitat for the Buena Vista Lake shrew was designated on January 24, 2005 (70 FR 3438). All 84 acres of designated critical habitat for this species are in one critical habitat unit, the Kern Lake Preserve Unit, in southwestern Kern County. The Kern Lake area was formerly managed by the Nature Conservancy for the Boswell Corporation, and was once thought to contain the last remaining population of the shrew. This area does not have a conservation easement and is managed by the landowners. The other properties with extant populations of Buena Vista Lake shrew were not designated in the final rule because they have adequate management plans in place that provide for the conservation of the Buena Vista Lake shrew and its habitat.

Based on our current knowledge of the life history, biology, and ecology of the species and the requirements of the habitat to sustain the essential life history functions of the species, we have determined that the shrew's primary constituent elements are: (1) Riparian or wetland communities supporting a complex vegetative structure with a thick cover of leaf litter or dense mats of low-lying vegetation; and (2) Suitable moisture supplied by a shallow water table, irrigation, or proximity to permanent or semi-permanent water; and (3) A consistent and diverse supply of prey. The requisite riparian and wetland habitat is essential for the shrew because it provides space and cover necessary to sustain the entire life cycle needs of the shrew, as well as its invertebrate prey. The shrew is preyed upon by many large vertebrate carnivores as well as by avian predators. Therefore, a dense vegetative structure provides the cover or shelter essential for evading predators as well as serving as habitat for breeding and reproduction, and allows for the protection and rearing of offspring and the growth of adult shrews

The Kern Lake Preserve Unit may require special management considerations or protection to maintain a functioning hydrological regime to maintain the requisite riparian and wetland habitat, which is essential for the shrew by providing space and cover necessary to sustain the entire life cycle needs of the shrew, as well as its invertebrate prey. This designated unit is threatened by activities that may result in the alteration of the moisture regime, which would lead to reduced water quality or supply, loss of suitable invertebrate supply for feeding and loss of complex vegetative structure for cover. Furthermore, no long-term protection or management plan exists for this unit.

Environmental Baseline within the Action Area

Species Baseline

Four of the six known occurrences of the Buena Vista Lake shrew are located within PG&E right-of ways of existing pipelines and electric lines of the 267,350-acre action area (CNDDB 2007). This is approximately 67% of the remaining occurrences of Buna Vista Lake shrew. The four extant occurrences for this species occupy approximately 261.4 acres of existing PG&E right-of-ways within the Kern County portion of the 276,350-acre action area.

The preferred habitat of the shrew is along the margins of wet areas, such as freshwater wetlands and riparian areas, where emergent vegetation provides cover and foraging opportunities. The HCP land-cover types utilized by the Buena Vista Lake shrew are Permanent Freshwater Wetlands and Woody Riparian. The HCP concluded that 5% of both the Permanent Freshwater Wetlands and Woody Riparian land-cover types present in the action area are suitable for Buena Vista Lake shrew occupancy. The HCP states that the percent of habitat considered suitable for occupancy is considered low (5%) where it occurs because of the limited extent of riparian and marsh cover types in the Tulare Basin.

Critical Habitat Baseline

The single designated Critical Habitat unit for the Buena Vista Lake shrew is the 84 acre Kern Lake Preserve Unit located in southwestern Kern County, approximately 16 miles south of Bakersfield. This Critical Habitat unit lies between Hwy 99 and Interstate 5, south of Herring Road near the New Rim Ditch at the edge of the historic Kern Lake. None of this designated Critical Habitat for Buena Vista lake Shrew is within the existing PG&E right-of-ways of the 250,350-acre action area.

Effects of the Action –Buena Vista Lake shrew

Direct and Indirect Effects

The actual acres of impact to Buena Visa Lake Shrew suitable habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities.

The HCP estimates that covered activities will disturb and temporarily remove less than 0.006 acres of suitable Buena Vista Lake shrew habitat annually (less than approximately 0.3 acres of suitable-habitat disturbance over 30 years). Temporary disturbance of habitat could occur as a result of Covered Activities such as pole replacements. No Buena Vista Lake shrew suitable habitat is expected to be destroyed and permanently lost each year from ground-disturbing covered activities... Therefore, covered activities have the potential to temporarily disturb or

permanently affect up to approximately 0.3 acre of Buena Vista Lake shrew suitable-habitat over the 30-year term of the proposed Permit (Buena Vista Lake shrew effect numbers from B. Norton *in litt* 2006).

In addition, HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will affect less than 1 acre of suitable Buena Vista Lake shrew habitat each year. Over the 30-year Permit term, "other disturbance" will occur in less than 30 acres of Buena Vista Lake shrew suitable habitat.

Buena Vista Lake shrew has a limited distribution within the 276,350-acre action area. The HCP concludes that direct take of individual shrews is unlikely because of the very localized distribution and specific habitat requirements (wetlands and riparian forest) of the species. The HCP considers direct effects of construction noise and human activity on Buena Vista Lake shrews highly unlikely because of the low likelihood of an overlap between covered activities and the range of the species, and because AMMs will be implemented if covered activities do occur within Buena Vista Lake shrew "designated occupied habitat"(HCP Appendix I). The HCP states that there is only a slight chance that covered activities could result in direct take (harm or harassment) if covered activities occur within suitable and occupied habitat.

Although potential for direct and indirect effects from Covered Activities is low, any such effects could be important, because the known population is very small and availability of suitable habitat is very limited. Therefore, PG&E has identified "designated-occupied" habitat area for the shrew (HCP Appendix I), and adopted AMM 25, which will identify potential suitable habitat, and protect the Buena Vista Lake shrew from effects of covered activities. This protection involves incorporating the known occupied habitat of the shrew (see figure I-2 in HCP Appendix I) into the PG&E's "GIS/SAP" workload management database, querying the database before conducting Covered Activities, identifying areas of suitable potential habitat within the Appendix I "designated-occupied habitat" area, verifying habitat conditions in the field, and applying buffers to maximize protection of suitable habitat. If covered activities must take place in the "designated occupied habitat", a qualified biologist will stake and flag an exclusion zone of 100 feet around all suitable-habitat. PG &E staff will also minimize the use of mechanical equipment and the area of ground disturbance within the "designated occupied habitat". If any suitable habitat were disturbed by covered activities, PG&E would implement compensation as discussed below.

Shrews in their burrows or foraging in dense leaf litter or mats of vegetation could be crushed at any time of the year by covered activity equipment implementing "other disturbance" activities (i.e. tree trimming of Fremont cottonwood or willows in riparian areas, or by PG&E patrol vehicles traveling off-road in the shrew's "designated occupied habitat" area). However, PG&E estimates that the "other disturbance" activities are would occur on less than one acre of the shrew's "designated occupied habitat" each year, and on less than 30 acres cumulatively over the term of the Permit. Although the potential for direct take of Buena Visa Lake shrews from the "other disturbance" activities is low, take of any individual Buena Vista Lake shrews over the term of the Permit would be important. The potential effects from all covered activities, including the "other disturbance" covered-activities will be reduced by PG&E's implementation of the general AMMs (AMMs 1-6, 8, 10, 29, and 30). The "general" AMMs, including parking

vehicles in previously disturbed areas, and minimizing the construction of new access roads may minimize direct impacts of the "other disturbance" covered activities on Buna Vista Lake shrew.

Effects of Compensation Measures
Approximately 3 acres of compensation is expected to be required for the Buena Vista Lake shrew over the 30-year permit term. With the application of the AMMs, there is a very low probability that any Covered Activities would be conducted in suitable habitat of the small area this species is known to occupy. If any disturbance of suitable habitat is unavoidable, PG&E will consult adaptively with the Service to develop appropriate compensation. PG&E will propose compensation for this species prior to the implementation of the covered activity causing the disturbance. The exact location and amount of mitigation will be determined at that time but would consist of mitigating permanent effects at a 3:1 ratio and temporary effects at 0.5:1.

Effects on Critical Habitat
None of the 84 acres of Buena Vista Lake shrew designated Critical Habitat is located within the existing PG&E right-of ways in the 276,350-acre action area. Because most covered activities occur on existing PG&E lines and facilities that are inside the existing right-of-ways, most covered activities will have no effect on the Buena Vista Lake shrew. However, the "minor construction" covered-activities (i.e. G14, G15, G16, E12, E13, E14, and E15) which extend existing facilities outside the existing rights-of-way have the potential to cause an adverse modification of Buena Vista Lake shrew critical habitat, if the new construction occurs within designated critical habitat. As described above under *Confer Process*, PG&E will confer with the Service prior to implementing any "minor construction" covered-activity or other medium or large covered-activities within any designated critical habitat. PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Conclusion
We anticipate that the proposed action will affect the Buena Vista Lake shrew as described in the analysis above, including the temporary or permanent disturbance of less than approximately 0.3 acres of suitable Buena Vista Lake shrew habitat over the 30-year term of the proposed Permit. Implementation of the avoidance, minimization measures included in the HCP will reduce the potential of this impact to occur. If disturbance of suitable "designated occupied habitat" does occur from ground-disturbing covered activities, compensation will be provided by PG&E. Less than 1 acre of compensation is expected to be required for the Buena Vista Lake shrew over the 30-year permit term.

"Other disturbance" covered activities will occur on less than one acres of suitable and occupied Buena Vista Lake shrew habitat each year. Over the 30-year Permit term, the "other disturbance" effects of vehicles traveling off-road or activities associated with tree trimming will occur on less than 30 acres of Buena Vista Lake shrew suitable-habitat. The "other disturbance" effects of vegetation management and vehicle travel through suitable habitat are individually small, widely dispersed and, therefore, likely to be insignificant and discountable.
After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the

Buena Vista Lake shrew or adversely modify its designated critical habitat. We reached this conclusion because the potential for impact to this species habitat is small, and is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take. (Buena Vista Lake Shrew).
We anticipate that ground disturbing covered activities in the proposed action will not harm (not significantly impair essential behavior patterns, kill, or injure) any Buena Vista Lake shrews over the 30-year term of the proposed permit. Zero (0) Buena Vista Lake shrews will be harmed by the proposed action. We also anticipate that ground-disturbing covered-activities occurring with a one-year period will harass an undetermined number of Buena Vista Lake shrews inhabiting 0.006 acres of suitable habitat (approximately 0.3 acres over 30 years) from the disturbance and temporary loss of suitable habitat.

We also anticipate that the "other disturbance" covered activities of the proposed action could cause take in the form of harassment of an undeterminable number of Buena Vista Lake shrews occupying less than one acre of suitable Buena Vista Lake shrew habitat each year of the 30-year Permit term (less than 30 acres over 30 years).

In the above Opinion, the Service determined that this level of take is not likely to result in the jeopardy of the Buena Vista Lake shrew, or the adverse modification of its critical habitat.

Endangered riparian brush rabbit (*Sylvilagus bachmani riparius*)
The riparian brush rabbit is one of the eight subspecies of brush rabbit (*Sylvilagus bachmani)* found in California. Riparian brush rabbits are small, brownish rabbits that can be distinguished from their relative, the desert cottontail (*Sylvilagus audubonii)*, by a smaller, more inconspicuous tail and short, uniformly colored ears lacking a black tip. The adult riparian brush rabbit is about 12 inches (30 centimeters) long and weighs about 1.6 pounds (Orr 1935, 1940).

Status of the Species
Listing Status
The riparian brush rabbit was federally listed as endangered on February 23, 2000 (65 FR 8881). A detailed account of the taxonomy, ecology, and biology of the riparian brush rabbit is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (Service 1998) and in the final rule (65 FR 8881). Critical Habitat has not been designated.

Life History, Reproductive Ecology
The breeding season of the riparian brush rabbit occurs from December to May (Williams 1988; Basey 1990), putting this species at a competitive disadvantage to the desert cottontails which breed all year. Riparian brush rabbits in a controlled propagation facility have been observed to breed for longer periods than individuals do in the wild (Matthew Lloyd, ESRP, pers. comm. 2006). The female gives birth to a litter of three or four young after a 27-to 30-day gestation period. In favorable years, females may produce three to four litters, resulting in 9-16 young. Although this is a relatively high reproductive rate, it is lower than many other cottontail species (Mossman 1955). The young rabbits mature in approximately four to five months; however,

approximately 85 percent of first-year rabbits typically do not survive to the next breeding season (Chapman and Harman 1972).

Riparian brush rabbits are not known to regularly use or dig burrows. According to Davis (1936) and Orr (1940, 1942), brush rabbits nest in shallow "forms" or cavities, natural or scraped out, approximately 3 to 6 inches (8 to 15 centimeters) deep, in the ground, usually beneath brushy cover. The nest is probably lined with dry vegetation, and/or fur, and may be covered with dry vegetation. Due to the density of the vegetation in which the riparian brush rabbits take cover, nests have not yet been observed for this subspecies (D.F. Williams, ESRP, pers. comm. 2000).

Riparian brush rabbits are most active during the twilight hours around dawn and dusk. Depending on the season, the main activity periods last from two to four hours. The least amount of activity was observed from about 10:30 a.m. to 4:00 p.m. (Chapman 1974). Shields (1960) reported that the home-range diameter of an adult male brush rabbit was 278 feet, significantly larger than the 149 feet (45 meters) recorded for females; he reported that distances traveled by emigrating juveniles ranged from 562 feet to 1,156 feet.

Habitat Affinities
Riparian brush rabbits inhabit dense, brushy areas of valley riparian forests marked by extensive thickets of California wild rose (*Rosa californica)*, California blackberries (*Rubus ursinus)*, and willows (*Salix* spp.*)*. Thriving mats of low-growing vines and shrubs serve as ideal living sites where they build tunnels under and through the vegetation.

Althoff *et al.* (1997) found that eastern cottontails (*Sylvilagus floridanus)* selected microenvironments in which the insulating effect of cover could allow them to conserve metabolic energy or reduction of heat loss. The amount of herbaceous and shrub cover allows the species to maintain a positive energy balance as well as avoid predators. Trent and Rongstad (1974) suggested that eastern cottontail survival was related to the abundance and distribution of suitable cover. New England cottontails (*Sylvilagus transitionalis)* on small resource-poor habitat patches were in poor physical condition, based on their body mass, and they often foraged on sites with limited cover from predators; this resulted in a higher mortality rate than among cottontails found on larger resource-rich patches (Villafuerte *et al.* 1997).

Riparian brush rabbits feed at the edges of shrub cover and generally avoid large openings. They frequent small clearings, trails, and firebreaks where they feed on a variety of herbaceous vegetation such as grasses, sedges, forbs, buds, bark, and leaves of woody plants. Grasses and herbs are the most important food for brush rabbits, but shrubs such as California wild rose, marsh baccharis, and California blackberry are also eaten. One preferred plant is green clover (*Trifolium wormskiolodii)* (Orr 1940).

Historical and Current Range, Distribution, Dispersal
Historically, the riparian brush rabbit is believed to have inhabited riparian forests, woodlands, and brushlands along portions of the San Joaquin River and it tributaries in California's Central Valley, from Stanislaus County north to the Sacramento-San Joaquin Delta (Orr 1935). Historically, the riparian brush rabbit may have existed in a metapopulation structure of core and

satellite populations, some of which periodically experienced local extinctions and recolonization.

The CNDDB (2007) identifies three extant occurrences of riparian brush rabbit in California, all in San Joaquin County (one extirpated occurrence is identified in Stanislaus County). These three natural populations are: (1) on protected property within Caswell Memorial State Park on the Stanislaus River in San Joaquin County; (2) along the San Joaquin River in an area known as Paradise Cut on Union Pacific Railroad private land in San Joaquin County; and (3) an oxbow on the east side of San Joaquin River from just north of De Lima Road to the Mossdale oxbow conservation area (2 miles southwest of Lathrop).

Current population numbers are too low to provide adequate captures for estimating population sizes with capture-recapture population estimator models (Williams and Hamilton 2002). In January 2001 at Caswell Memorial State Park, three riparian brush rabbits were captured, whereas in January 1993, 37 brush rabbits were caught during the standardized surveys (Williams 1993). An additional four rabbits were caught in 1993 in a portion of Caswell Memorial State Park that apparently is now uninhabited. Furthermore, in 2001, all three rabbits were caught in a single portion of Caswell Memorial State Park, similar to results in 1997-2000. Signs of rabbits elsewhere were scarce or absent between 1997 and 2001, unlike 1993, when fresh signs of rabbits could be found throughout Caswell Memorial State Park (Williams 1993). Flooding in January 1997 resulted in about 90 percent of the park and over 90 percent of the rabbit's habitat being under water, possibly resulting in the low numbers of rabbit captures subsequent to the flood.

Access restrictions on private land prevented extensive trapping to estimate population size on the San Joaquin River, but based on captures in 1998-2000 (Hamilton *in litt.* 2000) and the amount and distribution of habitat, the population probably consisted of 25-100 individuals (18 were captured). These numbers may be inflated because the most extensive habitat on private land was destroyed by clearing just before the 18 were trapped on adjacent habitat. The clearing operation probably displaced individuals into remaining habitat, which temporarily increased density.

In 2001, trapping occurred over four nights along Paradise Cut, resulting in the capture of 21 rabbits at three sites. The combined rate of sampling was 3.3 times higher than the highest capture rate at Caswell Memorial State Park (Williams and Hamilton 2001). This difference in sampling rate could reflect the differences in riparian communities at the two locations. Caswell Memorial State Park consists mostly of a climax Valley Oak forest.

Reasons for Decline and Threats to Survival

Several factors have contributed to the decline of the riparian brush rabbit. Riparian forests, the habitat of the riparian brush rabbit, have been severely depleted throughout the San Joaquin Valley, as well as the Sacramento Valley, over the last two centuries because of expansive agricultural and urban development (Katibah 1984; Thompson 1961; Roberts *et al.* 1977). As of 1849, the rivers and larger streams of the Central Valley were largely undisturbed. They supported continuous bands of riparian woodland four to five miles in width along major drainages such as the lower Sacramento River, and generally about 2 miles wide along the lesser

streams (Thompson 1961). Most of the riverine floodplains supported riparian vegetation to about the 100-year flood line (Katibah 1984). In the mid-1800s, hundreds of miles of riparian forest were harvested to fuel ferries operating on the San Joaquin River. A large human population influx occurred after 1849, and much of the Central Valley riparian habitat was rapidly converted to agriculture and used as a source of wood for fuel and construction to serve a wide area (Thompson 1961). By as early as 1868, riparian woodland had been severely affected in the Central Valley,

The clearing of riparian forests for fuel and construction made this land available for agriculture. Natural levees bordering the rivers, once supporting vast tracts of riparian habitat, became prime agricultural land (Thompson 1961). As agriculture expanded in the Central Valley, needs for increased water supply and flood protection spurred water development and reclamation projects. Beginning in the 1940s, large dams constructed for irrigation and flood control on the major rivers of the Central Valley changed the hydrology of the ecosystem, which contributed to the destruction and fragmentation of the San Joaquin Valley riparian forest (Larsen 1993). Riparian habitat was further reduced to small, isolated fragments by the construction of artificial levees, dams, river channelization, water diversion, and heavy groundwater pumping (Katibah 1984). In recent decades, these riparian areas have continued to decline because of ongoing agricultural conversion as well and urban development and stream channelization. As of 1989, there were over 100 dams within the Central Valley drainage basin, as well as thousands of miles of water delivery canals and streambank flood-control projects for irrigation, municipal and industrial water supplies, hydroelectric power, flood control, navigation, and recreation (Frayer *et al.* 1989). Riparian forests in the Central Valley have dwindled to discontinuous strips of widths currently measurable in yards rather than miles. By the mid-1980s, the riparian community had been reduced to about 5.8 percent of its original extent (Larsen 1993).

Riparian brush rabbits are predated by a wide variety of animals, including domestic dogs (*Canis familiaris*), domestic cats, bobcats (*Lynx rufus),* coyotes (*Canis latrans)*, rattlesnakes (*Crotalus* species), gopher snakes (*Pituophis melanoleucus)*, western kingsnakes (*Lampropeltisgetulus)*, black rats (*Rattus rattus)*, raccoons (*Procyon lotor)*, hawks (*Buteo* sp.), other raptors, and great horned owls (*Bubo virginianus)*.

Flooding resulting from storm events or other causes can drown the riparian brush rabbit, especially if there are no trees or other structures the animals can climb onto to escape the high waters. Basey (1990) observed riparian brush rabbits climbing into shrubs to feed, and Chapman (1974) stated that brush rabbits being held in an enclosure in Oregon hid and rested in small fir trees 4- feet to 5- feet above the ground. When floodwaters rose at Caswell Memorial State Park in 1986, riparian brush rabbits were observed gathering on patches of high ground. These areas coincide with areas of dense thickets and tree growth; riparian brush rabbits probably climbed into these trees and shrubs when threatened with rising floodwaters. Since the flooding of Caswell Memorial State Park in 1997, the most severe since the 1970s because of its duration, not exceptionally high water, the population of the riparian brush rabbit remained very low into the spring of 2001 (Williams *et al.* 2001).

Wildfire is a significant threat to the riparian brush rabbit. The animals may be incinerated by fire, the smoke may asphyxiate them, the loss of habitat may subject them to increased predation

due to loss of cover, or starvation due to the loss of food. Some of the areas the species inhabits contain deep accumulations of duff and leaf litter, dense understories of shrubs and vines, and overstories of mostly old trees. These conditions pose a serious threat of catastrophic wildfire.

The riparian brush rabbits may be imperiled due to competition with the desert cottontail. The diets and habitats selected by riparian brush rabbits and desert cottontails living in the same areas are often quite similar (Basey 1990). Both riparian brush rabbits and desert cottontails are found in association with riparian habitat in central California. Desert cottontails utilize a broader range of plant communities than riparian brush rabbits. Land conversions and associated human activities have led to changes in the distribution and abundance of desert cottontails, which compete with riparian cottontails for resources. In central California, desert cottontails often breed year round, becoming sexually mature in as little as 80 days with an average of less than three young per litter. Although riparian brush rabbits average more young per litter (three to four), their relatively short breeding season of five months, and their inability to reproduce until the breeding season following their birth makes them less fecund than desert cottontails.

A threat of unknown significance is disease; no information on disease has been reported for the riparian brush rabbit, but rabbits, including cottontails, are known to be susceptible to a variety of diseases that sometime reach epidemic proportions (Chapman 1974; Chapman et al. 1982; Myers and MacInnes 1981; Williams 1988). Common diseases in rabbits in California include tularemia, bubonic plague, myxomatosis, silverwater, California encephalitis, equine encephalitis, listeriosis, Q-fever, and brucellosis (Williams 1988).

Section 3950 of the California Fish and Game Code defines jackrabbits and varying hares (genus *Lepus)*, cottontails, brush rabbits, pigmy rabbits (genus *Sylvilagus)* as "Game Mammals". Persons hunting for non-listed rabbits may not be able to distinguish between the non-protected species and the endangered riparian brush rabbit. The effect on the riparian brush rabbit is unknown; however, Williams et al. (2001) reported finding spent 0.22 caliber and shotgun shells in areas inhabited by riparian brush rabbits.

Historically, the riparian brush rabbit may have existed in a metapopulation structure of core and satellite populations, some of which periodically experienced local extinctions and recolonization. The three known populations of this species exist in an environment drastically different from the historic one. Extensive habitat fragmentation results in geographic isolation, smaller population sizes, and reduces genetic exchange among populations; all factors that increase the vulnerability of the riparian brush rabbit populations to extirpation. At all three locations, there is a relatively high abundance of sympatric predators and competitors, along with the numerous factors described above, that likely contribute to low survival rates for the rabbits and as a result may limit population growth. An increase in inbreeding and the loss of genetic variation could increase the extinction risk for small, isolated populations of the riparian brush rabbit by interacting with demography to reduce fecundity, juvenile survival, and lifespan. Further sampling and analyses are necessary to assess the effects of these genetic bottlenecks. The population in Caswell Memorial State Park faces threats from random demographic events in small populations, inbreeding and loss of genetic diversity, fire, flooding, disease, human recreation activities, predation exacerbated by high numbers of feral cats (*Felis cattus)*, and possibly from competition with desert cottontails (Williams and Basey 1986; Williams 1988,

1993; Service 1998). The San Joaquin River populations face threats from stochastic demographic and genetic events, flooding, disease, predation, competition, and habitat conversion on private land.

Status with Respect to Recovery/Conservation
Since 2001, the Endangered Species Recovery Program (ESRP) has been raising riparian brush rabbits in a controlled propagation facility from individuals from the Paradise Cut site. Rabbits from this program have been translocated to the San Joaquin River National Wildlife Refuge (San Joaquin NWR) in Stanislaus County and the Faith Ranch (at the confluence of the San Joaquin and Stanislaus Rivers in Stanislaus County) in an attempt to established populations at these two sites. However, floods in the spring of 2006 have most likely extirpated the Faith Ranch population and killed approximately 80 percent of the radio-collared rabbits at the San Joaquin NWR These floods undoubtedly killed many more rabbits at Paradise Cut and Caswell Memorial State Park, as well. These spring flows are faster because the levees on these rivers are tall and close to the river channel. All of the natural populations are in San Joaquin County (Williams and Basey 1986; Williams *et al.* 2000), but a reestablished population is in Stanislaus County. The natural populations are under significant, proximate threats of extinction.

On the Mossdale Landing development, a conservation easement was placed on the approximate 30-acre natural riparian oxbow habitat to preserve this essential habitat for the riparian brush rabbit in perpetuity.

Riparian Brush Rabbit Environmental Baseline and Status within the Action Area
Two of the three known occurrences of the riparian brush rabbit are located within PG&E right-of ways of existing pipelines and electric lines of the 267,350-acre action area (CNDDB 2007). This represents approximately 67% of all extant occurrences for the riparian brush rabbit. The two extant occurrences for this species occupy approximately 7.7 acres of existing PG&E right-of-ways within the San Joaquin County portion of the 276,350-acre action area.

The HCP land-cover type utilized by riparian brush rabbit is "woody riparian". This species has very localized distributions within the San Joaquin and Stanislaus Counties, the only counties where they are known to occur. They are restricted to larger remnants of dense riparian woodlands, which represent a very low proportion of the mapped occurrences of the riparian cover type in the HCP. Therefore, the HCP concluded that 5% of the woody riparian cover in the action area is suitable for riparian brush rabbit occupancy.

Effects of the Action
Direct and Indirect Effects
The actual acres of impact to riparian brush rabbit suitable habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities.

The HCP estimates that covered activities will disturb and temporarily remove 0.043 acre annually of suitable for riparian brush rabbit habitat (approximately 1.5 acres of suitable habitat disturbance over 30 years). No suitable habitat for riparian brush rabbit is expected to be destroyed and permanently lost from covered activities. Therefore, covered activities have the

potential to disturbed and temporarily remove up to approximately 1.5 acres of riparian brush rabbit suitable-habitat over the 30-year term of the proposed Permit.

In addition, HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will affect less than 1 acre of riparian brush rabbit suitable-habitat each year. Over the 30-year Permit term, "other disturbance" will occur in less than 30 acres of riparian brush rabbit.

The HCP states that direct take of riparian brush rabbit is unlikely because the species has a very limited distribution in the action area (along the San Joaquin River and Stanislaus River between San Joaquin and Stanislaus counties), and because the species has specific habitat requirements (large remnants of dense riparian woodlands). Still, a small potential exists for take (harm and harassment) to occur. Any such effects could be important, because the known population is very small and availability of suitable habitat is very limited. Because of concerns about the limited population and distribution of this species, PG&E adopted AMMs 26 to avoid effects. AMM 26 will be applied to all ground-disturbing covered activities that may occur in the "designated occupied habitat" for the riparian brush rabbit (see HCP Appendix I), including the small covered-activities that disturb <0.1 acre of land cover. If a ground-disturbing covered-activity cannot avoid riparian brush rabbit "designated occupied habitat", a qualified biologist will stake and flag an exclusion zone of 100 feet around all suitable habitat, and PG&E staff will minimize the use of mechanical equipment and the area of ground disturbance in the suitable habitat in the "designated occupied habitat". All work in the "designated occupied habitat" will be avoided during the reproductive period (January 1 to May 31). Where establishing 100-foot work-exclusion zones are not possible, PG&E will establish a work exclusion zone of the maximum practicable distance. The HCP states that implementation of AMM 26 will reduce the potential for suitable habitat impacts or direct mortality (harm) to the riparian brush rabbit. A small possibility exists, however that an emergency action could result in the direct take (harm or harassment) of one, or a few, individual riparian brush rabbits during the 30 year term of the permit.

If any covered activity must be conducted within or adjacent to suitable riparian habitat within the riparian brush rabbit's "designated occupied habitat" area (HCP Appendix I), PG&E will conduct protocol-level surveys for the species and confer with the Service and CDFG to develop site-specific plans to avoid and minimize effects (see *Confer Process* above). PG&E will annually submit the resumes of the qualified biologists identifying riparian brush rabbit suitable habitat and conducting protocol-level riparian brush rabbit surveys to the Service and CDFG.

The "other disturbance" activities (i.e. tree trimming in riparian areas or PG&E vehicles traveling off-road in the rabbit's "designated occupied habitat", etc) could directly crush or harm riparian brush rabbits in their nests cavities at any time of the year. Riparian brush rabbits foraging at the edge of small clearings, margins of shrub cover, trails, or unpaved roads could be harmed or harassed by equipment implementing "other disturbance" vegetation management activities or by PG&E vehicles traveling anywhere off-road in the rabbit's "designated occupied habitat". However, PG&E estimates that the "other disturbance" activities are would occur on less than one acre of the rabbit's "designated occupied habitat" each year and on less than 30 acres cumulatively over the term of the Permit. Although the potential for direct take of riparian

brush rabbit from the "other disturbance" activities is low, take of any individual riparian brush rabbits over the term of the Permit would be important. The potential effects from all covered activities, including the "other disturbance", covered activities will be reduced by PG&E's implementation of the general AMMs (AMMs 1-6, 8, 10, 29, and 30). The "general" AMMs , including limiting the speed of off-road vehicles to 15 mph and parking vehicles in previously disturbed areas, may minimize direct impacts of the "other disturbance" covered activities.

Effects of Compensation Measures
The HCP states that less than 1.5 acres of compensation are expected to be required for riparian brush rabbit effects over the 30-year Permit term. The HCP estimates PG&E will provide 0.02 acres of riparian brush rabbit compensation in the North San Joaquin Valley annually. PG&E will protect 0.1 acres of habitat for the riparian brush rabbit for the first 5 years of effects. Additional mitigation will be provided in 5-year increments and will stay ahead of effects. Compensation for loss of suitable habitat would occur prior to the implementation of the covered-activity causing disturbance, using the *Confer Process* discussed above. PG&E will contact the Service and CDFG to develop site-specific measures that minimize effects and provide compensation for the species. The exact location and amount of compensation will be determined at that time, but would consist of compensating permanent effects at a 3:1 ratio and temporary effects at 0.5:1.

Conclusion
We anticipate that the proposed action will affect the riparian brush rabbit as described in the analysis above, including the temporary disturbance and removal of less than approximately 1.5 acres of riparian brush rabbit suitable-habitat over the 30-year term of the proposed Permit. Implementation of the avoidance and minimization measures included in the HCP will reduce these impacts on the riparian brush rabbit. If suitable "designated occupied habitat" is impacted, compensation will be provided. Less than 1.5 acres of riparian brush rabbit compensation is expected over the term of the permit.

The "other disturbance" effects of vegetation management and vehicle travel through suitable habitat are expected effect less than one acre of suitable riparian brush rabbit habitat each year. Over the 30-year Permit term, the "other disturbance" effects of vehicles traveling off-road or activities associated with tree trimming will occur on less than 30 acres of riparian brush rabbit suitable-habitat. The "other disturbance" effects would be infrequent, individually small, widely dispersed and, therefore, likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the riparian brush rabbit. We reached this conclusion because the potential for impact to this species habitat is small, and is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take (riparian brush rabbit)
We anticipate that the proposed action will not harm (not significantly impair essential behavior patterns, kill or injure) any riparian brush rabbits over the 30-year term of the proposed permit.

Zero (0) riparian brush rabbits will be harmed by the proposed action. We also anticipate that ground-disturbing covered-activities occurring with a one-year period will harass an undetermined number of riparian brush rabbits inhabiting 0.043 acres of suitable habitat annually (approximately 1.5 acres over 30 years) from disturbance and temporary loss of suitable habitat.

We also anticipate that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will cause take in the form of harassment of an undetermined number of riparian brush rabbits occupying less than 1 acre of suitable-habitat each year (30 acres over the permit term). Over the 30-year Permit term, "other disturbance" will occur in less than 30 acres of riparian brush suitable habitat (30 acres over the permit term). an undetermined number of

In the above Opinion, the Service determined that this level of take is not likely to result in the jeopardy of the riparian brush rabbit.

Endangered riparian (San Joaquin Valley) woodrat (*Neotoma fuscipes riparia*)

The riparian woodrat (*Neotoma fuscipes riparia*), also known as the San Joaquin woodrat, is a medium sized rodent in the Cricetidae family. It is one of eleven subspecies of dusky-footed woodrats (*N. fuscipes*). Dusky-footed woodrats are predominantly gray, cinnamon above, and whitish beneath. Their tails are well furred. Adult riparian woodrats weigh from about 7 to 14 ounces. The riparian woodrat can be distinguished from other subspecies by having white rather than dusky hind feet. It is also larger, lighter, and more grayish. Its tail is more distinctly bicolored.

Status of the Species

Listing Status

The riparian woodrat was listed as endangered on February 23, 2000 (65 FR 8881). A detailed account of the taxonomy, ecology, and biology of the riparian woodrat is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998) and in the final rule (65 FR 8881). Critical Habitat has not been designated. The riparian woodrat is a California Department of Fish and Game Species of Special Concern.

Life History, Reproductive Ecology.

Unlike many other sensitive species in the San Joaquin Valley, the life history of the riparian woodrat is particularly well known through studies on other subspecies of the dusky-footed woodrat, particularly *N. f. luciana* (Linsdale and Tevis 1951, Kelly 1990). Dusky-footed woodrats live in loosely cooperative societies and have a *matrilineal* (mother-offspring associations; through the maternal line) social structure (Kelly 1990). Unlike males, adjacent females are usually closely related and, unlike females, males disperse away from their birth den and are highly territorial and aggressive, especially during the breeding season.

Dusky-footed woodrats are well known for their large terrestrial stick houses, some of which can last for 20 or more years after being abandoned (Linsdale and Tevis1951, Carraway and Verts 1991). At Caswell Memorial State Park, riparian woodrats also make houses of sticks and other litter (Williams 1993). Riparian woodrat young are born in stick nest houses, or lodges, on the

ground, which measure 2 to 3 feet high and 4 to 6 feet in diameter. Most lodges are positioned over or against logs. Unlike other subspecies, the riparian woodrat occasionally builds nests in cavities in trees and artificial wood duck nest boxes.

Habitat Affinities
Riparian woodrats are most numerous where shrub cover is dense and are least abundant in open areas. In riparian areas, highest densities of woodrats and their houses are often encountered in willow thickets with an oak overstory. They are more common where there are deciduous valley oaks, but few live oaks. Woodrats are mostly active at night, and are, for the most part, generalist herbivores. They consume a wide variety of nuts and fruits, fungi, foliage, terminal shoots of twigs, flowers, nuts and some forbs (Linsdale and Tevis 1951).

Historical and Current Range, Distribution, Dispersal
Historical records for the riparian woodrat are distributed along the San Joaquin, Stanislaus, and Tuolumne rivers; along Corral Hollow in San Joaquin County; and elsewhere in San Joaquin, Stanislaus, and Merced counties. The type locality for the riparian woodrat is Kincaid's Ranch, about two miles northeast of Vernalis in Stanislaus County (Hooper 1938). Before the statewide reduction of riparian communities by nearly 90 percent, the riparian woodrat probably ranged throughout the extensive riparian forests along major streams flowing onto the floor of the northern San Joaquin Valley as far as southern Merced County or northern Fresno County (Hooper 1938).

Today, riparian woodrat populations are greatly depleted. Analysis of California Department of Water Resources land use maps indicate that there were approximately 50 acres of "natural vegetation" present along the San Joaquin River near the Kincaid Ranch type locality in 1988, though no woodrats have been seen in that area (USFWS 1998). The only known population that has been verified is the single, known extant population restricted to about 250 acres of riparian forest on the Stanislaus River in Caswell Memorial State Park, San Joaquin County. Williams (1993) estimated the size of this population at 437 individuals. Remnants of riparian habitat along the Stanislaus and San Joaquin rivers are now disjunct, preventing dispersal of the species. The CNDDB (2007) identifies three extant occurrences of riparian woodrat. At two of these occurrences, both located on the San Joaquin River two and three miles northeast of Vernalis (including the type-locality at Kincaid Ranch), the riparian woodrat has not been seen since 1935. The remaining CNDDB extant occurrence is the population at the Caswell Memorial State Park.

Reasons for Decline and Threats to Survival
The lost of riparian forests, the habitat of the riparian woodrat, has been severely depleted throughout San Joaquin Valley (see *Reasons for Decline* discussion above under riparian brush rabbit). Thus, loss and fragmentation of riparian habitat are the principal reasons for the decline of the riparian woodrat. Much of this loss was the result of the construction of large dams and canals, which diverted water for the irrigation of crops and permanently altered the hydrology of Valley streams. Additional riparian habitat was lost through cultivation of the river bottoms. Historically, cattle probably affected riparian woodrat populations since the thick undergrowth, which is particularly important to woodrats, is sensitive to trampling, browsing, and grazing by livestock (USFWS 1998).

The only known extant population of riparian woodrat is small, with its size limited by the suitable habitat available in and near Caswell Memorial State Park. The riparian woodrat is thus at an increased risk of extinction because of genetic, demographic, and random catastrophic events (e.g., drought, flooding, fire) that threatens small, isolated populations. Because of its breeding behavior, the effective size of the woodrat population is generally much smaller than the actual population size. This increases the risk of inbreeding depression.

The woodrat population at Caswell Memorial State Park is vulnerable to flooding of the Stanislaus River. Because of its well-developed arboreality (ability to climb in trees), the woodrat itself is not as sensitive to flooding as some other riparian brush-dwelling species (e.g., the riparian brush rabbit). However, woodrat houses are essential for survival and these can be severely impacted by flooding, thus affecting population viability.

Other threats to this species include habitat conversion, wildfire, disease, predation, drought, clearing of riparian vegetation, use of rodenticides and other pesticides, and browsing and trampling by ungulates (USFWS 1998). Threats to riparian woodrat are similar to the threats discussed above for the riparian brush rabbit.

Environmental Baseline within the Action Area

Species Baseline

Portions of all the extant-occurrences for the riparian woodrat are located within PG&E right-of ways in the 267,350-acre action area (CNDDB 2007). As discussed above, the three occurrences all have some suitable habitat, but only the occurrence at Caswell Memorial State Park is known to be occupied by riparian woodrats. The three extant occurrences for riparian woodrat occupy approximately 285 acres of existing PG&E right of way within the San Joaquin and Stanislaus county portions of the 276,350-acre action area.

This species has a very localized distribution on the border between San Joaquin and Stanislaus Counties at Caswell Memorial State Park. Riparian woodrat is restricted to larger remnants of dense riparian woodlands, which represent a very low proportion of the mapped woody-riparian land-cover type in the HCP document. The HCP concluded that 5% of the woody riparian land-cover type present in the action area is suitable for riparian woodrat occupancy.

Effects of the Action on riparian woodrat

Direct and Indirect Effects

The actual acres of impact to riparian woodrat suitable habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities.).

The HCP estimates that covered activities will disturb and temporarily remove disturb 0.043 acre annually of woody riparian land-cover suitable for riparian woodrat (approximately 1.5 acre of suitable habitat disturbance over 30 years). No suitable habitat for riparian woodrat is expected to be permanently lost from covered-activities. Therefore, covered activities have the potential to temporarily disturb or permanently affect up to approximately 1.5 acres of riparian woodrat

suitable-habitat over the 30-year term of the proposed Permit (B. Norton *in litt.)*. November 2006).

In addition, HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming actions that do not disturb ground surfaces) will affect less than 1 acre of riparian woodrat suitable-habitat each year. Over the 30-year Permit term, "other disturbance" will occur in less than 30 acres of riparian woodrat suitable habitat.

As with the riparian brush rabbit, the HCP states that direct take of riparian woodrat is unlikely because the species has a very limited distribution in the action area (along the Stanislaus River between San Joaquin and Stanislaus counties), and because the species has specific habitat requirements (large remnants of dense riparian woodlands). Still, a small potential exists for take (harm and harassment) to occur. Any such effects could be important, because the known population is very small and availability of suitable habitat is very limited. Because of concerns about the limited population and distribution of this species, PG&E adopted AMMs 27 to avoid effects. AMM 27 will be applied to all ground-disturbing covered activities that may occur in the "designated occupied habitat" for the riparian woodrat (see HCP Appendix I), including the small covered-activities that disturb <0.1 acre of land cover. If a ground-disturbing covered-activity cannot avoid riparian woodrat "designated occupied habitat", a qualified biologist will stake and flag a work exclusion zone of 100 feet around all suitable habitat, and PG&E staff will minimize the use of mechanical equipment and the area of ground disturbance in the "designated occupied habitat". Where establishing 100-foot work-exclusion zones are not possible, PG&E will establish a work exclusion zone of the maximum practicable distance. The HCP did not establish a work-window for implementing covered activities in riparian woodrat designated-occupied habitat. The HCP states that implementation of AMM 26 will reduce the potential for suitable habitat impacts or direct mortality (harm) to the riparian woodrat. A small possibility exists, however that an emergency action could result in the direct take (harm or harassment) of one, or a few, individual riparian woodrats during the 30 year term of the permit.

If any covered activity must be conducted within or adjacent to suitable riparian habitat within the riparian woodrat "designated occupied habitat" area (HCP Appendix I), PG&E will conduct protocol-level surveys for the species and confer with the Service and CDFG to develop site-specific plans to avoid and minimize effects (see *Confer Process* above). PG&E will annually submit the resumes of the qualified biologists identifying riparian woodrat suitable habitat or conducting protocol-level riparian woodrat surveys to the Service and CDFG.

The "other disturbance" activities (i.e. tree trimming in riparian areas or PG&E vehicles traveling off-road in the riparian woodrat "designated occupied habitat", etc) could directly crush or harm riparian woodrats at any time of the year. Foraging riparian woodrats could be harmed or harassed by equipment implementing "other disturbance" vegetation management activities, or by PG&E vehicles traveling anywhere off-road, within the woodrat's "designated occupied habitat". However, PG&E estimates that the "other disturbance" activities are would occur on less than one acre of riparian woodrat "designated occupied habitat" each year and on less than 30 acres cumulatively over the term of the Permit. Although the potential for direct take of riparian woodrat from the "other disturbance" activities is low, take of any individual riparian woodrats over the term of the Permit would be important. The potential effects from all covered

activities, including the "other disturbance", covered activities will be reduced by PG&E's implementation of the general AMMs (AMMs 1-6, 8, 10, 29, and 30). The "general" AMMs , including limiting the speed of off-road vehicles to 15 mph and parking vehicles in previously disturbed areas, may minimize direct impacts of the "other disturbance" covered activities.

Effects of Compensation Measures
The HCP states that less than 0.65 acres of compensation are expected to be required for riparian woodrat effects over the 30-year Permit term. The HCP Table 4-11 estimates PG&E will provide 0.02 acres of riparian woodrat compensation in the North San Joaquin Valley annually. PG&E will protect 0.1 acres of habitat for the riparian woodrat for the first 5 years of effects. Additional mitigation will be provided in 5-year increments and will stay ahead of effects. Compensation for loss of suitable habitat would occur prior to the implementation of the covered-activity causing disturbance, using the *Confer Process* discussed above. PG&E will contact the Service and CDFG to develop site-specific measures that minimize effects and provide compensation for the species. The exact location and amount of compensation will be determined at that time, but would consist of compensating permanent effects at a 3:1 ratio and temporary effects at 0.5:1.

Conclusion
We anticipate that the proposed action will affect the riparian woodrat as described in the analysis above, including the disturbance and temporary removal of approximately 1.5 acres of riparian woodrat suitable-habitat over the 30-year term of the proposed Permit. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to riparian woodrat. Compensation will be provided for all direct and indirect impacts to suitable riparian woodrat habitat, providing 0.02 acre of riparian woodrat compensation annually (an estimated 0.6 acres over 30 years). "

Other disturbance "would affect less than one acre of suitable riparian woodrat habitat each year. Over the 30-year Permit term, the "other disturbance" effects of vehicles traveling off-road or activities associated with tree trimming will occur on less than 30 acres of riparian woodrat suitable-habitat. The "other disturbance" effects of vegetation management and vehicle travel through suitable habitat are individually small, widely dispersed and, therefore, likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the riparian woodrat. We reached this conclusion because the potential for impact to this species habitat is small, and is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take (riparian woodrat)-
We anticipate that the proposed action will not harm (not significantly impair essential behavior patterns, kill or injure) the riparian woodrat over the 30-year term of the proposed permit. Zero (0) riparian woodrats will be harmed by the proposed action. We also anticipate that the

proposed action will harass an undetermined number of riparian woodrats on approximately 1.5 acre of suitable habitat over 30 years).

We also anticipate that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) could cause take in the form of harassment of an undetermined number of riparian woodrats occupying less than 1 acre of suitable-habitat each year of the permit (30 acres over the permit term).

In the above Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the riparian woodrat.

Endangered Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*)

The Tipton kangaroo rat is one of three subspecies of the San Joaquin kangaroo rat. Tipton kangaroo rat males length averages around 9 1/4 inches. The fur is dark yellowish-buff dorsally and white ventrally. A white stripe extends across the hips, continuing for the length of the tufted tail. The base of the tail is circumscribed by white. The top and bottom of the tail are blackish. A black band of fur connects dark whisker patches on each side of the nose.

Status of the Species

Tipton Kangaroo Rat Listing Status

Tipton kangaroo rat was federally listed as endangered in July 1988 (53 FR 25608). A detailed account of the taxonomy, ecology, and biology of the Tipton kangaroo rat is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998) and in the final rule (53 FR 25608). Critical Habitat is not designated. Tipton kangaroo rat was listed as endangered by the State of California in June 1989.

Life History, Reproductive Ecology

Little specific information has been published on reproduction of Tipton kangaroo rats. At the Pixley National Wildlife Refuge in southwest Tulare County, reproduction commences in late January and peaks in late March and early April (USFWS 1998). Most females appear to have only a single litter, though some adult females have two or more, and females born early in the year also may breed (USFWS 1998). Tipton kangaroo rats live in ground burrows. The occupant or a predecessor of the same species probably digs most burrows. Most burrows are less than 25 centimeters (10 inches) deep (Germano and Rhodehamel 1995). San Joaquin kangaroo rats infrequently emerge from their burrows during daylight; Tappe 1941, Williams et al. 1993b.

Habitat Affinities

Tipton kangaroo rats inhabit saltbush scrub and alkali sink scrub communities in the southern San Joaquin Valley. The preferred location for Tipton kangaroo rat burrows typically involves alluvial fans and flood plains and includes fine, highly alkaline sands and, to a lesser degree, alkaline sandy loams. Burrow systems are usually in open areas but may occur in areas of thick scrub. They are typically simple, but may include interconnecting tunnels. Most burrows are less than 10 inches deep. They are commonly within slightly elevated mounds, the berms of roads, canal embankments, railroad beds, and bases of shrubs and fences where wind-blown soils

accumulate above the level of surrounding terrain. Terrain not subject to flooding is essential for permanent occupancy by Tipton kangaroo rats. Tipton kangaroo rats eat mostly seeds, with small amounts of green, herbaceous vegetation and insects supplementing their diet when available.

Historical and Current Range, Distribution, Dispersal
The historical geographic range of Tipton kangaroo rats was over 1.7 million acres within the floor of the Tulare Basin. Its distribution was limited to arid-land communities occupying the Valley floor of the Basin in level or nearly level terrain. In 1995, the most recent year in which sufficient information is available, the Tipton kangaroo rat was believed to be present in only about 63,000 acres, or 3.7% of the historical range.

There are presently 72 extant occurrences of the Tipton kangaroo rat within 4 California counties: Kings (7), Tulare (11), Kern (54), and San Luis Obispo (2) (CNDDB 2007). Current occurrences are limited to scattered, isolated, clusters in the Tulare Lake Bed in Kings County; in southern Tulare County in the areas of Tipton, Pixley, Earlimart, the Pixley National Wildlife Refuge, the Allensworth Ecological Reserve, and Allensworth State Historical Park; in northern Kern County between Delano, the Kern National Wildlife Refuge, Lost Hills and Famoso in northwestern Kern County, and scattered in natural lands southwest of Bakersfield near Buttonwillow, the Coles Levee Ecosystem Preserve, along the California Aqueduct and Buena Vista Lakebed; and south of Bakersfield near Lamont. Nothing specific to the dispersal behavior of the Tipton subspecies has been published.

Reasons for Decline and Threats to Survival
The causes of decline of the Tipton kangaroo rat are similar to those discussed below for the giant kangaroo rat and for the kit fox. Conversion of native habitats to agricultural production is the primary reason for the Tipton kangaroo rat's population decline (53 FR 25608). The construction of dams and canals was principally responsible for the decline and endangerment of the Tipton kangaroo rat because that construction made a dependable supply of water available, and allowed the cultivation of the alkaline soils of the saltbush, valley sink scrub, and relictual dune communities. Widespread, unrestricted use of rodenticides to control California ground squirrels probably contributed to the decline or extirpation of small populations. Urban and industrial development and petroleum extraction all have contributed to habitat destruction.

Tipton kangaroo rats are food for a variety of predators: coyotes, San Joaquin kit foxes, long-tailed weasels, American badgers, owls, hawks, various species of snakes, and probably other predators. Except for small, isolated populations, predation is unlikely to threaten Tipton kangaroo rats. The increasing fragmentation of the range of Tipton kangaroo rats, however, increases the vulnerability of small populations to predation.

Because of the small, isolated nature of many remaining populations, their lack of genetic diversity, and low powers of dispersal, Tipton kangaroo rats are especially vulnerable to local extirpation from random environmental events such as flooding or unpredictable land use changes.

Tipton Kangaroo Rat Environmental Baseline within the Action Area

Species Baseline

There are approximately 57 extant occurrences of Tipton kangaroo rat in the 276,350-acre action area. This is approximately 79% of all remaining occurrences for the species. Approximately 5 occurrences are in Kings County, 7 in Tulare County, and 45 in the Kern County portions of the action area. The 57 extant occurrences for this species occupy approximately 3,148 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007).

The distribution of Tipton kangaroo rat species is disjunt and localized, primarily because of habitat fragmentation of remnant suitable habitat by agricultural development. Tipton kangaroo rats require saltbush scrub and alkali sink scrub habitats, but the HCP identified Grassland and Woody Riparian and-cover types as the only HCP land-cover typed utilized by Tipton kangaroo rat. Because of habitat fragmentation, limited dispersal distances, and small population size, the HCP concluded that only a small proportion of these land-cover types in the action area are suitable for occupancy by this species. The HCP concluded that 10% of the Grassland land-cover type and 10% of the Woody Riparian cover type present in the action area is suitable is for species occupancy.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to Tipton kangaroo rat suitable habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities.

The HCP estimated that ground-disturbing covered activities would directly disturb 4 acres of Tipton kangaroo rat suitable-habitat each year (120 acres of temporary disturbance over 30 years). The HCP estimated that less than 0.1 acre per year of Tipton kangaroo rat suitable habitat would be permanently lost each year from ground disturbing covered activities (less than 3 acres of habitat permanently lost over 30 years).

HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will affect 24 acres of Tipton kangaroo rat habitat each year. Over the 30-year Permit term, these "other disturbance" will occur in 720 acres of suitable habitat for the Tipton kangaroo rat.

The temporary disturbances, permanent habitat losses, and "other disturbances" would occur in small areas and would be scattered over the limited range of the species in Kings, Tulare, and Kern counties, but these impacts have the potential to cumulatively-affect 79% of the remaining occurrences of the Tipton kangaroo rat over the Permit term.

Pre-activity surveys for medium and large covered-activities will identify known and new Tipton kangaroo rat burrows in the vicinity of a medium or large covered activity site. PG&E's review of the MapBook will identify known areas of Tipton kangaroo rat burrows in the vicinity of small-disturbance covered activity sites. To reduce the potential for take of Tipton kangaroo rats, PG&E will implement AMM 20 at small, medium, and large ground-disturbing activities. When trained PG&E staff observe burrows at small-disturbance covered-activity sites that are outside the two CDFG "core areas" (CDFG 2007 and Figure 2[2]), the trained PG&E staff will

determine if the burrows are active (occupied or potentially occupied). If trained staff determines that the burrows at a small activity site are not occupied by Tipton kangaroo rat, then PG&E staff will proceed with the covered activity. Burrows at medium and large covered-activity sites outside the two "core areas" will be evaluated by qualified PG&E biologists during the pre-construction survey. If active (occupied or potentially occupied) burrows for Tipton kangaroo rat are identified at small, medium, or large activity sites, a qualified biologist will stake and flag an exclusion zone of at least 30 feet and remain on-site as a biological monitor, or the biologist shall stake and flag a work exclusion zone of 50 feet around active burrow prior to covered activities on the job site. Wherever establishing 30 or 50-foot work-exclusion zones are not possible, PG&E will establish a work exclusion zone of the maximum practicable distance. AMM 20 would reduce effects on occupied habitat and reduce the potential for direct take of individuals.
Noise or ground vibrations could affect individual Tipton kangaroo rats if suitable habitat or burrows are present adjacent to Covered Activity sites. This disturbance would not cause direct mortality, but could cause take by affecting behavior during the breeding period. The HCP states that such effects are unlikely and would be highly localized if they do occur

Foraging Tipton kangaroo rats or individuals in their burrows could be crushed or harmed at any time of the year by vehicles and equipment implementing "other disturbance" activities (i.e. tree trimming, patrols, PG&E vehicles traveling off-road, etc.). HCP Table 3-11 indicates that the "other disturbance" will affect 24 acres of Tipton kangaroo rat habitat per year (cumulatively, 720 acres of "other disturbance" in suitable habitat over 30 years). The potential effects from all covered activities, including the "other disturbance" covered-activities will be reduced by PG&E's implementation of the general AMMs (AMMs 1-6, 8, 10, 29, and 30). The "general" AMMs, including limiting the speed of off-road vehicles to 15 mph, parking vehicles in previously disturbed areas when practicable, and minimizing the construction of new access roads may minimize direct impacts of the "other disturbance" covered activities on Tipton kangaroo rat.

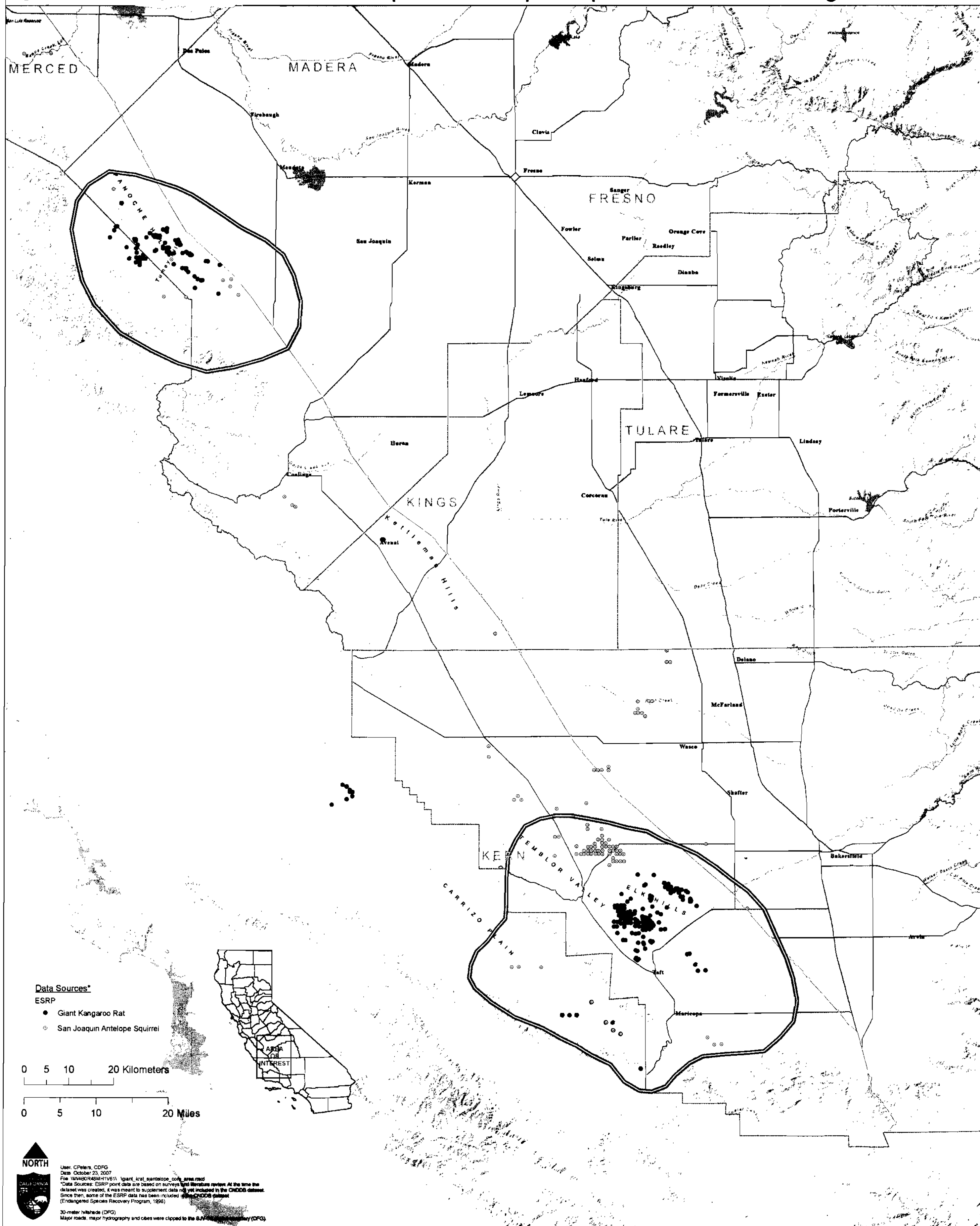
Effects of Compensation Measures
Permanent loss of suitable habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 2.28 acres of Tipton kangaroo rat compensation annually in the South San Joaquin Valley. Overall, PG&E will provide approximately 69 acres of Tipton kangaroo rat compensation over the 30-year permit term). To compensate expected take, PG&E will protect more 11.4 acre of suitable habitat for the Tipton kangaroo rat for the first 5 years of effects. PG&E will provide additional mitigation in 5-year increments and will stay ahead of effects.

Compensation areas for Tipton kangaroo rat will be located within the species' known range in Kings, Tulare, or Kern counties, and in areas generally considered to be occupied habitat within the HCP planning area. Compensation areas for Tipton kangaroo rats will contain friable soils with fine texture, and will be in terrain not subject to frequent flooding.

Compensation would permanently protect suitable habitat as mitigation for the temporary disturbance of occupied habitat and loss of habitat use. Selection of compensation areas for other grassland species will also include suitable habitat for Tipton kangaroo rats, if possible.

Figure 2.

Core-Areas for San Joaquin Antelope Squirrel & Giant Kangaroo Rat



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Conclusion for Tipton kangaroo rat

We anticipate that the proposed action will directly and indirectly affect the Tipton kangaroo rat as described in the analysis above, including the disturbance of 4 acres of Tipton kangaroo rat suitable-habitat annually (approximately 120 acres of habitat disturbance over the 30-year Permit term), and the permanent loss of less than 3 acres of Tipton kangaroo rat suitable habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce the actual impacts to the Tipton kangaroo rat and its habitat. Compensation will be provided for all temporary and permanent disturbance of suitable habitat. We anticipate that PG&E will provide approximately 2.28 acres of Tipton kangaroo rat compensation annually (approximately 68 acres of permanent habitat protection over 30 years).

With the application of the general AMMs, we anticipate that the "other disturbance" effects of vehicle travel through 24 acres of Tipton kangaroo rat suitable-habitat annually (720 acres over 30 years) will be individually small, widely dispersed within the existing range of the species and, therefore, likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Tipton kangaroo rat.

We reached this conclusion because the potential for impact to this species habitat is small, and is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take (Tipton kangaroo rat)

With implementation of AMMs and other measures, we anticipate that the ground disturbing covered activities will result in the take (harm and harassment) of an undetermined number of Tipton kangaroo rats within 4 acres of suitable habitat each year (120 acres over the 30-years) from the disturbance and temporary loss of habitat, and we anticipate take in the form of harm of an undetermined number of Tipton kangaroo rats within 0.1 acres of suitable habitat each year (3 acres over 30 years) from the destruction and permanent loss of habitat.

The Service also anticipates take in the form of harm and harassment of an undetermined number of Tipton kangaroo rats within 24 acres of suitable habitat each year from off-road travel and "other disturbance" covered activities (720 acres cumulatively over 30 years).

The temporary habitat disturbances and permanent habitat losses would occur in small areas and would be scattered over the limited range of the species in Kings, Tulare, and Kern counties, but these impacts have the potential to cumulatively-affect 79% of the remaining occurrences of the Tipton kangaroo rat over the Permit term. In the above Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the Tipton kangaroo rat.

Endangered Giant Kangaroo Rat (*Dipodomys ingens*)

The giant kangaroo rat is the largest of the kangaroo rats. It is a dusky colored kangaroo rat with a distinctly bicolored tail. The tail is longer than the combined head and body length and terminates in a large tuft. The hind feet each have five toes.

Status of the Species

Listing Status

The giant kangaroo rat was federally listed as endangered January 1987 (52 FR 283) and was listed by the State of California as endangered on October 2, 1980. A detailed account of the taxonomy, ecology, and biology of the giant kangaroo rat is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998) and in the final rule (52 FR 283). Critical Habitat has not been designated.

Life History, Reproductive Ecology

Giant kangaroo rats are primarily seedeaters, but also eat green plants and insects. They cut the ripening heads of grasses and forbs and cure them in small surface pits located on the area over their burrow system. Giant kangaroo rats forage on the surface from around sunset to near sunrise, though most activity takes place in the first 2 hours after dark. Foraging activity is greatest in the spring as seeds of annual plants ripen. Its burrow systems may have from one to four entrances of 50-55 millimeters in diameter. Small holes where seeds are stored may be excavated around the entrances of the burrows. The giant kangaroo rat is also known to construct haystacks. Although other kangaroo rat species may construct haystacks, the clipped grasses mounded into haystacks can be one useful diagnostic characteristic for determination of the presence of this species.

Most females enter estrus in the cool, wet winter in central California, in mid or late December or January. In most years, females were reproductive between December and March or April, but in colonies with low densities, reproduction extended into August or September. When population density is high and most precincts are occupied, adult females may have only a single litter of from 1-4 young after a gestation period of about 32 days. Under these circumstances, young-of-the-year do not breed. During years of drought and low or no seed production, females are monestrous or anestrous. During years with a prolonged wet season or where population density is low and there are many vacant precincts, adult females may have 2-3 litters and young-of-the-year females may begin breeding when about 12-13 weeks old. Young giant kangaroo rats appear on the surface when they weigh about 50-70 grams and are presumably about 6.5 to 8.5 weeks old. The major time for dispersal of giant kangaroo rats seems to be following maturation of young, about 11 to 12 weeks after birth.

Severe drought results in population decline, mainly by reduction or cessation of reproduction; whereas torrential rainfall over several days results in great, rapid population decline, presumably by drowning, death from wetting and hypothermia, and other factors related to too much moisture. The population trends of giant kangaroo rats fluctuate widely in response to inter-annual variations in precipitation. The ESRP has tracked population trends in giant kangaroo rats on grazed and ungrazed plots surveyed biannually since 1987 on the Elkhorn Plain (Kelly *et al.* 2004, Williams and Germano 1994). The largest population decline occurred in 1991 after several years of drought without successful seed production. The drought ended with

a heavy rainfall the last week of March 1991 resulting in flooding which probably contributed to the precipitous decline in numbers of giant kangaroo rats to only 2 per hectare during the April 1991 census. Subsequently, densities increased to 120-140 per hectare in 1992 and remained at 60-120 per hectare through 1997.

Habitat Affinities
The preferred habitat of giant kangaroo rats is arid annual grassland on gentle slopes of generally less than 10 degrees, with friable, sandy-loam soils. However, most remaining populations are on poorer and marginal habitats, which include shrub communities on a variety of soil types and on slopes up to about 22 degrees.

Studies have also observed the positive effects of livestock grazing during wet years on giant kangaroo rats within the southern range (Germano *et al.* 2005, Germano *et al.* 2001). Livestock grazing thins out the dense growth of exotic annual grasses (e.g. red brome [*Bromus madritensis* ssp. *rubens*]) that occurs during wet years. The actual cause for decline in kangaroo rats during wet years is not known, but probable factors include dense grass growth that likely inhibits foraging, increases the risk of predation, and increases soil moisture, thereby causing kangaroo rat seed caches to become infected by molds, some of which are toxic (Germano *et al.* 2001, Single *et al.* 1996, Frank 1988). Wildfire and prescribed burn monitoring has indicated that this species responds positively to fire (Germano and Saslaw, 1999, unpublished data).

The better habitats for giant kangaroo rats are shared with few or no other small, nocturnal mammals. San Joaquin antelope squirrels are the only other common mammal. During the day, they enter the openings of giant kangaroo rat burrows, usually reappearing shortly. Giant kangaroo rats have major impacts on their communities, increasing and enriching plant productivity, being the base of the food chain for most predatory vertebrates, providing sheltering burrows for the endangered blunt-nosed leopard lizard (*Gambelia sila*), threatened antelope squirrel, and other animals, and providing favorable microhabitats for the endangered plants, San Joaquin wooly-threads (*Lembertia congdoni* and California jewelflower*(Caulanthus californicus*). Where shrubs such as saltbushes (*Atriplex* spp.) and snakeweed (*Gutierrezia* spp.) are recruited during rare, heavy, late-spring rains, giant kangaroo rats gnaw through the stems, eventually eradicating most or all shrubs on their precincts and surrounding ground.

Historical and Current Range, Distribution, Dispersal
Up until the 1950s, colonies of giant kangaroo rats were spread over hundreds of thousands of acres of continuous habitat from southern Merced County, south through the San Joaquin Valley, to southwestern Kern County and northern Santa Barbara County, including the Carrizo Plain, and Cuyama Valley; Shaw 1934; Hawbecker 1944, 1951). The historical range of giant kangaroo rat was estimated to be up to 1,561,017 acres (Williams 1992). Completion of the San Luis Unit of the Central Valley Project and the California Aqueduct of the State Water Project resulted in rapid cultivation and irrigation of natural communities that had provided habitat for giant kangaroo rats along the west side of the San Joaquin Valley (Williams 1992, Williams and Germano 1993). Between about 1970 and 1979, almost all the natural communities on the western floor and gentle western slopes of the Tulare Basin were developed for irrigated agriculture, restricting occurrence of most species of the San Joaquin saltbush and valley grassland communities, including the giant kangaroo rat. This rapid habitat loss was the main

reason for its listing as endangered. The current distribution of giant kangaroo rats is restricted to about 27,450 acres or less than 2% of its historic range (Williams 1992). The remaining habitats are highly fragmented and mostly located on suboptimal terrain (Grinnell 1932; Williams 1992; Williams *et al.* 1993, 1995; Goldingay *et al.* 1997).

The northern range of giant kangaroo rat is highly fragmented by complex topography and separated into the following disjunct populations in eastern San Benito and western Fresno Counties: Panoche Valley, Tumey Hills, Ciervo Hills, Monocline Ridge, and San Joaquin Valley. There are no long-term studies of population trends in the northern range (J. Lowe, BLM, pers. comm.); however, several short-term studies have estimated the population and aerial coverage of giant kangaroo rats there (i.e. Williams 1992, Williams *et al.* 1995, Lowe *et al.* 2005). In 1980-1985, the population of giant kangaroo rats in the northern range was estimated at only 2,000 covering 287 hectares (709 acres) (Williams 1992). Beginning in summer 1991, the population of giant kangaroo rats increased dramatically at the end of a 5-year drought. In 1992-1993, the population of giant kangaroo rats in the northern range was estimated to be 37,125 covering a range of 1,882.8 hectares (4,653 acres; Williams *et al.* 1995). More recently, Loew *et al.* (2005) estimated the population of giant kangaroo rats in the Panoche-Ciervo northern range to be about 12,375 based on burrow and cache counts, as well as capture-mark/recapture methods. The authors further estimated the subpopulations of giant kangaroo rat within the northern range to be about 80 in the Ciervo Hills, 1,194 in Tumey Hills, 5,480 in Monocline Ridge, and 5,621 in the Panoche Valley. In September 2006, 1,200 acres of rangeland in the Panoche Valley were sold to private interests and another 9,000 acres of rangeland are currently for sale (Schuil and Associates 2006). Additionally, studies of the genetic structure and variability of giant kangaroo rats in the northern range show some populations within the Tumey Hills and Ciervo Hills are genetically isolated and at risk of extinction (Loew *et al.* 2005). Panoche Creek and Silver Creek were identified as important dispersal corridors within the northern range of the giant kangaroo rat (Loew *et al.* 2005); however, the majority of these areas are currently unprotected.

The vast majority of giant kangaroo rat habitat in the Kettleman Hills area of southwestern Kings County is on private lands and unprotected. The status of giant kangaroo rat in the Kettleman Hills is unmonitored and, therefore, little is known about the status of this small satellite population. The latest reported sightings of giant kangaroo rat in the Kettleman Hills were 30 precincts over 2-3 acres at Avenal Gap in 1985, and an unspecified number of colonies 0.5 mile northeast of Las Perillas Pumping Plant in the early 1980s (CDFG 2006). In August 2006, about 2,000 acres of native saltbush habitat along Interstate 5 north of the Kings-Kern County line was disked for cultivation of melons. The site was less than 5 miles east of reported sightings of giant kangaroo rat in the Avenal Gap of the Kettleman Hills (CDFG 2006), and therefore, could have been giant kangaroo rat habitat. The construction of the evaporative tanks and final stabilization unit for the Kettleman Hills hazardous waste facility by Chemical Waste Management, Inc. (USFWS 1989) permanently disturbed 26.8 acres of giant kangaroo rat, San Joaquin kit fox, and blunt-nosed leopard lizard habitat 3.5 miles southeast of Kettleman City, Kings County. Chemical Waste Management, Inc. compensated for the impacts to the giant kangaroo rat, San Joaquin kit fox, and blunt-nosed leopard lizard by purchasing 80.4 acres of conservation lands at Semitropic Ridge in northwestern Kern County (Hewitt in litt. 1989). No giant kangaroo rats, however, have been observed at Semitropic Ridge, and their occurrence is

highly unlikely (G. Warrick, CNLM, pers. comm.). Giant kangaroo rats occur in scattered colonies across the Lokern area of western Kern County.

The 2006 long-term status trend for giant kangaroo rat was also judged to be decreasing, however, long-term population studies on the Lokern area (Germano *et al.* 2005, L. Saslaw unpubl. data), and the Elk Hills [Naval Petroleum Reserve #1 (NPR-1)] (Quad Knopf Inc. 2006) show the species status within western Kern County to be stable or even increasing after several years of drought. The annual Lokern grazing study reports the effects of cattle grazing on giant kangaroo rats and other listed species in the Lokern area from 1998-2005 (Germano *et al.* 2005). During the eight-year study, a total of 15 giant kangaroo rats were trapped on the ungrazed plots while 33 were caught on the grazed plots. The number of giant kangaroo rats caught annually was greater on grazed plots than ungrazed plots. Giant kangaroo rats, however, represented less than 3% of the total number of small mammals trapped on the Lokern grazing study plots, while short-nosed kangaroo rats (*Dipodomys nitratoides brevinasus*) represented 63% of the small mammals captured there. Braun (1985) stated that areas in which giant kangaroo rats constitute only a fraction of the small mammal population are likely suboptimal habitat. Warrick (2006) compared the number of kangaroo rats on shrubland and grassland plots in the Lokern area from 2001-2006. Giant kangaroo rats were only 3 – 5% of the total number of small mammals trapped. On grassland plots, the number of giant kangaroo rats increased from a low of 2 in 2001 to a high of 8 in 2005. On shrubland plots, the number of giant kangaroo rats increased from a low of zero in 2001 to a high of 7 in 2005. The number of giant kangaroo rats on the grassland plots was higher than on the shrubland plots during all five years of the study. In 2006, Warrick trapped a combined total of 9 giant kangaroo rats on the Lokern grassland and shrubland plots; this was down from the 15 giant kangaroo rats trapped in 2005 but more than the 2 - 6 giant kangaroo rats trapped annually in 2001 – 2004.

The North Lokern BLM parcel had significantly higher densities of giant kangaroo rats than observed on the Lokern annual grazing study plots (L. Saslaw unpubl. data). From 1993 – 2005, the number of giant kangaroo rats captured on a single plot with a 150 meter-by-150 meter effective trapping area ranged from a high of 110 in 1994 and 1996 to a low of zero during the wet year 1998. From 2002 – 2005, the number of giant kangaroo rats at the North Lokern site was moderately high from 40-75. In 2006, the number of giant kangaroo rats captured at the North Lokern site increased to 94. The Bureau of Land Management (BLM), in cooperation with species experts, has initiated giant kangaroo rat population monitoring studies in the Lokern area.

The 47,409-acre Elk Hills Naval Petroleum Reserve #1 (NPR#1) in western Kern County has been highly disturbed by petroleum extraction activities. The Federal government and Department of Energy disturbed about 9,500 acres prior to the 1995 Elk Hills (NPR#1) biological opinion (USFWS 1995b). That biological opinion authorized the permanent disturbance of an additional 2,525 acres, temporary disturbance of 318 acres, and harm of up to 900 individual giant kangaroo rats. NPR#1 was then sold to Occidental Petroleum (Oxy) which entered into a Conservation Management Agreement (CMA) on November 6, 1998, with the Service and the CDFG for the establishment of a 7,801-acre conservation area along the northern (North Flank) and southern (Buena Vista Valley) flanks of the Elk Hills. Quad Knopf (2006) surveyed the number of active giant kangaroo rat precincts on the northern (i.e. Lokern) and

southern (i.e. Buena Vista Valley) flanks of the Elk Hills (i.e. NPR#1) from 2001-2005. In 2005, active giant kangaroo rat precincts were reported in 11 out of 13 sections surveyed. A total of 275 active giant kangaroo rat precincts were observed in 2005 compared to 199 reported in 2004. The majority of the activity (85%) in 2005 occurred along the northwest portion of Elk Hills and adjacent properties. In Buena Vista Valley, a total of 40 active precincts were observed in 2005 compared to 84 in 2004 (but greater than in 2001 and 2002). Loew *et al.* (2005) estimated the subpopulations of giant kangaroo rat within eastern San Luis Obispo County to be about 20,000 in the Elkhorn Plain, 500 at Painted Rock in the Carrizo Plain, and 1,300 in the translocated population at Soda Lake in the Carrizo Plain; no estimates were given for giant kangaroo rat subpopulations in western Kern County.

There are presently 95 extant occurrences for the giant kangaroo rat in 5 California counties: Fresno (12), Kern (53), Kings (2), San Benito (5), and San Luis Obispo (24) (CNDDB 2007).

Reasons for Decline and Threats to Survival
The causes of decline of the giant kangaroo rat are similar to those discussed below for the kit fox. The decline of giant kangaroo rats is attributed primarily to habitat loss from the conversion of native scrub and grasslands to agriculture (Service 1998). An estimated 1.8 percent of the giant kangaroo rat's historical habitat remains extant (Williams 1992).

Habitat destruction resulting from the development of small cities and towns along the western edge of the San Joaquin Valley between Coalinga and Maricopa, as well as development of the infrastructures for petroleum and mineral exploration and extraction, roads and highways, new energy and water conveyance facilities, communications infrastructures, and agriculturally related industrial developments continue to destroy habitat for giant kangaroo rats and increase the threats to the species by reducing and further fragmenting and isolating populations. Giant kangaroo rat habitat near the growing communities of Taft and Maricopa in western Kern County is currently threatened by urban and residential development.

Widespread use of rodenticides and rodenticide-treated grain to control ground squirrels and kangaroo rats may also have contributed to the decline of giant kangaroo rats in some areas. Habitat degradation due to lack of appropriate habitat management on conservation lands, especially lack of grazing or fire to control density of vegetation (including shrubs) may be an additional threat to giant kangaroo rats (Williams and Germano 1993).

Giant kangaroo rat Environmental Baseline within the Action Area
Portions of the 276,350-acre action area are within three of the six remaining giant kangaroo rat geographic units: 1) the Panoche-Ciervo Region in western Fresno and eastern San Benito Counties; 2) the Kettleman Hills in southwestern Kings County and; 3) western Kern County [including the Lokern area, Elk Hills, Buena Vista Valley, McKittrick Valley, former Navel Petroleum Reserve #2, Taft, and Maricopa areas).

There are approximately 28 extant occurrences of the giant kangaroo rat in the existing right-of-ways in the 276,350-acre action area. Approximately 5 occurrences are in Fresno County, 2 in Kings County, and 21 in the Kern County portions of the action area. This represents 30% of the remaining occurrences for giant kangaroo rat. The 28 extant occurrences for this species occupy

approximately 1,212 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007).

The HCP land-cover types utilized by giant kangaroo rats are identified in the HCP as " Grassland" and "Woody Riparian". Giant kangaroo rat distribution is localized, primarily as a result of habitat fragmentation of remnant suitable habitat by agricultural development. This species occurs only in the intact grassland areas on the western portions of the action area. Action-area occurrences are concentrated in two main populations located in Fresno County and in Kern County. There are only scattered occurrences in the area between these two population centers.

Because of habitat fragmentation, limited dispersal distances, and small population size, the HCP considered only a small proportion of the land-cover types suitable for occupancy by this species. The HCP concluded that 10% of the Grassland cover and 10% of the Woody Riparian cover in the action area is suitable for giant kangaroo rat.

Effects of the Action on giant kangaroo rat

Direct and Indirect Effects

The actual acres of impact to giant kangaroo rat habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities.

The HCP estimated that ground-disturbing covered activities would directly disturb approximately 5 acres of giant kangaroo rat suitable-habitat each year (150 acres of temporary disturbance over 30 years). Less than 0.1 acre per year of giant kangaroo rat suitable habitat is expected to be permanently lost each year (less than 3 acres of habitat permanently lost over 30 years).

HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will affect 30 acres of giant kangaroo rat habitat each year. Over the 30-year Permit term, these "other disturbance" will occur in 900 acres of suitable habitat for the giant kangaroo rat. The temporary disturbances, permanent habitat losses, and "other disturbances" would occur in small areas and would be scattered over the limited range of the species in Fresno, Kings, and Kern counties. However, these impacts have the potential to cumulatively-affect 30% of the remaining occurrences of the giant kangaroo rat over the Permit term.

Pre-activity surveys for medium and large covered-activities will identify known and new giant kangaroo rat burrows in the vicinity of a medium or large covered activity site. PG&E's review of the MapBook will identify known areas of giant kangaroo rat burrows in the vicinity of small-disturbance covered activity sites.

To reduce the potential for take of giant kangaroo rats, PG&E will implement AMM 20 at small, medium, and large disturbance covered-activity sites. When small disturbance covered activities occur inside two giant kangaroo rat/San Joaquin antelope squirrel "core areas" identified by

CDFG (Figure 2 attached[2]), a qualified PG&E biologists shall identify "occupied" and "potentially occupied" active burrows. PG&E staff shall avoid the occupied or potentially occupied burrows identified by the biologist. If occupied or potentially occupied burrow in the two "core areas" cannot be avoided, a qualified PG&E biologist will stake and flag a work exclusion zone of at least 30 feet and remain on site as a biological monitor during implementation of the covered activity. If the biologist cannot stay onsite during implementation of the covered activity, then the biologist shall flag a work exclusion zone of 50 feet around the burrow(s). At medium and large covered-activity sites inside the two CDFG "core areas", qualified PG&E biologists will identify occupied and potentially occupied burrows during the pre-activity surveys, and will stake and flag the work exclusion zones of 30 or 50 feet around active burrows. If work must proceed inside a work-exclusion zone within a giant kangaroo rat/San Joaquin antelope squirrel "core area", a wildlife-agency approved-biologist will use standard techniques to trap and hold the species in captivity, and then excavate and close the burrows prior to covered-activity work. The approved biologist will release the mammals at the same site; as soon as possible after work is completed. The approved biologist shall hold an ESA section 10(a)(1)(A) permit for the species.

When burrows are observed at small-disturbance covered-activities outside the two CDFG giant kangaroo rat/San Joaquin antelope squirrel "core areas" (Figure 2), trained PG&E staff will determine if the burrows are active (occupied or potentially occupied) by giant kangaroo rat. If trained staff determines that the burrows at a small activity site are not occupied, then PG&E staff will proceed with the covered activity. Burrows at medium and large covered-activity sites outside the two "core areas" will be evaluated by qualified PG&E biologists during pre-construction survey. If active (occupied or potentially occupied) burrows for giant kangaroo rat are identified outside the two "core areas", a qualified biologist will stake and flag an exclusion zone of at least 30 feet and remain on-site as a biological monitor, or the biologist shall stake and flag a work exclusion zone of 50 feet around active burrow prior to covered activities on the job site. Wherever establishing 30 or 50-foot work-exclusion zones are not possible, PG&E will establish a work exclusion zone of the maximum practicable distance

AMM 20 would reduce effects on occupied habitat and reduce the potential for direct take of individuals. Still, a small potential exists for take to occur. Ground-disturbing covered-activities have the potential to cause direct temporary habitat loss and direct take of giant kangaroo rats.

Noise or ground vibrations could affect individual giant kangaroo rats if suitable habitat or burrows are present adjacent to Covered Activity sites. This disturbance would not cause direct mortality, but could cause take by affecting behavior during the breeding season. The HCP states that such effects are unlikely and would be highly localized if they do occur

There is some chance that giant kangaroo rats could be crushed or harmed by vehicles and equipment driving over occupied burrows or over foraging kangaroo rats while implementing the "other disturbance" activities (i.e. tree trimming, patrols, PG&E vehicles traveling off-road, etc.). HCP Table 3-11 indicates that the "other disturbance" will affect 30 acres of giant kangaroo rat

[2] Figure 2 was prepared by CDFG in November of 2007. As the boundaries of the giant kangaroo rat/San Joaquin antelope squirrel "core areas" are revised by CDFG over the term of the Permit, PG&E shall use those new boundaries in the implementation of the HCP and parts of AMM20.

habitat per year (cumulatively, 900 acres of "other disturbance" in suitable habitat over 30 years).

The potential effects from all covered activities, including the "other disturbance" covered-activities will be reduced by PG&E's implementation of the general AMMs (AMMs 1-6, 8, 10, 29, and 30). The "general" AMMs, including limiting the speed of off-road vehicles to 15 mph, parking vehicles in previously disturbed areas when practicable, and minimizing the construction of new access roads may minimize direct impacts of the "other disturbance" covered activities on giant kangaroo rat.

Effects of Compensation Measures

Permanent loss of suitable habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 0.74 acres in the central San Joaquin Valley and 2.17 acres of giant kangaroo rat compensation annually in the South San Joaquin Valley. Overall, PG&E will provide approximately 87.3 acres of giant kangaroo rat compensation over the 30-year permit term). To compensate expected take in advance, PG&E will protect more 14.6 acre of suitable habitat for the giant kangaroo rat for the first 5 years of effects. PG&E will provide additional mitigation in 5-year increments and will stay ahead of effects.

Compensation areas for giant kangaroo rat will be located within the species' current range (figure 2). Habitat compensation proposed by PG&E for giant kangaroo rat will have documented species presence on or adjacent to proposed compensation area. Compensation areas for giant kangaroo rats will contain friable soils with fine texture and terrain not subject to frequent flooding. Compensation would permanently protect suitable habitat as mitigation for the temporary disturbance of occupied habitat and loss of habitat use. Selection of compensation areas for other grassland species will also include suitable habitat for giant kangaroo rats, if possible.

Giant kangaroo rat Conclusion

We anticipate that the proposed action will directly and indirectly affect the giant kangaroo rat as described in the analysis above, including the disturbance of 5 acres of giant kangaroo rat suitable-habitat annually (approximately 150 acres of suitable habitat disturbance over the 30-year Permit term), and the permanent loss of less than 3 acres of giant kangaroo rat suitable habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce the actual impacts to the giant kangaroo rat and its habitat. Compensation will be provided for all temporary and permanent disturbance of suitable habitat. We anticipate that PG&E will provide approximately 2.17 acres of giant kangaroo rat compensation annually (approximately 65 acres of permanent habitat protection over 30 years).

With the application of the general AMMs, we anticipate that the "other disturbance" effects of vehicle travel through 30 acres of giant kangaroo rat suitable-habitat annually (900 acres over 30 years) will be individually small, widely dispersed within the existing range of the species and, therefore, likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the giant kangaroo rat.

We reached this conclusion because the potential for impact to this species habitat is relatively small. When it occurs, habitat disturbance will be small, the duration of effects will be relatively short, and it is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range. Compensatory mitigation will fully mitigate any take that does occur.

Amount or Extent of Take. Effect of the Take (giant kangaroo rat)
With implementation of AMMs and other measures, we anticipate that the ground disturbing covered-activities in the proposed action will result in the take (harm and harassment) of an undetermined number of giant kangaroo rats occupying 5 acres of suitable habitat each year (150-acres over 30-years) from disturbance and temporary loss of habitat. We also anticipate that take in the form of harm of an undetermined number of giant kangaroo rats from the destruction and permanent loss of 0.1-acres of suitable habitat each year (3 acres over 30 years).

The Service also anticipates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will cause take in the form of harassment of an undetermined number of giant kangaroo rats occupying 30 acres of suitable-habitat each year (900 acres over the permit term).

The temporary habitat disturbances and permanent habitat losses would occur in small areas and would be scattered over the limited range of the species in Fresno, Kings, and Kern counties. However, these impacts have the potential to cumulatively-affect 30% of the remaining occurrences of the giant kangaroo rat over the Permit term. In the above Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the giant kangaroo rat.

San Joaquin (Nelson's) antelope squirrel (*Ammospermophilus nelsoni*)
The San Joaquin antelope squirrel *(Ammospermophilus nelsoni)* is a small pinkish-buff squirrel with a distinctive creamy-white lateral stripe on each side. The San Joaquin antelope squirrel is the only ground squirrel with stripes in the San Joaquin Valley. The antelope squirrel runs with its tail curled over its back, exposing the white under surface.

Status of the Species
Listing Status
The San Joaquin antelope squirrel was removed as a Category 1 candidate for Federal listing in 1995 (Service 1995) and is now considered a Federal Species of Concern (61 FR 7596). The State of California listed it as threatened on October 2, 1980. A detailed account of the taxonomy, ecology, biology, and conservation of the San Joaquin antelope squirrel is addressed in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998).

Life History, Reproductive Ecology
San Joaquin antelope squirrels are omnivores. The squirrels eat green vegetation, fungi, and insects more often than seeds. The breeding period is late winter through early spring, with only one breeding period per year, coinciding with the time of year when green vegetation is present. Young squirrels do not breed their first year. Young are born between March and April. The timing, nature, and distance of dispersal are poorly documented.

Habitat Affinities
San Joaquin antelope squirrels inhabit arid annual grassland and shrubland communities in areas typically receiving less than 10 inches of mean annual precipitation. They are most numerous in areas with sparse-to-moderate cover of shrubs and flat to gently sloping terrain. Areas with no shrubs are sparsely populated. This species requires areas free from flooding. Soils are friable and primarily loam and sandy-loam, but soils with a wide range of textures are used. The species forages for green leaves during the winter and seeds and insects whenever they are available (Quad 1995).

Historical and Current Range, Distribution, Dispersal
Historically, the San Joaquin antelope squirrel occurred in the western and southern portions of the Tulare Basin and the contiguous areas to the west in the upper Cuyama Valley and on the Carrizo and Elkhorn plains. They ranged from western Merced County on the northwest, southward along the western side of the Valley to its southern end. They were distributed over the San Joaquin Valley floor in Kern County and along the eastern edge of the San Joaquin Valley northward to near Tipton in Tulare County. San Joaquin antelope squirrels are not common above 26,000 feet on the ridges and plains west of the San Joaquin Valley proper.

Since 1979, this species has disappeared from many of the smaller islands of habitat on the Valley floor, including Pixley National Wildlife Refuge in Tulare County; Alkali Sink and Kerman Ecological Reserves in Fresno County; and several areas within the Allensworth Conceptual Area of Tulare and Kern counties. Substantial populations are found only in and around Lokern and the Elk Hills in western Kern County, and on the Carrizo and Elkhorn plains in eastern San Luis Obispo County. There are presently 246 extant occurrences for the San Joaquin antelope squirrel in 9 California counties: Fresno (38), Kern (166), Kings (8), Los Angeles (1), Merced (3), San Benito (14), San Luis Obispo (23), Santa Barbara (2), Tulare (2) (CNDDB 2007).

Reasons for Decline and Threats to Survival
The causes of decline of the San Joaquin antelope squirrel are similar to those discussed above for Tipton and giant kangaroo rat, and below for the kit fox. Loss of habitat to agricultural developments, urbanization, and petroleum extraction is the primary cause for decline in numbers of antelope squirrels. Use of rodenticides and insecticides may also negatively impact the species.

The processes of habitat loss and fragmentation are expected to continue on a smaller scale than in the past, but the direct and indirect effects of these processes are expected to accelerate the decline of the species. One of the two largest populations and most important habitat areas, the Carrizo Plain Natural Area, is now mostly under public ownership. Protection is tenuous for the

equally important population of in the Lokern-Elk Hills area of western Kern County. Another threat to the San Joaquin antelope squirrel on private land may be the long-term effects of excessive grazing by livestock. Elimination of shrubs and soil erosion from heavy grazing of rangeland communities degrades their carrying capacities for most species. Substantial soil erosion has occurred on both public and private lands throughout the historical geographic range of the species (Williams et al. 1993).

Status with Respect to Recovery
The Recovery Plan calls for protecting the two largest populations on the Carrizo Plain Natural Area and in western Kern County, as well as protecting additional populations in western Fresno and eastern San Benito counties, along the edge of the Valley between Fresno and Kern counties, and on the Valley floor. Protection and enhancement of habitat in the Semitropic Ridge area of Kern County is important to maintaining a population on the Valley floor. Protecting and restoring habitat in Pixley National Wildlife Refuge and Allensworth Natural Area, and reintroducing antelope squirrels to Pixley National Wildlife Refuge is necessary to secure a population in the eastern portions of the Valley.

San Joaquin Antelope Squirrel Environmental Baseline within the Action Area
There are 116 extant occurrences for San Joaquin antelope squirrel in the existing right-of-ways of the 276,350-acre action area (CNDDB 2007). This is approximately 47% of the remaining occurrences for the species. Two extant occurrences are in Merced County, 16 in Fresno County, 3 in Kings County, 1 in Tulare, and 94 in the Kern County portions of the action area. The 116 extant occurrences for this species occupy approximately 4,215 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007).

San Joaquin antelope squirrels occur in grassland and shrub cover types in the southwestern portion of the action area. Substantial portions of these habitats are fragmented and isolated by agricultural development. This fragmentation has led to local extirpation in some remnants of suitable habitat. Consequently, the HCP considered only 50% of grassland areas and 10% of Upland Scrub within the action area suitable for San Joaquin antelope squirrel occupancy.

Effects of the Action
Direct and Indirect Effects
The actual acres of impact to San Joaquin antelope squirrel suitable habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities. The HCP estimated that covered activities would directly disturb 38 acres of San Joaquin antelope squirrel suitable-habitat each year (1,140 acres of temporary habitat disturbance over 30 years). Less than 0.5 acre per year of San Joaquin antelope squirrel suitable habitat is expected to be permanently lost each year (less than 15 acres of habitat destroyed over 30 years). HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will affect 218 acres of San Joaquin antelope squirrel habitat each year. Over the 30-year Permit term, these "other disturbance" will occur in 6,480 acres of suitable habitat for the San Joaquin antelope squirrel. The temporary disturbances, permanent habitat losses, and "other disturbances" would occur in small areas and would be scattered over the limited range of the species in Merced, Fresno, Kings, Tulare, and Kern counties. However, these impacts have the

potential to cumulatively-affect 47% of the remaining occurrences of the San Joaquin antelope squirrel over the Permit term.

Noise or ground vibrations could affect individual San Joaquin antelope squirrels if suitable habitat or burrows are present adjacent to Covered Activity sites. This disturbance would not cause direct mortality, but could cause take by affecting behavior during the breeding season. The HCP states that such effects are unlikely and would be highly localized if they do occur.

Habitat for the San Joaquin antelope squirrel could be degraded by invasion of weedy plants following ground-disturbing activities. Implementation of AMM 10 will seed a non-native commercial seed mix on disturbed grassland land-cover areas larger than 0.25 acre to discourage introduction of weeds and to reduce the potential of invasive weeds colonizing suitable San Joaquin antelope squirrel habitat.

Pre-activity surveys for medium and large covered-activities will identify known and new San Joaquin antelope squirrel burrows in the vicinity of a medium or large covered activity site. PG&E's review of the MapBook will identify known areas of San Joaquin antelope squirrel burrows in the vicinity of small-disturbance covered activity sites. To reduce the potential for take of San Joaquin antelope squirrels, PG&E will implement AMM 20 at small, medium, and large disturbance covered-activity sites when burrows are present. When small disturbance covered activities occur inside two giant kangaroo rat/San Joaquin antelope squirrel "core areas" identified by CDFG (Figure 2 attached[2]), a qualified PG&E biologists shall identify "occupied" and "potentially occupied" active burrows. PG&E staff shall avoid the occupied or potentially occupied burrows identified by the biologist. If occupied or potentially occupied burrow in the two "core areas" cannot be avoided, a qualified PG&E biologist will stake and flag a work exclusion zone of at least 30 feet and remain on site as a biological monitor during implementation of the covered activity. If the biologist cannot stay onsite during implementation of the covered activity, then the biologist shall flag a work exclusion zone of 50 feet around the burrow(s). At medium and large covered-activity sites inside the two CDFG "core areas", qualified PG&E biologists will identify occupied and potentially occupied burrows during the pre-activity surveys, and will stake and flag the work exclusion zones of 30 or 50 feet around active burrows. If work must proceed inside a work-exclusion zone within a giant kangaroo rat/San Joaquin antelope squirrel "core area", a wildlife-agency approved-biologist will use standard techniques to trap and hold the species in captivity, and then excavate and close the burrows prior to covered-activity work. The approved biologist will release the mammals at the same site; as soon as possible after work is completed. The approved biologist shall hold an ESA section 10(a)(1)(A) permit for the species.

When burrows are observed at small-disturbance covered-activities outside the two CDFG giant kangaroo rat/San Joaquin antelope squirrel "core areas" (Figure 2), trained PG&E staff will determine if the burrows are active (occupied or potentially occupied) by San Joaquin antelope squirrel. If trained staff determines that the burrows at a small activity site are not occupied, then PG&E staff will proceed with the covered activity. Burrows at medium and large covered-activity sites outside the two "core areas" will be evaluated by qualified PG&E biologists during pre-construction survey. If active (occupied or potentially occupied) burrows for San Joaquin antelope squirrel are identified outside the two "core areas", a qualified biologist will stake and

flag an exclusion zone of at least 30 feet and remain on-site as a biological monitor, or the biologist shall stake and flag a work exclusion zone of 50 feet around active burrow prior to covered activities on the job site. Wherever establishing 30 or 50-foot work-exclusion zones are not possible, PG&E will establish a work exclusion zone of the maximum practicable distance

AMM 20 would reduce effects on occupied habitat and reduce the potential for direct take of individuals. Still, a small potential exists for take to occur. Ground-disturbing covered-activities have the potential to cause direct temporary habitat loss and direct take of San Joaquin antelope squirrels.

There is some chance that antelope squirrels could be crushed or harmed by vehicles and equipment driving over occupied burrows or over foraging squirrels while implementing the "other disturbance" activities (i.e. tree trimming, patrols, PG&E vehicles traveling off-road, etc.). HCP Table 3-11 indicates that the "other disturbance" will affect 218 acres of San Joaquin antelope squirrel habitat per year (cumulatively, 6,480 acres of "other disturbance" in suitable habitat over 30 years). The potential effects from all covered activities, including the "other disturbance" covered-activities will be reduced by PG&E's implementation of the general AMMs (AMMs 1-6, 8, 10, 29, and 30). The "general" AMMs, including limiting the speed of off-road vehicles to 15 mph, parking vehicles in previously disturbed areas when practicable, and minimizing the construction of new access roads may minimize the direct impacts of the "other disturbance" covered activities on San Joaquin antelope squirrel. These measures will limit direct mortality but will not eliminate potential for a small amount of take over the life of the project.

Effects of Compensation
Permanent loss of suitable habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 9.1 acres of San Joaquin antelope squirrel compensation annually in the Central San Joaquin Valley (Merced, Madera, Fresno counties) and 11.03 acres of compensation annually in the South San Joaquin Valley (Kings, Tulare, and Kern counties). Overall, PG&E will provide approximately 20.1 acres of San Joaquin antelope squirrel compensation annually, or 606 acres of permanent compensation over the 30-year permit term. To compensate expected take in advance, PG&E will protect 100.7 acres of suitable habitat for the San Joaquin antelope squirrel for the first 5 years of effects. PG&E will provide additional mitigation in 5-year increments and will stay ahead of effects.

Compensation areas for San Joaquin antelope squirrel will be located within the species' current range. Habitat compensation proposed by PG&E for San Joaquin antelope squirrel will have documented species presence on or adjacent to proposed compensation area. Compensation areas for San Joaquin antelope squirrels will contain friable soils with fine texture and terrain not subject to frequent flooding. Compensation would permanently protect suitable habitat as mitigation for covered-activity temporary disturbance of occupied habitat and temporary loss of habitat use. Selection of compensation areas for other grassland species will also include suitable habitat for San Joaquin antelope squirrels, if possible.

Conclusion for San Joaquin antelope squirrel

We anticipate that the proposed action will directly and indirectly affect the San Joaquin antelope squirrel as described in the analysis above, including the disturbance of 38 acres of San Joaquin antelope squirrel suitable-habitat annually (approximately 1,140 acres of habitat disturbance over the 30-year Permit term), and the permanent loss of 15 acres of San Joaquin antelope squirrel suitable habitat over the 30-year Permit term. Implementation of the avoidance and minimization measures included in the HCP will reduce the effects to the San Joaquin antelope squirrel and its habitat. Compensation will be provided for all temporary and permanent disturbance of suitable habitat. We anticipate that PG&E will provide approximately 20.1 acres of San Joaquin antelope squirrel compensation annually (approximately 604 acres of permanent habitat protection over 30 years).

With the application of the general AMMs, we anticipate that the "other disturbance" effects of vehicle travel through 218 acres of San Joaquin antelope squirrel suitable-habitat annually (6,480 acres over 30-years) will be individually small, widely dispersed within the existing range of the species and, therefore, likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Joaquin antelope squirrel.

We reached this conclusion because the potential for impact to this species habitat is relatively small. When it occurs, habitat disturbance will be small, the duration of effects will be relatively short, and it is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range. Compensatory mitigation will fully mitigate any take that does occur.

Amount or Extent of Take. Effect of the Take (San Joaquin antelope squirrel).

With implementation of AMMs and other measures, we anticipate that the ground disturbing covered-activities in the proposed action will cause take in the form of harm and harassment of an undetermined number of San Joaquin antelope squirrels occupying 38 acres of suitable habitat (1,140 acres over 30 years) from disturbance and temporary loss of habitat, and we anticipate that take in the from of harm of an undetermined number of San Joaquin antelope squirrel the destruction and permanent habitat loss of 0.5 acres of suitable habitat annually (15 acres over 30 years)an undetermined number of In total we anticipate that an undetermined number of San Joaquin antelope squirrels within 1,155 acres will be harmed or harassed from habitat impacts over 30 years).

The Service also anticipates take in the form of harassment of an undetermined number of San Joaquin antelope squirrels within 218 acres of suitable San Joaquin antelope squirrel habitat each year (6,480 acres over 30 years) from off-road travel and "other disturbances" covered-activities that do not disturb ground surfaces.

The temporary habitat disturbances and permanent habitat losses would occur in small areas and would be scattered over the limited range of the species in Merced, Fresno, Kings, Tulare, and

Kern counties. However, these impacts have the potential to cumulatively-affect 47% of the remaining occurrences of the San Joaquin antelope squirrel over the Permit term. In the above Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the San Joaquin antelope squirrel.

Endangered San Joaquin kit fox (*Vulpes macrotis mutica*)

The San Joaquin kit fox is the smallest fox in North America, with an average body length of 20 inches and weight of about 5 pounds. San Joaquin kit foxes are lightly built, with long legs and large ears. Their coat ranges from tan to buffy gray in the summer to silvery gray in the winter. Their belly is whitish and their tail is black-tipped.

Status of the Species

Listing Status

The San Joaquin kit fox was listed as an endangered species on March 11, 1967 (32 FR 4001) and was listed by the State of California as a threatened species on June 27, 1971. *The Recovery Plan for Upland Species of the San Joaquin Valley, California* (Recovery Plan) includes this canine (Service 1998). Critical Habitat is not designated.

Habitat Affinities

The San Joaquin kit fox seems to prefer more gentle terrain and decreases in abundance as terrain ruggedness increases (Grinnell *et al.* 1937; Morrell 1972; Warrick and Cypher 1998). Historically, this species occurred in several San Joaquin Valley native plant communities. In the southernmost portion of the range, these communities included Valley Sink Scrub, Valley Saltbush Scrub, Upper Sonoran Sub-shrub Scrub, and Annual Grassland. The kit fox is often associated with open annual grasslands, which form large contiguous blocks within the eastern portions of the range of the animal. The kit fox also utilizes oak savanna and some types of agriculture (e.g. orchards and alfalfa), although the long-term suitability of these habitats is unknown (Jensen 1972; Service 1998). In eastern Merced County, the lands between the urban corridor along Highway 99 and the open grasslands to the east are a mixture of orchards and annual crops, mostly alfalfa. Orchards occur in large contiguous blocks in the northwest portions of the action area and at scattered locations in the southwest portions. Orchards sometimes support prey species if the grounds are not manicured; however, denning is typically low and kit foxes can be more susceptible to coyotes predation within the orchards (Orloff 2000).

Alfalfa fields provide an excellent prey base (Woodbridge 1987; Young 1989), and berms adjacent to alfalfa fields sometimes provide good denning habitat (Orloff 2000). Although agricultural areas are not traditional kit fox habitat and are often highly fragmented, they can offer sufficient prey resources and denning to support small numbers of kit foxes. Kit foxes often den adjacent to, and forage within, agricultural areas (Bell 1994; Scott-Graham 1994). Kit foxes can inhabit the margins and fallow lands near irrigated row crops, orchards, and vineyards, and forage in these areas (Service 1998). San Joaquin kit foxes also exhibit a capacity to utilize habitats that have been altered by man. The animals are present in many oil fields, grazed pasturelands, and "wind farms" (Cypher 2000).

Kit foxes are reputed to be poor diggers, and their dens are usually located in areas with loose-textured, friable soils (Morrell 1972; O'Farrell 1984). However, the depth and complexity of their dens suggest that they possess good digging abilities, and kit fox dens have been observed on a variety of soil types (Service 1998). Some studies have suggested that where hardpan layers predominate, kit foxes create their dens by enlarging the burrows of California ground squirrels (*Spermophilus beecheyi*) or badgers (*Taxidea taxus*) (Jensen 1972; Morrell 1972; Orloff *et al.* 1986). In parts of their range, particularly in the foothills, kit foxes often use ground squirrel burrows for dens (Orloff *et al.* 1986). Kit fox dens are commonly located on flat terrain or on the lower slopes of hills. About 77 percent of all kit fox dens are at or below midslope (O'Farrell 1983), with the average slope at den sites ranging from 0 to 22 degrees (California Department of Fish and Game 1980; O'Farrell 1983; Orloff *et al.* 1986). Natal and pupping dens are generally found in flatter terrain. Common locations for dens include washes, drainages, and roadside berms. Kit foxes also commonly den in human-made structures such as culverts and pipes (O'Farrell 1983; Spiegel 1996a).

Life History, Reproductive Ecology, Dispersal
Adult San Joaquin kit foxes are usually solitary during late summer and fall. In September and October, adult females begin to excavate and enlarge natal dens (Morrell 1972), and adult males join the females in October or November (Morrell 1972). Typically, pups are born between February and late March following a gestation period of 49 to 55 days (Egoscue 1962; Morrell 1972; Spiegel and Tom 1996; Service 1998). Mean litter sizes reported for San Joaquin kit foxes include 2.0 on the Carrizo Plain (White and Ralls 1993) and 3.0 at Camp Roberts (Spencer *et al.* 1992) in eastern San Luis Obispo County; 3.7 in the Lokern area in western Kern County (Spiegel and Tom 1996), and 3.8 at the Elk Hills former Naval Petroleum Reserve (Cypher *et al.* 2000) in western Kern County. Pups appear above ground at about age 3-4 weeks, and are weaned at age 6-8 weeks. Reproductive rates, the proportion of females bearing young, of adult San Joaquin kit foxes vary annually with environmental conditions, particularly food availability. Annual rates range from 0-100%, and reported mean rates include 61% at the former Naval Petroleum Reserve (Cypher *et al.* 2000), 64% in the Lokern area (Spiegel and Tom 1996), and 32% at Camp Roberts (Spencer *et al.* 1992). Although some yearling female kit foxes will produce young, most do not reproduce until age 2 years (Spencer et al. 1992; Spiegel and Tom 1996; Cypher *et al.* 2000). Some young of both sexes, but particularly females may delay dispersal, and may assist their parents in raising in the following year's litter of pups (Spiegel and Tom 1996). The young kit foxes begin to forage for themselves at about four to five months of age (Koopman *et al.* 2000; Morell 1972).

Although most young kit foxes disperse less than 5 miles (Scrivner *et al.* 1987), dispersal distances of up to 76.3 miles have been documented for the San Joaquin kit fox (Scrivner *et al.* 1993; Service 1998). Dispersal can be through disturbed habitats, including agricultural fields, and across highways and aqueducts. The age at dispersal ranges from 4-32 months (Cypher 2000). Among juvenile kit foxes surviving to July 1 at the former Naval Petroleum Reserve, 49% of the males dispersed from natal home ranges while 24% of the females dispersed (Koopman *et al.* 2000). Among dispersing kit foxes, 87% did so during their first year of age. Most, 65.2%, of the dispersing juveniles at the former Naval Petroleum Reserve died within 10 days of leaving their natal home den (Koopman *et al.* 2000). Some kit foxes delay dispersal and may inherit their natal home range.

Natal and pupping dens may include from two to 18 entrances and are usually larger than dens that are not used for reproduction (O'Farrell *et al.* 1980; O'Farrell and McCue 1981). Natal dens may be reused in subsequent years (Egoscue 1962). It has been speculated that natal dens are located in the same location as ancestral breeding sites (O'Farrell 1983). Active natal dens are generally 1.2 to 2 miles from the dens of other mated kit fox pairs (Egoscue 1962; O'Farrell and Gilbertson 1979). Natal and pupping dens usually can be identified by the presence of scat, prey remains, matted vegetation, and mounds of excavated soil (i.e. ramps) outside the dens (O'Farrell 1983). However, some active dens in areas outside the Valley floor often do not show evidence of use (Orloff *et al.* 1986). During telemetry studies of kit foxes in the northern portion of their range, 70 percent of the dens that were known to be active showed no sign of use (e.g., tracks, scats, ramps, or prey remains)(Orloff *et al.* 1986). In another more recent study in the Coast range, 79 percent of active kit fox dens lacked evidence of recent use other than signs of recent excavation (Jones and Stokes Associates 1997).

Kit foxes often change dens and may use many dens throughout the year; however, evidence that a den is being used by kit foxes may be absent. A kit fox can use more than 100 dens throughout its home range, although on average, an animal will use approximately 12 dens a year for shelter and escape cover (Cypher *et al.* 2001). San Joaquin kit foxes have multiple dens within their home range and individual animals have been reported to use up to 70 different dens (Hall 1983). At the former Naval Petroleum Reserve, individual kit foxes used an average of 11.8 dens per year (Koopman *et al.* 1998). Kit foxes typically use individual dens for only brief periods, often for only one day before moving to another den (Ralls *et al.* 1990). Possible reasons for changing dens include infestation by ectoparasites (e.g., fleas) in dens, local depletion of prey, or avoidance of coyote predators (*Canis latrans*) (Egoscue 1956). Kit foxes tend to use dens that are located in the same general area, and clusters of dens can be surrounded by hundreds of hectares of similar habitat devoid of other dens (Egoscue 1962). In the southern San Joaquin Valley, kit foxes were found to use up to 39 dens within a denning range of 320 to 482 acres (Morrell 1972). O'Farrell (1984) reported an average den density of one den per 69 to 92 acres in the southern San Joaquin Valley. Dens are used by kit foxes for temperature regulation, shelter from adverse environmental conditions, and escape from predators. Kit foxes excavate their own dens, use those constructed by other animals, and use human-made structures (culverts, abandoned pipelines, and banks in sumps or roadbeds).

The diet of the San Joaquin kit fox varies geographically, seasonally, and annually, based on temporal and spatial variation in abundance of prey. In the portion of their geographic range that includes Merced County, known prey species of the kit fox include white-footed mice (*Peromyscus* spp.), insects, California ground squirrels, kangaroo rats (*Dipodomys* spp.), San Joaquin antelope squirrels, black-tailed hares (*Lepus californicus*), and chukar (*Alectoris chukar*) (Jensen 1972, Archon 1992), listed in approximate proportion of occurrence in fecal samples. Kit foxes also prey on desert cottontails (*Sylvilagus audubonii)*, ground-nesting birds, and pocket mice (*Perognathus* spp.). The diets and habitats selected by coyotes and kit foxes living in the same areas are often quite similar. Hence, resource competition between these species may be quite high when prey resources are scarce such as during droughts, which are quite common in semi-arid, San Joaquin Valley. Competition for resources between coyotes and kit foxes may result in kit fox mortalities. Coyote-related injuries accounted for 50-87 per cent of the

mortalities of radio collared kit foxes at Camp Roberts, the Carrizo Plain Natural Area, the Lokern Natural Area, and the former Naval Petroleum Reserves (Cypher and Scrivner 1992; Standley *et al.* 1992).

San Joaquin kit foxes are primarily nocturnal, although individuals are occasionally observed resting or playing (mostly pups) near their dens during the day (Grinnell *et al.* 1937). Average distances traveled each night range from 5.8 to 9.1 miles and are greatest during the breeding season (Cypher 2000). Individuals often move independently within their home range (Cypher 2000). Kit foxes maintain core home range areas that are exclusive to mated pairs and their offspring (White and Ralls 1993, Spiegel 1996b, White and Garrott 1997). Other adult offspring from previous litters are sometimes present (Koopman *et al.* 2000). This territorial spacing behavior eventually limits the number of foxes that can inhabit an area owing to shortages of available space and per capita prey. Hence, as habitat is fragmented or destroyed, the carrying capacity of an area is reduced and a larger proportion of the population is forced to disperse. Increased dispersal generally leads to lower survival rates and, in turn, decreased abundance because greater than 65 percent of dispersing juvenile foxes die within 10 days of leaving their natal range (Koopman *et al.* 2000).

Mean annual survival rates reported for adult San Joaquin kit foxes include 0.44 at the former Naval Petroleum Reserve (Cypher *et al.* 2000), 0.53 at Camp Roberts (Standley *et al.* 1992), 0.56 at the Lokern area (Spiegel and Disney 1996), and 0.60 on the Carrizo Plain (Ralls and White 1995). However, survival rates widely vary among years (Spiegel and Disney 1996; Cypher *et al.* 2000). Mean survival rates for juvenile San Joaquin kit foxes (<1 year old) are lower than rates for adults. Survival to age 1 year was 0.14 at the former Naval Petroleum Reserve (Cypher *et al.* 2000), 0.20 at Camp Roberts (Standley *et al.* 1992), and 0.21 on the Carrizo Plain (Ralls and White 1995). For both adults and juveniles, survival rates of males and females are similar. San Joaquin kit foxes may live to ten years in captivity (McGrew 1979) and 8 years in the wild (Berry et al. 1987), but most kit foxes do not live past 2-3 years of age.

Estimates of fox density vary greatly throughout its range, and have been reported as high as 1.3 animals per square mile in optimal habitats in good years (Service 1998). At the Elk Hills in Kern County, density estimates varied from 1.86 animals per square mile in the early 1980s to 0.03 animals per square mile in 1991 (Service 1998).

Kit fox home ranges vary in size from approximately 1 to 12 square miles (649 acres to 7,680 acres) (Spiegel *et al.* 1996; Service 1998). Knapp (1978) estimated that a home range in agricultural areas is approximately 1 square mile. White and Ralls (1993) found kit foxes occupy home ranges that vary in size from 1.7 to 4.5 square miles (1,088-2,880 acres). Recently, in the Lokern area of western Kern County, home range was measured at 2.3 square miles (1,493 acres) (Nelson 2005). A mated pair of kit foxes and their current litter of pups usually occupy each home range (White and Ralls 1993, Spiegel 1996, White and Garrott 1997. Individual home ranges overlap considerably, at least outside the core activity areas (Morrell 1972; Spiegel *et al.* 1996).

Historical and Current Range, Distribution
Before 1930, the range of the San Joaquin kit fox in San Joaquin Valley extended from southern Kern County north to Tracy in San Joaquin County on the west side, and north to near La Grange in Stanislaus County on the east side (Grinnell *et al.* 1937; Service 1998).

By 1930, the kit fox range had been reduced by more than half, with the largest portion remaining in the southern and western parts of the Valley. By 1958, an estimated 50% of the Valley's original natural communities had been lost, due to extensive land conversions, intensive land uses, and the use of pesticides. The status (i.e., distribution, abundance) of the kit fox has decreased since its listing in 1967. In 1979, only about 6.7% of the San Joaquin Valley's original wildlands south of Stanislaus County remained untilled and undeveloped.

Today most of the natural communities used by kit fox are represented only by small, degraded remnants. Kit foxes are found in grassland and scrubland communities, which have been extensively modified by humans with oil exploration, wind turbines, agricultural practices, and/or grazing. The kit fox population is fragmented, particularly in the northern part of the range. This trend is reasonably certain to continue into the foreseeable future unless measures to protect, sustain, and restore suitable habitats, and alleviate other threats to their survival and recovery, are implemented. Threats that are seriously affecting kit foxes are described in further detail in the following paragraphs.

Presently, there are approximately 989 extant occurrences of San Joaquin kit fox in California (CNDDB 2007). These are located in 15 central and southern California counties within or bordering the San Joaquin Valley: Alameda (19), Contra Costa (25), Fresno (78), Kern (459), Kings (67), Madera (5), Merced (50), Monterey (53), San Benito (35), San Joaquin (20), San Luis Obispo (92), Santa Barbara (14), Santa Clara (7), Stanislaus (11), and Tulare (99). Most extant occurrences are in Kern County.

Reasons for Decline and Threats to Survival of the San Joaquin Kit Fox
Loss of Habitat Less than 20 percent of the habitat within the historical range of the kit fox remained when the subspecies was listed as federally-endangered in 1967, and there has been a substantial net loss of habitat since that time. Historically, San Joaquin kit foxes occurred throughout California's Central Valley and adjacent foothills. Extensive land conversions in the Central Valley began as early as the mid-1800s with the Arkansas Reclamation Act. By the 1930's, the range of the kit fox had been reduced to the southern and western parts of the San Joaquin Valley (Grinnell *et al.* 1937). The primary factor contributing to this restricted distribution was the conversion of native habitat to irrigated cropland, industrial uses (e.g., hydrocarbon extraction), and urbanization (Laughrin 1970, Jensen 1972; Morrell 1972, 1975). Approximately one-half of the natural communities in the San Joaquin Valley were tilled or developed by 1958 (Service 1980).

This rate of loss accelerated following the completion of the Central Valley Project and the State Water Project, which diverted and imported new water supplies for irrigated agriculture (Service 1995). Approximately 1.97 million acres of habitat, or about 66,000 acres per year, were converted in the San Joaquin region between 1950 and 1980 (California Department of Forestry and Fire Protection 1988). The counties specifically noted as having the highest wildland

conversion rates included Kern, Tulare, Kings, and Fresno, all of which are occupied by kit foxes. From 1959 to 1969 alone, an estimated 34 percent of natural lands were lost within the then-known kit fox range (Laughrin 1970).

By 1979, only approximately 370,000 acres out of a total of approximately 8.5 million acres on the San Joaquin Valley floor remained as non-developed land (Williams 1985, Service 1980). Data from the CDFG (1985) and Service file information indicate that between 1977 and 1988, essential habitat for the blunt-nosed leopard lizard, a species that occupies habitat that is also suitable for kit foxes, declined by about 80 percent - from 311,680 acres to 63,060 acres, an average of about 22,000 acres per year (USFWS 2000). Virtually all of the documented loss of essential habitat was the result of conversion to irrigated agriculture.

During 1990 to 1996, a gross total of approximately 71,500 acres of habitat were converted to farmland in 30 counties (total area 23.1 million acres) within the Conservation Program Focus area of the Central Valley Project. This figure includes 42,520 acres of grazing land and 28,854 acres of "other" land, which is predominantly comprised of native habitat. During this same time period, approximately 101,700 acres were converted to urban land use within the Conservation Program Focus area (California Department of Conservation 1994, 1996, 1998). This figure includes 49,705 acres of farmland, 20,476 acres of grazing land, and 31,366 acres of "other" land, which is predominantly comprised of native habitat. Because these assessments included a substantial portion of the Central Valley and adjacent foothills, they provide the best scientific and commercial information currently available regarding the patterns and trends of land conversion within the kit fox's geographic range.

In summary, more than one million acres of suitable habitat for kit foxes have been converted to agricultural, municipal, or industrial uses since the listing of the kit fox. In contrast, less than 500,000 acres have been preserved or are subject to community-level conservation efforts designed, at least in part, to further the conservation of the kit fox (Service 1998).

Land conversions contribute to declines in kit fox abundance through direct and indirect mortalities, displacement, reduction of prey populations and denning sites, changes in the distribution and abundance of larger canids that compete with kit foxes for resources, and reductions in carrying capacity. Kit foxes may be buried in their dens during land conversion activities (C. Van Horn, Endangered Species Recovery Program, Bakersfield, personal communication to S. Jones, Fish and Wildlife Service, Sacramento, 2000), or permanently displaced from areas where structures are erected or the land is intensively irrigated (Jensen 1972, Morrell 1975). Furthermore, even moderate fragmentation or loss of habitat may significantly impact the abundance and distribution of kit foxes. Capture rates of kit foxes at the Naval Petroleum Reserve in Elk Hills were negatively associated with the extent of oil-field development after 1987 (Warrick and Cypher 1998). Likewise, the California Energy Commission found that the relative abundance of kit foxes was lower in oil-developed habitat than in nearby undeveloped habitat at Lokern (Spiegel 1996a). Researchers from both studies inferred that the most significant effect of oil development was the lowered carrying capacity for populations of both foxes and their prey species owing to the changes in habitat characteristics or the loss and fragmentation of habitat (Spiegel 1996b, Warrick and Cypher 1998).

Dens are essential for the survival and reproduction of kit foxes that use them year-round for shelter and escape and in the spring for rearing young. Hence, kit foxes generally have dozens of dens scattered throughout their territories. However, land conversion reduces the number of typical earthen dens available to kit foxes. For example, the average density of typical, earthen kit fox dens at the Naval Petroleum Reserve was negatively correlated with the intensity of petroleum development (Zoellick *et al.* 1987), and almost 20 percent of the dens in developed areas were found to be in well casings, culverts, abandoned pipelines, oil well cellars, or in the banks of sumps or roads (Service 1983). These results are important because the California Energy Commission found that, even though kit foxes frequently used pipes and culverts as dens in oil-developed areas of western Kern County, only earthen dens were used to birth and wean pups (Spiegel 1996b). Similarly, kit foxes in Bakersfield use atypical dens, but have only been found to rear pups in earthen dens (P. Kelly, Endangered Species Recovery Program, Fresno, personal communication to P. White, Fish and Wildlife Service, Sacramento, April 6, 2000). Hence, the fragmentation of habitat and destruction of earthen dens could adversely affect the reproductive success of kit foxes. Furthermore, the destruction of earthen dens may also affect kit fox survival by reducing the number and distribution of escape refuges from predators. Land conversions and associated human activities can lead to widespread changes in the availability and composition of mammalian prey for kit foxes. For example, oil field disturbances in western Kern County have resulted in shifts in the small mammal community from the primarily granivorous species that are the staple prey of kit foxes (Spiegel 1996b), to species adapted to early successional stages and disturbed areas (e.g., California ground squirrels)(Spiegel 1996a). Because more than 70 percent of the diets of kit foxes usually consist of abundant leporids (*Lepus*, *Sylvilagus*) and rodents (e. g., *Dipodomys* spp.), and kit foxes often continue to feed on their staple prey during ephemeral periods of prey scarcity, such changes in the availability and selection of foraging sites by kit foxes could influence their reproductive rates, which are strongly influenced by food supply and decrease during periods of prey scarcity (White and Garrott 1997, 1999).

Extensive habitat destruction and fragmentation have contributed to smaller, more-isolated populations of kit foxes. Small populations have a higher probability of extinction than larger populations because their low abundance renders them susceptible to stochastic (i.e., random) events such as high variability in age and sex ratios, and catastrophes such as floods, droughts, or disease epidemics (Lande 1988, Frankham and Ralls 1998, Saccheri *et al.* 1998). Similarly, isolated populations are more susceptible to extirpation by accidental or natural catastrophes because their recolonization has been hampered. These chance events can adversely affect small, isolated populations with devastating results. Extirpation can even occur when the members of a small population are healthy, because whether the population increases or decreases in size is less dependent on the age-specific probabilities of survival and reproduction than on raw chance (sampling probabilities). Owing to the probabilistic nature of extinction, many small populations will eventually lose out and go extinct when faced with these stochastic risks (Caughley and Gunn 1995).

Oil fields in the southern half of the San Joaquin Valley also continue to be an area of expansion and development activity. This expansion is reasonably certain to increase in the near future owing to market-driven increases in the price of oil. The cumulative and long-term effects of oil extraction activities on kit fox populations are not fully known, but recent studies indicate that

moderate- to high-density oil fields may contribute to a decrease in carrying capacity for kit foxes owing to habitat loss or changes in habitat characteristics (Spiegel 1996b, Warrick and Cypher 1998). There are no limiting factors or regulations that are likely to retard the development of additional oil fields. Hence, it is reasonably certain that development will continue to destroy and fragment kit fox habitat into the foreseeable future.

Competitive Interactions with Other Canids. Several species prey upon San Joaquin kit foxes (such as coyotes, bobcats, non-native red foxes, badgers, and golden eagles [*Aquila chrysaetos*]). Badgers, coyotes, and red foxes also may compete for den sites (Service 1998). The diets and habitats selected by coyotes and kit foxes living in the same areas are often quite similar (Cypher and Spencer 1998). Hence, the resource competition between these species may be quite high when prey resources are scarce such as during droughts (which are quite common in semi arid, central California). Land conversions and associated human activities have led to changes in the distribution and abundance of coyotes, which compete with kit foxes for resources.

Coyotes occur in most areas with abundant populations of kit foxes and, during the past few decades, coyote abundance has increased in many areas owing to a decrease in ranching operations, favorable landscape changes, and reduced control efforts (Orloff *et al.* 1986, Cypher and Scrivner 1992, White and Ralls 1993, White *et al.* 1995). Coyotes may attempt to lessen resource competition with kit foxes by killing them. Coyote-related injuries accounted for 50-87 percent of the mortalities of radio collared kit foxes at Camp Roberts, the Carrizo Plain Natural Area, the Lokern Natural Area, and the former Naval Petroleum Reserves (Cypher and Scrivner 1992, Standley *et al.* 1992, Ralls and White 1995, Spiegel 1996b). Coyote-related deaths of adult foxes appear to be largely additive (i.e., in addition to deaths caused by other mortality factors such as disease and starvation) rather than compensatory (i.e., tending to replace deaths due to other mortality factors; White and Garrott 1997). Hence, the survival rates of adult foxes decrease significantly as the proportion of mortalities caused by coyotes increase (Cypher and Spencer 1998, White and Garrott 1997), and increases in coyote abundance may contribute to significant declines in kit fox abundance (Cypher and Scrivner 1992, Ralls and White 1995, White *et al.* 1996). There is some evidence that the proportion of juvenile foxes killed by coyotes increases as fox density increases (White and Garrott 1999). This density-dependent relationship would provide a feedback mechanism that reduces the amplitude of kit fox population-dynamics and keeps foxes at lower densities than they might otherwise attain. In other words, coyote-related mortalities may dampen or prevent fox population growth, and accentuate, hasten, or prolong population declines.

Land-use changes also contributed to the expansion of non-native red foxes into areas inhabited by kit foxes. Historically, the geographic range of the red fox did not overlap with that of the San Joaquin kit fox. By the 1970's, however, introduced and escaped red foxes had established breeding populations in many areas inhabited by San Joaquin kit foxes (Lewis *et al.* 1993). The larger and more aggressive red foxes are known to kill kit foxes (Ralls and White 1995), and could displace them, as has been observed in the arctic when red foxes expanded into the ranges of smaller arctic foxes (Hersteinsson and Macdonald 1982). The increased abundance and distribution of non-native red foxes will also likely adversely affect the status of kit foxes because they are closer morphologically and taxonomically, and would likely have higher dietary overlap than coyotes, resulting in more intense competition for resources. Two documented

deaths of kit foxes due to red foxes have been reported (Ralls and White 1995), and red foxes appear to be displacing kit foxes in the northwestern part of their range (Lewis *et al.* 1993). At Camp Roberts, red foxes have usurped several dens that were used by kit foxes during previous years (California Army National Guard, Camp Roberts Environmental Office, unpublished. data). In fact, opportunistic observations of red foxes in the cantonment area of Camp Roberts have increased 5-fold since 1993, and no kit foxes have been sighted or captured in this area since October 1997. In addition, a telemetry study of sympatric red foxes and kit foxes in the Lost Hills area has detected spatial segregation between these species, suggesting that kit foxes may avoid or be excluded from red fox-inhabited areas (P. Kelly, Endangered Species Recovery Program, Fresno, pers. comm. to P. White, Fish and Wildlife Service, Sacramento, April 6, 2000). Such avoidance would limit the resources available to local populations of kit foxes and possibly result in decreased fox abundance and distribution.

Disease. Wildlife diseases do not appear to be a primary mortality factor that consistently limits kit fox populations throughout their range (McCue and O'Farrell 1988, Standley and McCue 1992). However, central California has a high incidence of wildlife rabies cases (Schultz and Barrett 1991), and high prevalence of canine distemper virus and canine parvovirus indicate that kit fox populations have been exposed to these diseases (McCue and O'Farrell 1988; Standley and McCue 1992). Hence, disease outbreaks could cause substantial mortality or contribute to reduced fertility in seropositive females, as was noted in closely-related swift foxes (*Vulpes velox*).

For example, there are some indications that rabies virus may have contributed to a catastrophic decrease in kit fox abundance at Camp Roberts in San Luis Obispo County during the early 1990's. San Luis Obispo County had the highest incidence of wildlife rabies cases in California during 1989 to 1991, and striped skunks (*Mephitis mephitis*) were the primary vector (Barrett 1990, Schultz and Barrett 1991, Reilly and Mangiamele 1992). A rabid skunk was trapped at Camp Roberts during 1989 and two foxes were found dead due to rabies in 1990 (Standley *et al.* 1992). Captures of kit foxes during annual live trapping sessions at Camp Roberts decreased from 103 to 20 individuals during 1988 to 1991. Captures of kit foxes were positively correlated with captures of skunks during 1988 to 1997; suggesting that some factor(s) such as rabies virus was contributing to concurrent decreases in the abundances of these species. In addition, captures of kit foxes at Camp Roberts were negatively correlated with the proportion of skunks that were rabid when trapped by County Public Health Department personnel two years previously. These data suggest that a rabies outbreak may have occurred in the skunk population and spread into the fox population. A similar time lag in disease transmission and subsequent population reductions was observed in Ontario, Canada, although in this instance the transmission was from red foxes to striped skunks (MacDonald and Voigt 1985).

Pesticides and Rodenticides. Pesticides and rodenticides pose a threat to kit foxes through direct or secondary poisoning. Kit foxes may be killed if they ingest rodenticide in a bait application, or if they eat a rodent that has consumed the bait. Even sublethal doses of rodenticides may lead to the death of these animals by impairing their ability to escape predators or find food. Pesticides and rodenticides may also indirectly affect the survival of kit foxes by reducing the abundances of their staple prey species.

For example, the California ground squirrel, which is the staple prey of kit foxes in the northern portion of their range, was thought to have been eliminated from Contra Costa County in 1975, after extensive rodent eradication programs. Field observations indicated that the long-term use of ground squirrel poisons in this county severely reduced kit fox abundance through secondary poisoning and the suppression of populations of its staple prey (Orloff *et al.* 1986).

Kit foxes occupying habitats adjacent to agricultural lands are also likely to come into contact with insecticides applied to crops owing to runoff or aerial drift. Kit foxes could be affected through direct contact with sprays and treated soils, or through consumption of contaminated prey. Data from the California Department of Pesticide Regulation indicate that acephate, aldicarb, azinphos methyl, bendiocarb, carbofuran, chlorpyrifos, endosulfan, s-fenvalerate, naled, parathion, permethrin, phorate, and trifluralin are used within one mile of kit fox habitat. A wide variety of crops (alfalfa, almonds, apples, apricots, asparagus, avocados, barley, beans, beets, bok choy, broccoli, cantaloupe, carrots, cauliflower, celery, cherries, chestnuts, chicory, Chinese cabbage, Chinese greens, Chinese radish, collards, corn, cotton, cucumbers, eggplants, endive, figs, garlic, grapefruit, grapes, hay, kale, kiwi fruit, kohlrabi, leeks, lemons, lettuce, melons, mustard, nectarines, oats, okra, olives, onions, oranges, parsley, parsnips, peaches, peanuts, pears, peas, pecans, peppers, persimmons, pimentos, pistachios, plums, pomegranates, potatoes, prunes, pumpkins, quinces, radishes, raspberries, rice, safflower, sorghum, spinach, squash, strawberries, sugar beets, sweet potatoes, Swiss chard, tomatoes, walnuts, watermelons, and wheat), as well as buildings, Christmas tree plantations, commercial/industrial areas, greenhouses, nurseries, landscape maintenance, ornamental turf, rangeland, rights of way, and uncultivated agricultural and non agricultural land, occur in close proximity to San Joaquin kit fox habitat.

Efforts have been underway to reduce the risk of rodenticides to kit foxes (Service 1993). The Federal government began controlling the use of rodenticides in 1972 with a ban of Compound 1080 on Federal lands pursuant to Executive Order. Aboveground application of strychnine within the geographic ranges of listed species was prohibited in 1988. A July 28, 1992, biological opinion regarding the Animal Damage Control (now known as Wildlife Services) Program by the U.S. Department of Agriculture found that this program was likely to jeopardize the continued existence of the kit fox owing to the for rodent control activities to take the fox. As a result, several reasonable and prudent measures were implemented, including a ban on the use of M-44 devices, toxicants, and fumigants within the recognized occupied range of the kit fox. Also, the only chemical authorized for use by Wildlife Services within the occupied range of the kit fox was zinc phosphide, a compound known to be minimally toxic to kit foxes (Service 1993).

Despite these efforts, the use of other pesticides and rodenticides still pose a significant threat to the kit fox, as evidenced by the death of 2 kit foxes at Camp Roberts in 1992 owing to secondary poisoning from chlorophacinone applied as a rodenticide, (Berry *et al.* 1992, Standley *et al.* 1992). In addition, the livers of 3 foxes that were recovered in the City of Bakersfield during 1999 were found to contain detectable residues of the anticoagulant rodenticides chlorophacinone, brodifacoum, and bromadiolone (California Department of Fish and Game 1999).

To date, no specific research has been conducted on the effects of different pesticide or rodent control programs on the kit fox (Service 1998). This lack of information is problematic because Williams (in lit., 1989) documented widespread pesticide use in known kit fox and Fresno kangaroo rat habitat adjoining agricultural lands in Madera County. In a separate report, Williams (in lit., 1989) documented another case of pesticide use near Raisin City, Fresno County, where treated grain was placed within an active Fresno kangaroo rat precinct. In addition, farmers have been allowed to place bait on Bureau of Reclamation property to maximize rodent kills before they entered adjoining fields (biological opinion for the Interim Water Contract Renewal, Ref. No. 1-1-00-F-0056, February 29, 2000).

A September 22, 1993, biological opinion issued by the Service to the Environmental Protection Agency (EPA) regarding the regulation of pesticide use (31 registered chemicals) through administration of the Federal Insecticide, Fungicide, and Rodenticide Act found that use of the six chemicals would likely jeopardize the continued existence of the kit fox. These chemicals are: (1) aluminum and magnesium phosphide fumigants; (2) chlorophacinone anticoagulants; (3) diphacinone anticoagulants; (4) pival anticoagulants; (5) potassium nitrate and sodium nitrate gas cartridges; and (6) sodium cyanide capsules (Service 1993). Reasonable and prudent alternatives to avoid jeopardy included restricting the use of aluminum/magnesium phosphide, potassium/sodium nitrate within the geographic range of the kit fox to qualified individuals, and prohibiting the use of chlorophacinone, diphacinone, pival, and sodium cyanide within the geographic range of the kit fox, with certain exceptions (e.g., agricultural areas that are greater than 1 mile from any kit fox habitat)(Service 1999).

Endangered Species Act Section 9 Violations and Noncompliance with the Terms and Conditions of Existing Biological Opinions. The intentional or unintentional destruction of areas occupied by kit foxes is an issue of serious concern. Section 9 of the ESA prohibits the "take" (e.g., harm, harass, pursue, injure, kill) of federally listed wildlife species. "Harm" (i.e., "take") is further defined to include habitat modification or degradation that kills or injures wildlife by impairing essential behavioral patterns including breeding, feeding, or sheltering. Congress established two provisions (under sections 7 and 10 of the ESA) that allow for the "incidental take" of listed species of wildlife by Federal agencies, non-Federal government agencies, and private interests. Incidental take is defined as "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity". Such take requires a permit from the Secretary of the Interior that anticipates a specific level of take for each listed species. If no permit is obtained for the incidental take of listed species, the individuals or entities responsible for these actions could be liable under the enforcement provisions of section 9 of the ESA if any unauthorized take occurs. Nevertheless, the Service is aware of numerous instances of conversion of fox habitat to agricultural, residential, and commercial purposes throughout the San Joaquin Valley.

Risk of Chance Extinction Owing To Small Population Size, Isolation, and High Natural Fluctuations in Abundance. Historically, kit foxes may have existed in a metapopulation structure of core and satellite populations, some of which periodically experienced local extinctions and recolonization (Service 1998). Today's populations exist in an environment drastically different from the historic one, however, and extensive habitat fragmentation will result in geographic isolation, smaller population sizes, and reduced genetic exchange among populations; all of which increase the vulnerability of kit fox populations to extirpation.

Populations of kit foxes are extremely susceptible to the risks associated with small population size and isolation because they are characterized by marked instability in population density. For example, the relative abundance of kit foxes at the Naval Petroleum Reserves, California, decreased 10-fold during 1981 to 1983, increased 7-fold during 1991 to 1994, and then decreased 2-fold during 1995 (Cypher and Scrivner 1992, Cypher and Spencer 1998).

Many populations of kit fox are at risk of chance extinction owing to small population size and isolation. This risk has been prominently illustrated during recent, drastic declines in the populations of kit foxes at Camp Roberts and Fort Hunter Liggett. Captures of kit foxes during annual live trapping sessions at Camp Roberts decreased from 103 to 20 individuals during 1988 to 1991. This decrease continued through 1997 when only three kit foxes were captured (White *et al.* 2000). A similar decrease in kit fox abundance occurred at nearby Fort Hunter Liggett, and only 2 kit foxes have been observed on this installation since 1995 (L. Clark, Wildlife Biologist, Fort Hunter Liggett, pers. comm. to P. White, Service, Sacramento, February 15, 2000). It is unlikely that the current low abundances of kit foxes at Camp Roberts and Fort Hunter Liggett will increase substantially in the near future owing to the limited for recruitment. The chance of substantial immigration is low because the nearest core population on the Carrizo Plain is distant (greater than 16 miles) and separated from these installations by barriers to kit fox movement such as roads, developments, and irrigated agricultural areas. In addition, there is a relatively high abundance of sympatric predators and competitors on these installations that contribute to low survival rates for kit foxes and, as a result, may limit population growth (White *et al.* 2000). Hence, these populations may be on the verge of extinction.

The destruction and fragmentation of habitat could also eventually lead to reduced genetic variation in populations of kit foxes that are small and geographically isolated. Historically, kit foxes likely existed in a metapopulation structure of core and satellite populations, some of which periodically experienced local extinctions and recolonization. Preliminary genetic assessments indicate that historic gene flow among populations was quite high, with effective dispersal rates of at least one to 4 dispersers per generation (M. Schwartz, University of Montana, Missoula, pers. comm. on March 23, 2000, to P. White, Service, Sacramento, California). This level of genetic dispersal should allow for local adaptation while preventing the loss of any rare alleles. Based on these results, it is likely that northern populations of kit foxes were once panmictic (i.e., randomly mating in a genetic sense), or nearly so, with southern populations. In other words, there were no major barriers to dispersal among populations.

Current levels of gene flow also appear to be adequate, however, extensive habitat loss and fragmentation continues to form more or less geographically distinct populations of foxes, which could reduce genetic exchange among them. An increase in inbreeding and the loss of genetic variation could increase the extinction risk for small, isolated populations of kit foxes by interacting with demography to reduce fecundity, juvenile survival, and lifespan (Lande 1988, Frankham and Ralls 1998, Saccheri *et al.* 1998).

An area of particular concern is Santa Nella in western Merced County where pending development plans threaten to eliminate the little suitable habitat that remains and provides a dispersal corridor for kit foxes between the northern and southern portions of their range.

Preliminary estimates of expected heterozygosity from foxes in this area indicate that this population may already have reduced genetic variation.

Other populations that may be showing the initial signs of genetic isolation are the Lost Hills area in northwestern Kern County and populations in the Salinas-Pajaro River watershed (i.e., Camp Roberts and Fort Hunter Liggett). Preliminary estimates of the mean number of alleles per locus from foxes in these populations indicate that allelic diversity is lower than expected. Although these results may, in part, be due to the small number of foxes sampled in these areas, they may also be indicative of an increase in the amount of inbreeding due to population subdivision (M. Schwartz, University of Montana, Missoula, pers. comm. on March 23, 2000, to P. J. White, Fish and Wildlife Service, Sacramento, California). Further sampling and analyses are necessary to assess adequately the effects of these genetic bottlenecks.

Arid systems are characterized by unpredictable fluctuations in precipitation, which lead to high frequency, high amplitude fluctuations in the abundance of mammalian prey for kit foxes (Goldingay *et al.* 1997, White and Garrott 1999). Because the reproductive and neonatal survival rates of kit foxes are strongly depressed at low prey densities (White and Ralls 1993; White and Garrott 1997, 1999), periods of prey scarcity owing to drought or excessive rain events can contribute to population crashes and marked instability in the abundance and distribution of kit foxes (White and Garrott 1999). In other words, unpredictable, short-term fluctuations in precipitation and, in turn, prey abundance can generate frequent, rapid decreases in kit fox density that increase the extinction risk for small, isolated populations.

Status with Respect to Recovery/Conservation
The primary goal of the recovery strategy for kit foxes identified in the Recovery Plan is to establish a complex of interconnected core and satellite populations throughout the species' range. The long-term viability of each of these core and satellite populations depends partly upon periodic dispersal and genetic flow between them. Therefore, kit fox movement-corridors between these populations must be preserved and maintained. In the northern range, from the Ciervo Panoche in Fresno County northward, kit fox populations are small and isolated, and have exhibited significant decline. The core populations are the Ciervo Panoche area, the Carrizo Plain area, and the western Kern County population. Satellite populations are found in the urban Bakersfield area, Porterville/Lake Success area, Creighton Ranch/Pixley Wildlife Refuge, Allensworth Ecological Reserve, Semitropic/Kern National Wildlife Refuge (NWR), Antelope Plain, eastern Kern grasslands, Pleasant Valley, western Madera County, Santa Nella, Kesterson NWR, and Contra Costa County. Major corridors connecting these population areas are on the east and west side of the San Joaquin Valley, around the bottom of the Valley, and cross-valley corridors in Kern, Fresno, and Merced counties.

In response to the drastic loss of habitat and steadily increasing fragmentation, California Department of Transportation and the Service convened a San Joaquin Kit Fox Conservation and Planning Team to address the rapid decline of kit fox habitat in the northern range, and increasing barriers to kit fox dispersal. Consisting of Federal, State, and local agencies, local land trusts, environmental groups, researchers, and other concerned individuals, the goal of this team was to coordinate agency actions that will recover the species, and troubleshoot threats to San Joaquin kit foxes as they emerge. Between the years 2001-2003, the team addressed

connectivity issues at specific points along the west-side corridor north of the Ciervo Panoche core population.

San Joaquin kit fox Environmental Baseline within the Action Area

The distribution of San Joaquin kit fox is widely discontinuous within the action area. There are approximately 360 extant occurrences of the San Joaquin kit fox in the existing PG&E right-of-ways of the 276,350-acre action area. This is approximately 36% of all remaining occurrences for the species. Approximately 12 occurrences are in San Joaquin County, 5 in Stanislaus County, 22 in Merced County, 2 in Madera County, 37 in Fresno County, 29 in Kings County, 10 in Tulare County, and 243 in the Kern County portions of the action area. The 360 extant occurrences for this species occupy approximately 72,763 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007).

The HCP identified 6 of the 16 HCP land-cover types as land-cover utilized by the San Joaquin kit fox. These are: Agricultural Fields, Blue Oak Woodland, Grassland, Seasonal Wetland, Upland Scrub, and Valley-Oak Woodland cover types. The HCP concluded that only 70% of the Grassland land-cover in the action area is suitable habitat for San Joaquin kit fox. The HCP also concluded that 10% of Upland Scrub and 20% of Seasonal Wetland cover types in the action area are suitable for kit fox occupancy, while only 2% of the Agricultural Fields, Blue Oak Woodland, and Valley-Oak Woodland land-cover in the action area are suitable habitat for the San Joaquin kit fox. There are 4,177,433 acres of Grassland cover in the action area (34% of the action area). Therefore, 2,924,203 acres of Grassland in the action area can provide suitable habitat for the San Joaquin kit fox. Because of habitat fragmentation resulting from urbanization and agricultural development, portions of suitable habitat remaining in the action area are not occupied by San Joaquin kit fox.

HCP Table 3-10 (Estimate of Percentage of Habitat Considered Suitable for Occupancy) did not include the Urban and Other Developed and Disturbed (ODD) land cover types. However, San Joaquin kit fox dens have been found in urban and other highly disturbed areas within their existing range.

Effects of the Action on San Joaquin kit fox

Direct Effects

The actual acres of impact to San Joaquin kit fox suitable habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and estimated for the small disturbance activities.

The HCP estimated that ground-disturbing covered activities would directly disturb 73 acres of San Joaquin kit fox suitable-habitat each year (2,190 acres of temporary habitat disturbance over 30 years). Less than one acre per year of San Joaquin kit fox suitable habitat is expected to be permanently lost each year (less than 30 acres of habitat destroyed over 30 years). Most individual habitat disturbances would occur in small, linear areas (<0.1 to 18 acres per site) and would be scattered over suitable habitat in the remaining range of the species in the San Joaquin Valley. Effects are expected to be distributed fairly uniformly throughout the action area; approximately 27% of the effects occur in the northern San Joaquin Valley (San Joaquin, Stanislaus, and Mariposa Counties), 38% occur in the central San Joaquin Valley (Merced, Madera, and Fresno Counties), and 35% occur in the southern San Joaquin Valley (Kings, Kern,

and Tulare Counties). Because San Joaquin kit fox occurrences are more numerous in Kern County than in other parts of the action area (see *Current Range, Distribution)*, implementing covered activities in the south San Joaquin Valley will have a proportionally greater effect on the species. Over the term of the Permit, ground-disturbing covered activities in the existing PG&E right of ways will have the potential to affect 360 extant occurrences of San Joaquin kit fox, or 36% of the remaining occurrences of the San Joaquin kit fox.

HCP Table 3-11 indicates that the "other disturbance" covered activities (activities such as off-road travel and tree trimming that do not disturb ground surfaces) will affect 433 acres of San Joaquin kit fox habitat each year. Over the 30-year Permit term, these "other disturbance" will occur in 12,990 acres of suitable habitat for the San Joaquin kit fox.

The ground-disturbing covered-activities and the "other disturbance" covered-activities have the potential to cause direct take of individual San Joaquin kit foxes. Kit foxes in their dens could be crushed or harmed by equipment and vehicles driving over the occupied dens. Vehicles or equipment could strike kit foxes when they are out of their burrows. Kit foxes could be attracted to prey that is displaced from the "minor construction" or the other medium/large ground disturbing activity sites, and thus be exposed to an elevated potential for injury, mortality, or predation. Kit foxes in dens adjacent to work-sites could be directly affected by noise and vibration from minor construction and medium/large disturbance activities; such disturbance could disrupt reproduction.

Implementation of AMMs would reduce the potential for direct effects on this covered species. Covered-activity sites larger than 0.1 acre will have pre-activity surveys prior to land disturbance. Under AMM 21, if any kit fox den is present in or adjacent to the proposed work site, PG&E will avoid den disturbance and destruction to the maximum extent possible. However, if dens located within a proposed work area cannot be avoided during ground disturbing activities, qualified PG&E biologists will determine if the dens are occupied, in accordance with Service procedures (USFWS 1999). If unoccupied, the qualified biologist will remove these dens by hand excavating them in accordance with Service procedures (USFWS 1999). If kit fox occupy a den, PG&E will implement a work-exclusion zone around the den site following USFWS (1999) or the latest USFWS procedures. The radius of these work-exclusion zones will follow the latest procedure standards or will be as follows: Potential Den - 50 feet; Known Den-100 feet; Natal or Pupping Den-to be determined on a case-by-case basis in coordination with the Service and CDFG. Pipes will be capped and exit ramps will also be installed in these areas to avoid direct mortality.

The "general" AMMs (AMMs 1-6, 8, 10, 29, and 30) include limiting the speed of off-road vehicles to 15 mph, minimizing the construction of new access roads, and parking vehicles in previously disturbed areas where practicable. Standard restrictions on human activities at construction sites (e.g., prohibition of firearms and dogs, proper disposal of food scraps) are standard PG&E operating requirements. These AMMs will minimize the potential for vehicles or equipment strikes and other direct effects on individual San Joaquin kit foxes during "other disturbance" activities and during ground-disturbing covered activities. The above measures will limit direct mortality of San Joaquin kit fox, but will not eliminate potential for a small amount of direct take over the life of the Permit.

Indirect Effects
Covered-activity equipment or vehicles could collapse empty dens, indirectly affecting the individual kit foxes that periodically use that den for temperature regulation, shelter from adverse environmental conditions, and escape from predators in their home range. Hand removal of unoccupied dens under AMM 21 could also indirectly affect individual kit foxes that periodically use that den for temperature regulation, shelter from adverse environmental conditions, and escape from predators in their home range.

Most covered-activities causing land-cover disturbances are of short duration (i.e. several hours, or at most several days). Most individual ground-disturbing covered-activities will disturb less than 0.5 acre of land-cover in suitable San Joaquin kit fox habitat. Because of the small size of most ground-disturbances, the disturbance site will likely remain usable by kit fox immediately after the activity is completed (i.e., the site will continue to support kit fox foraging, breeding, sheltering, migration or new colonization in the area). The average kit-fox home range in central and southern San Joaquin Valley is relatively large (1 to 4.5 square miles), and most kit fox behaviors would not be affected by a small area of habitat disturbance within that large home range. Except for the few covered-activities that require new roads, such as electric poles and substation expansions or the activities that include permanent above ground facilities, almost all ground-disturbing covered-activities cause a temporary disturbance of land-cover. The majority of suitable habitat for the San Joaquin kit fox in the action area is the Grassland land-cover type. The HCP describes Grasslands as a land-cover as habitat that recovers rapidly from disturbance (i.e. 1 to 3 years). In addition, the vast majority of temporary land-cover disturbances to Grassland will occur in existing PG&E right-of-ways where some amount of land-cover disturbance has occurred previously.

Some covered-activities may disturb 10 to 18 acres of suitable San Joaquin kit fox habitat. Loss of vegetation and other substantial habitat changes in these larger disturbance sites may cause a small local depletion of kit fox prey items. The depletion of prey items would likely be temporary, but would persist until adequate habitat for prey-species returns in the disturbance site (1-3 years). This local depletion in prey items could indirectly affect individual kit foxes by causing them to abandon foraging in that area of their home range, or cause them to move to an alternate den site within their home range. However, most land-cover disturbances are long and relatively narrow, which reduces the effect of the larger disturbances on prey item habitat.

Ground disturbance from medium and large covered-activities may allow noxious or invasive weed-species to take over the work site. Conversion of annual grassland to a land-cover dominated by invasive weed species could permanently change the food availability and habitat of mammalian prey-items in that site. A local change in abundance or types of prey-items in a portion of a kit fox home range could have a long-term indirect-effect on kit fox foraging and reproductive success in that home range. However, individual medium and large disturbance sites are relatively small (0.1 to 18 acres), which would affect approximately 0.3% to 2.8% of the average-sized south San Joaquin Valley kit fox home-range. Medium and large disturbance covered-activities are expected to disturb 322 acres in the action area each year (9,663 acres in the 276,350-acre action area over 30 years). PG&E's use of general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix)

may discourage introduction of noxious or invasive weeds in those disturbance sites, and will help restore vegetative cover in the disturbance site(after the beginning of the next rainy season).

Despite implementation of the general AMMs and AMM 21, however, a potential remains for a small amount of San Joaquin kit fox direct and indirect take to occur from the Covered Activities over the term of the permit.

Effects of Compensation Measures
Permanent loss of suitable habitat will be compensated at the 3:1 ratio and temporary disturbance to suitable habitat will be compensated at 0.5:1 ratio. The HCP estimates PG&E will provide 10.42 acres of San Joaquin kit fox compensation in the North San Joaquin Valley, 12.97 acres in the Central San Joaquin Valley, and 15.48 acres in the South San Joaquin Valley annually. Overall, PG&E will provide 38.9 acres of San Joaquin kit fox compensation annually (1,166 acres over 30 years). To compensate for potential take of kit fox expected from the first 5 years of covered activity effects, PG&E will initially protect 195 acres of grassland or other habitat that supports San Joaquin kit fox. Additional mitigation will be provided in 5-year increments and will stay ahead of effects to the species.

Compensation areas for San Joaquin kit fox will be located within the species' present range in areas that are generally considered occupied habitat. Compensation areas will be selected to contribute to maintenance of large habitat blocks and maintain connectivity of remaining San Joaquin kit fox habitat in the San Joaquin Valley, consistent with the *San Joaquin Valley Recovery Plan* (USFWS 1998). Compensation areas will provide permanent habitat protection and management to compensate for temporary disturbances to suitable kit fox habitat.

Conclusion
We anticipate that the proposed action will affect the San Joaquin kit fox as described in the analysis above, including direct and indirect effects from the disturbance of 73 acres of suitable San Joaquin kit fox habitat annually (approximately 2,290 acres of suitable habitat disturbance over the 30-year Permit term) and the permanent loss of less than 30 acres of suitable San Joaquin kit fox habitat over the 30-year Permit term. A small amount of direct harm (kill or injury) and harassment to San Joaquin kit fox is expected from PG&E vehicles and equipment conducting "other disturbance" covered-activities on 433 acres of suitable kit fox habitat annually (12,990 acres over 30-years). Implementation of the avoidance and minimization measures included in the HCP will reduce these effects to the San Joaquin kit fox. Compensation will be provided for all direct and indirect effects to San Joaquin kit fox. PG&E will preserve approximately 39 acres of suitable and occupied San Joaquin kit fox habitat annually (an estimated 1,166 acres over 30 years).

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Joaquin kit fox. We reached this conclusion because the size of each impact to this species habitat is relatively small, and nearly all impacts to this species habitat will be temporary (lasting 1-3 years). When it occurs, the duration of effects will be relatively short. Compensatory mitigation will fully mitigate any take does occur. The relatively small amounts of direct and

indirect take expected, when viewed in conjunction with the compensation measures long-term protection and management of occupied and suitable San Joaquin kit fox is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take. Effect of the Take.
With implementation of AMMs and other HCP measures, we anticipate that the ground disturbing covered-activities and vegetative management covered-activities will not cause take in the form of harm (kill or injury) to individual San Joaquin kit fox. Therefore, we anticipate that zero (0) San Joaquin kit fox will be harmed by ground-disturbing or by vegetative management covered-activities over the term of the permit.

We also anticipate that the ground disturbing covered-activities and the vegetative management covered-activities will cause take in the form of harassment of an undetermined number of San Joaquin kit fox occupying 74-acres of suitable habitat each year (harassment of an undetermined number of kit fox on 2,220 acres of suitable habitat over 30 years).

The Service further anticipates that the "other disturbance" covered activities could result in take (kill or injury) of individual San Joaquin kit fox. Take could occur from PG&E or third-party operation of vehicles or equipment on paved roads, unpaved access roads, or driving cross-country. We anticipate that one (1) San Joaquin kit fox might experience take in the form of mortality (kill) and one (1) San Joaquin kit fox might experience take in the form of injury from vehicles or equipment implementing "other disturbance" covered activities over the 30-year term of the Permit. If a San Joaquin kit fox is harmed (killed or injured) by PG&E or their third parties, PG&E shall immediately contact the Service as described in the Permit. PG&E will continue implementing the San Joaquin Valley Operation and Management Plan and the HCP if take (kill injury) of an individual San Joaquin kit fox does occur. PG&E, the Service, and CDFG shall immediately investigate the cause of the kit fox take, and determine if certain AMMs or other elements of the HCP need to be modified through the Adaptive Management Process to prevent further take (kill or injury) of individual kit fox. The Service will then amend the Opinion to allow one (1) additional take (mortality or injury) or one additional take (injury) of a San Joaquin kit fox individual, when appropriate.

The Service also anticipates that the "other disturbance" covered activities including off-road travel, tree trimming, and other activities that do not disturb ground surface, will also cause take in the form of harassment of an undetermined number of kit fox occupying 433 acres of suitable kit fox habitat (harassment of an undetermined number of kit fox on 12,990 acres of suitable habitat over 30 years.

In total, we anticipate that all covered activities (ground disturbing, vegetation management, and "other disturbance") could result in the harassment of an undetermined number of San Joaquin kit fox occupying a total of 507 acres of suitable habitat each year (15,210 acres over the term of the proposed Permit), the direct mortality (kill) of one kit fox, and the direct injury of one kit fox.

In the above Opinion, the Service determined that these levels of take are not likely to result in the jeopardy of the San Joaquin kit fox.

PLANTS

PLANTS – VERNAL POOL and WETLAND

Plant covered species which utilize vernal pool seasonal wetlands or other wetland types are Hoover's spurge(*Chamaesyce hooveri*), legenere (*Legenere limosa*), Mason's lilaeopsis (*Lilaeopsis masonii*), succulent owl's clover (*Castilleja campestris* ssp. *succulenta*), pincushion navarretia (*Navarretia myersii* ssp. *myersii*), Colusa grass(*Neostapfia colusana*), San Joaquin Valley Orcutt grass(*Orcuttia inaequalis)*, hairy Orcutt grass(*Orcuttia pil*osa), Greene's tuctoria (*Tuctoria greenei*) and Bogg's Lake hedge-hyssop(*Gratiola heterosepala*) .

Threatened Hoover's spurge (*Chamaesyce hooveri*) and its Critical Habitat

Hoover's spurge, also known as Hoover's sandmat, is a prostrate, tap-rooted, vernal-pool annual herb in the spurge family (Euphorbiaceae). It forms grey-green mats from a few inches to a few feet across. The Hoover's spurge flowering structure, or "cyathium", has white petal-like appendages each with four red to olive in color glands.

Status of the Species and the Critical Habitat

Listing Status

Hoover's spurge was federally listed as threatened in March 1997 (62 FR 14338). A detailed account of the taxonomy, ecology, and biology of Hoover's spurge is presented in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005) and in the final rule (62 FR 14338). Final Critical Habitat was designated in August 2003(68 FR 46684), and critical habitat units for this species were published in February 2006 (71 FR 7117). The California Native Plant Society has placed Hoover's spurge on List 1B (rare or endangered throughout its range). Although the species has not been officially listed by the State of California, the Department of Fish and Game considers it "very threatened".

Life History, Reproductive Ecology

Hoover's spurge is a summer annual found in vernal pools, but few details of Hoover's spurge life history are known. Demographic data suggest that seeds of *Chamaesyce hooveri* can remain dormant until the appropriate temperature and moisture conditions occur. This dormancy is evident from the fact that plants can be absent from a given pool for up to 4 years and then reappear in substantial numbers (Stone *et al.* 1988). Seeds of Hoover's spurge germinate after water evaporates from the pools; the plants cannot grow in standing water (Alexander and Schlising 1997). Populations in Merced and Tulare Counties typically flower from late May through July, whereas those farther north in Stanislaus County and the Sacramento Valley flower from mid-June into October (Alexander and Schlising 1997, J. Silveira *in litt.* 2000, CNDDB 2003). Seed set apparently begins soon after flowering. Beetles (order Coleoptera), flies (order Diptera), bees and wasps (order Hymenoptera), and butterflies and moths (order Lepidoptera) have been observed visiting the flowers of Hoover's spurge and may serve as pollinators (Stone *et al.* 1988, Alexander and Schlising 1997).

Habitat Affinities

Hoover's spurge is restricted to vernal pools (Stone et al. 1988, Koutnik 1993). However, the plant appears adapted to a wide variety of soils, which range in texture from clay to sandy loam.

The vernal pool types and soils associated with the six areas of concentration of C. hooveri differ greatly across the geographic range of the species; these differences lead to different species compositions and environmental conditions between Hoover's spurge occurrences. Natural pools in which the plant occurs are primarily classified as Northern Hardpan and Northern Claypan vernal pools (Sawyer and Keeler-Wolf 1995. Hoover's spurge grows in relatively large, deep vernal pools among the rolling hills, remnant alluvial fans, and depositional stream terraces at the base of the Sierra Nevada foothills. It tends to occur where competition from other species has been reduced by prolonged seasonal inundation or other factors. The pools supporting this species vary in size from 0.47acres (20,520 square feet) to 618 acres.

Field observations suggest that C. hooveri is restricted to specific microhabitat sites within the vernal pools and may behave somewhat independently, depending on environmental and edaphic conditions and are likely locally adapted (Alexander and Schlising 1997; Stone et al. 1988; Vollmar 2002)

Historical and Current Range, Distribution
The historical localities for this species were in the Solano-Colusa, the Northeastern Sacramento Valley, the San Joaquin Valley, and the Southern Sierra Foothills Vernal Pool Regions (Keeler-Wolf *et al.* 1998). The distribution of Hoover's spurge is thought to be greatly reduced from historical times because of widespread destruction and degradation of its vernal pool habitat. Vernal pool habitats in the Central Valley now represent only about 25 percent of their former area, and remaining habitats are considerably more fragmented and isolated than during historical times.

The remaining occurrences of Hoover's spurge are in three general areas of concentration in Tehama, Butte, Glenn, Stanislaus, Merced, and Tulare Counties in the Sacramento and San Joaquin Valleys. The California Natural Diversity Database lists 26 extant occurrences of Hoover's spurge within six counties: Butte (3), Glenn (3), Merced (1), Stanislaus (2), Tehama (12), and Tulare (5) (CNDDB 2007). The main remaining area of concentration for Hoover's spurge is within the Northeastern Sacramento Valley Vernal Pool Region. The Vina Plains of Tehama and Butte Counties contain 15 (58 percent) of the 26 known extant occurrences for Hoover's spurge (CNDDB 2007) in an area of about 35 square miles (Stone *et al.* 1988). One other site in the same region is near Chico in Butte County. Three other occurrences are on the Sacramento National Wildlife Refuge in Glenn County, which is in the Solano-Colusa Vernal Pool Region.

Seven of the extant occurrences are in the Southern Sierra Foothills Vernal Pool Region, including two in the Hickman-La Grange area of Stanislaus County and five in the Visalia-Yettem area of Tulare County. The one other extant occurrence is on the Bert Crane Ranch in Merced County, which is within the San Joaquin Valley Vernal Pool Region (Keeler-Wolf *et al.* 1998, CNDDB 2003). The California Department of Fish and Game manages two of the extant Tulare County occurrences as part of the Stone Corral Ecological Reserve complex. One additional occurrence of Hoover's spurge in Merced County is on private land (the Bert Crane Ranch) that is protected from development by a conservation easement (J. Silveira *in litt.* 2000).

The HCP estimated that the potential geographic range of Hoover's spurge inside the San Joaquin Valley (Stanislaus, Merced, and Tulare counties) is 110,000 acres. HCP Table F2 calculated that 0.075 percent, or 83 acres, of this 110,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
Habitat loss and fragmentation are the largest threats to the survival and recovery of vernal pool species. Loss of habitat generally results from urbanization, agricultural conversion, and mining. Habitat loss also occurs in the form of habitat alteration and degradation as a result of changes to natural hydrology, invasive species, incompatible grazing regimes, infrastructure projects (e.g., roads, water storage and conveyance, utilities), recreational activities (e.g., off-highway vehicles and hiking), erosion, contamination and inadequate management and monitoring.

Agricultural conversions (*i.e.,* from grasslands or pastures to croplands, or from one crop-type to another) are a continuing specific threat, particularly in Stanislaus County (Stone *et al.* 1988). Competition from invasive native and non-native plants threatens nine of the extant occurrences, including eight in the Vina Plains and one on the Sacramento National Wildlife Refuge in Glenn County.

Five of the remaining occurrences of Hoover's spurge are subject to specific hydrologic threats; four of the five are in the San Joaquin Valley and the fifth is in the Vina Plains. Hydrology has been altered by (1) construction of levees and other water barriers and (2) runoff from adjacent agricultural operations, roads, and culverts. Such impacts result in some pools receiving insufficient water, while others remain flooded for too long to allow growth of Hoover's spurge (Stone *et al.* 1988, Stebbins *et al.* 1995, CNDDB 2003).

Some specific threats also are continuing due to inappropriate livestock grazing practices. While livestock generally do not forage on Hoover's spurge because it grows very close to the ground and contains a toxic, milky sap (Wheeler 1941, Stone *et al.* 1988), cattle trampling has been identified as seriously reducing Hoover's spurge populations at one site each in Butte and Stanislaus Counties (Stone *et al.* 1988); relatively high livestock stocking rates such as often prevail during summer months could similarly damage this plant's populations at other locations.

Another specific threat is the lack of pollinators. If essential pollinators are declining through habitat loss, Hoover's spurge may be declining in response.

The threat posed by small population size may also be a significant continuing factor. At least five of the known occurrences of this plant total fewer than 100 individuals in years of most-favorable conditions (CNDDB 2003). Two other occurrences with populations of only a few hundred individuals also may be similarly threatened. Such small populations are subject to extirpation from random events, including extrinsic factors such as weather and intrinsic factors such as genetic drift (Shaffer 1981, Menges 1991).

Critical Habitat Status
Final Critical Habitat for Hoover's spurge was originally designated in August 2003(68 FR 46684). The designation was revised August 11, 2005 (70 FR 46923). The Service published

species-specific Critical Habitat unit descriptions and maps on February 10, 2006 (71 FR 71117). The total designated Critical Habitat for Hoover's spurge is 114,713 acres within 6 Critical Habitat Units and 13 subunits in California (71 FR 7118). Hoover's spurge critical habitat units are depicted for Tehama, Stanislaus, Tuolumne, Merced, and Tulare counties.

The biological and physical features (primary constituent elements) that are essential to the conservation of Hoover's spurge in the designated critical habitat are the habitat components that provide: (1) 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, 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 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 non-native 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.

Hoover's Spurge Environmental Baseline within the Action Area

Species Baseline

There are two extant occurrences for Hoover's spurge in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). Both of these occurrences are in the Tulare County portion of the action area. The two extant occurrences for this species occupy approximately 2.1 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007). The HCP land-cover type utilized by Hoover's spurge is Seasonal Wetland. The HCP classifies Hoover's spurge as a "narrowly endemic" plant covered-species.

Critical Habitat Baseline

Of the 114,713 acres of Hoover's spurge designated Critical Habitat (71 FR 7118), approximately 229 acres are located in existing PG&E right-of-ways the 250,350-acre action area. Most Hoover's spurge critical habitat in the action area is in existing electric distribution right-of-ways. Of these 229 acres, approximately 42 acres are located in electric transmission ROWs and 170 acres are located in electric distribution. No Hoover's spurge Critical Habitat is located in the gas transmission ROWs, but the HCP estimated that 17 acres of Hoover's spurge Critical Habitat could be located inside the gas distribution ROWs of the action area.

Of the 6 Critical Habitat units designated for Hoover's spurge, 3 units and 10 subunits are located in the 276,250-acre action area. These are Unit 4 (Stanislaus County), Unit 5A (Stanislaus and Merced counties), Unit 6 A-E (Merced County), Unit 7 A-E (Tulare County). The acres of each existing PG&E line-facility ROW in each Critical Habitat Unit are shown in Opinion Table 6:

Table 6. Hoover's spurge Critical Habitat Units and Acres inside the Action Area							
Hoover's spurge Critical Habitat Units within the action area	Total Acres in the Critical Habitat Unit	Acres of existing Electric Transmission ROW in the Unit	Acres of existing Electric Distribution ROW in the Unit	Acres of existing Gas Transmission ROW in the Unit	Acres of existing Gas Distribution ROW in the Unit*	Total acres of existing ROW in the Unit	Percent of the Critical Habitat Unit overlapping an existing PG&E line-facility ROW (where effects could occur)
4	15,214	0	57.5	0	*	57.5	.38%
5	14,218	0	33.8	0	*	33.8	.24%
6	6,679	38.8	25.3	0	*	48.0	.72%
7	9,160	3.0	53.3	0	*	8.7	.10%
total acres	45,271	41.8	169.9	0	17.0	228.7	Average = .36%

* PG&E does not have location information for most of their gas distribution lines. The HCP assumed that the acres of gas distribution ROW inside designated Critical Habitat are approximately 10% of the Electric Distribution ROW acres inside Critical Habitat. Most gas-distribution lines are located in the Urban land cover type and are not expected to be inside designated critical habitat.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on Hoover's spurge using the methods discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Hoover's spurge occupied habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Hoover's spurge survey is not possible during an appropriate period in July or August, and 1) any CNDDB Hoover's spurge occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and vernal pool habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area could directly disturb 0.151 acre of occupied Hoover's spurge habitat, and permanently remove (hardscape) 0.002 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur within the 2.1 acres of right-of-way currently occupied by Hoover's spurge (see *Species Baseline* above). Implementing the "minor construction" covered activities (outside the existing rights-of-way) could disturb an additional 0.151 acre of occupied Hoover's spurge habitat, and permanently remove an additional 0.002 acre of occupied Hoover's spurge habitat. In total, PG&E estimates that covered activities will directly disturb 0.303 acre (13,180 square feet) and permanently remove 0.004 acre (174 square feet) of Hoover's spurge occupied habitat over the 30-year term of the permit (0.307 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Hoover's spurge occupied-habitat within the PG&E existing rights-of-way is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Hoover's spurge habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, loss of vernal pool microhabitat-features essential to this species, or a permanent loss of hydrological integrity within that vernal pool or possibly within the entire

vernal pool complex. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Hoover's spurge for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Hoover's spurge habitat likely to impacted by these indirect-effects, but the Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Hoover's spurge that is present in the disturbance site.

To minimize direct and indirect effects on Hoover's spurge, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking exclusion zones 250 feet around the vernal pool (AMM 15) or delaying the activity until after the plant species sets seed and senescences, and before the first significant rain fall (AMM 13). These AMMs will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Hoover's spurge take over the term of the proposed Permit.

AMM14 would not be effective on this plant species, and it should not be considered an avoidance or minimization measure for the plant covered-species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Hoover's spurge extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual Hoover's spurge plants in subsequent seasons, possibly extirpating Hoover's spurge from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid occupied habitat for Hoover's spurge to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. If PG&E determines during a pre-construction survey that a ground-disturbing activity cannot completely avoid Hoover's spurge occupied habitat, PG&E will confer with the Service as described above under *Confer Process.* The Confer Process will determine if the ground disturbance will result in a temporary or a permanent loss of Hoover's spurge habitat, discuss a proposed compensation approach, and discuss what compensatory mitigation would be appropriate for Hoover's spurge.

Compensation will be based the acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and

0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Hoover's spurge. Therefore, PG&E may provide between 0.15 acre and 0.92 acre of Hoover's spurge compensation over the 30-year Permit term.

Compensation lands for effects to Hoover's spurge will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for Hoover's spurge will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Effects on Hoover's spurge Critical Habitat
Of the approximately 299 acres of Hoover's spurge critical habitat located within the existing PG&E right-of-ways (see *Critical Habitat Baseline* above), PG&E estimates that ground-disturbing covered activities will directly impact 6.9 acres of critical habitat over 30 years (0.23 acres annually). PG&E also estimates that the "other disturbance" covered activities (activities which do not disturb land-cover such as tree trimming or off-road travel) will affect 352 acres of Hoover's spurge designated critical habitat annually (105.6 acres over 30 years). These effects would occur within the existing PG&E rights-of-ways located in 4 critical habitat units. The area of PG&E right of ways within each Hoover's spurge critical habitat unit is small, occupying less than 0.75% of each unit (Table 6 above).

The "minor construction" covered-activities may also impact designated critical habitat. The "minor construction" activities (G14-G16 and E12-E15) will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries and will include the acquisition of additional right-of-way acres. PG&E cannot predict where these line extensions will be constructed, and some may be constructed inside designated Hoover's spurge critical-habitat. PG&E will confer with the Service prior to implementing any "minor construction" covered-activity or other medium or large covered-activities within a designated critical-habitat unit. During the Confer Process, PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Hoover's spurge as described in the analysis above, including the permanent loss of up to 0.307 acres of occupied Hoover's spurge vernal-pool habitat over the 30-year Permit term.

Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Hoover's spurge occupied habitat. Compensation will be provided for all impacts to occupied Hoover's spurge vernal pool habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Hoover's spurge, preserving up to 0.921 acres of occupied habitat over 30 years.

The area of impact expected in four Hoover's spurge critical habitat units is a very small proportion of the total area in each unit; these impacts are not expected to change the current ability of the primary constituent elements to support the function and conservation role of those critical habitat units. The "other disturbance" effects of vehicle travel through dry vernal pools and associated upland areas are individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Hoover's spurge or adversely modify its designated critical habitat.

We reached this conclusion because the small impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Legenere (*Legenere limosa*)

Legenere is an inconspicuous vernal-pool annual in the bellflower family (Campanulaceae) 3.9 to 11.8 inches tall. The leaves, which are produced underwater fall off the plant before flowers appear. Flowers may or may not have corollas (fused bell-shaped petals), and a single plant can produce both types of flowers. When present, the corollas are white or yellowish and small (3.5 to 4 millimeters long) (McVaugh 1943, Abrams and Ferris 1960, Holland 1984, Hickman 1993).

Status of the Species

Listing Status

Legenere is not federally listed and is not listed by the California Department of Fish and Game. A detailed account of the taxonomy, ecology, and biology of legenere is presented in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005). The California Native Plant Society has placed legenere on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Seeds germinate between late February and April. The specific conditions necessary for seed germination are unknown. The plants grow through the standing water; as the water evaporates or recedes, stems may collapse onto the lake bottom or become caught on taller, stronger plants (Holland 1984). Legenere flowers during April, May, or June (Holland 1984, Skinner and Pavlik 1994). Pollination in legenere has not been studied, but the small, inconspicuous flowers suggest that it may be self-pollinated (Holland 1984). Seed dispersal agents are unknown but may include gravity, water, and waterfowl. Most populations contain densities of less than one plant per square meter (10.8 square feet) (Holland 1984). The presence of *Legenere limosa* is even more variable than other vernal pool annuals; entire populations have disappeared for decades, and then reappeared (Holland 1984, CNDDB 2001). Thus, a persistent soil seed bank most likely exists. Other aspects of demography have not been investigated.

Habitat Affinities
Legenere grows in a variety of habitats including vernal pools, vernal marshes, artificial ponds, and floodplains of intermittent streams at elevations of 3- to 2,887-feet. Occupied vernal pool types include Northern Basalt Flow, Northern Claypan, Northern Hardpan, Northern Volcanic Ashflow, and Northern Volcanic Mudflow (Sawyer and Keeler-Wolf 1995). The surrounding plant community may be grassland, open woodland, or hardwood forest containing oaks or California buckeye. At one site, it grows in both the vernal pool and the adjacent grassland (CNDDB 2001).

Historical and Current Range, Distribution
Legenere is endemic to California. The historical counties of occurrence were Solano, Lake, Sacramento, San Joaquin and Napa, Placer, San Mateo, Sonoma, and Stanislaus Counties (one site each) (Mason 1957, Rubtzoff and Heckard 1975, Holland 1984). These sites were located in the Central Coast, Lake-Napa, Santa Rosa, Solano-Colusa, Southeastern Sacramento Valley, and Southern Sierra Foothills vernal pool regions (Keeler-Wolf *et al.* 1998). It has been extirpated from the Southern Sierra Foothills Vernal Pool Region (CNDDB 2005) and is extirpated from Stanislaus County (CNDDB 2007).

The vernal pool regions where Legenere remains extant are Lake-Napa, Northwestern Sacramento Valley, Northeastern Sacramento Valley, Santa Rosa, Solano-Colusa, and Southeastern Sacramento Valley (Keeler-Wolf *et al.* 1998). There are 54 occurrences presumed to be extant (CNDDB 2007). Twenty-two are in Sacramento County, including 9 in the vicinity of Elk Grove and 6 in the vicinity of the former Mather Air Force Base. Another area of concentration, with 10 extant occurrences, is near Dozier in Solano County. Other counties where this species is presumed to remain are Alameda (1), Lake (2), Napa (1), Placer (2) San Joaquin (2), San Mateo (1) Santa Clara (1), Shasta (3) Sonoma (1), Tehama (5), and Yuba (3) (CNDDB 2007).

The HCP estimated that the potential geographic range of legenere inside the San Joaquin Valley totals 67,000 acres in San Joaquin and Stanislaus counties. The HCP calculated that 0.001 percent, or 1 acre, of this 67,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
As discussed above for vernal-pool tadpole shrimp and the other vernal pool wildlife and plant species, declines in legenere are due to the loss of vernal pool habitat in the California Central Valley since pre agricultural times. Continued conversion of the grassland-vernal pool ecosystem matrix to urban or agricultural uses, and associated hydrological changes, is the largest threat to survival of the legenere.

About one-third of the extant occurrences of legenere are in areas slated for commercial or residential development (Holland 1984, CNDDB 2005). In fact, some of the populations extant in 1983 already may have been destroyed by development, but they have not been visited since that time. More than one-third of the total population is subject to livestock grazing (CNDDB 2005), but few appear to be declining. Holland (1984) indicated that "light" grazing during the winter and early spring did not seem to be detrimental to Legenere.

Legenere Environmental Baseline within the Action Area

Species Baseline

There is one extant occurrence for legenere in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This occurrence is in the San Joaquin County portion of the action area at Buckeye Ranch, which is north of the Mokelumne River in Galt. This occurrence occupies approximately 7.3 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). A second occurrence was located in the action area on the San Joaquin-Stanislaus County border; but it has been extirpated by agricultural development (CNDDB 2002).

The HCP land-cover types utilized by legenere are Permanent Freshwater Wetland, Seasonal Wetland, and Grassland. The HCP classifies legenere as an "other" plant covered-species (a plant-covered species that is not a "narrowly endemic" species.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on legenere as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to legenere occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a legenere survey is not possible during an appropriate period in April May, or June, and 1) any CNDDB legenere occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area could directly disturb 0.433 acre of occupied legenere habitat, and permanently remove (hardscape) 0.004 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur within the 7.3 acres of right-of-way currently occupied by legenere (see *Species Baseline* above). Implementing the "minor construction" covered activities (outside the existing rights-of-way) could disturb an additional 0.433 acre of occupied legenere habitat, and permanently remove an additional 0.004 acre of occupied legenere habitat. In total, PG&E estimates that covered activities would directly disturb 0.866 acre and permanently remove 0.008 acre of occupied legenere habitat over the 30-year term of the permit (0.874 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in legenere occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied legenere habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, loss of vernal pool microhabitat-features essential to this species, or a permanent loss of hydrological integrity within that vernal pool or possibly within the entire

vernal pool complex. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with legenere for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied legenere habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for legenere that is present in the disturbance site.

Because the HCP does not classify legenere as a "narrowly endemic" species, ground-disturbance in or near legenere occupied habitat would not trigger the "Confer Process". To minimize direct and indirect effects on legenere, PG&E will apply one or more of the plant AMMs. Plant AMMs include staking a work-exclusion zone 250 feet around the occupied vernal pool prior to beginning a ground-disturbing covered activity (AMM15), or delaying the activity until after the plant species sets-seed and senescences and before the first significant rain fall (AMM 13). These AMMs will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of legenere take over the term of the proposed Permit.

AMM14 would not be effective on this plant species, and it should not be considered an avoidance or minimization measure for this species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a legenere extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual legenere plants in subsequent seasons, possibly extirpating legenere from the disturbance site.

Effects of Compensation Measures

Although PG&E will avoid legenere occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the acres of occupied plant-habitat actually directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios*. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for legenere. Therefore, PG&E may provide between 0.46 acres and 2.6 acres of legenere compensation over the 30-year Permit term.

Compensation lands for effects to legenere will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for legenere will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion

We anticipate that the proposed action will directly and indirectly affect legenere as described in the analysis above, including the permanent loss of up to 0.874 acres of occupied legenere vernal-pool habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to legenere occupied habitat. PG&E will provide compensation if ground-disturbance occurs in legenere occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to legenere vernal pool habitat, preserving between 0.46 acres and 2.6 acres of occupied legenere habitat over 30 years, based on estimated effects.

The "other disturbance" effects of vehicle travel through dry vernal pools and associated upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of legenere or adversely modify its designated critical habitat.

We reached this conclusion because the small impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Endangered hairy Orcutt grass (*Orcuttia pilosa*) and its Critical Habitat

Hairy Orcutt grass (*Orcuttia pilosa*) is a small, tufted annual grass in the tribe Orcuttieae of the grass family Poaceae. The plant grows in tuffs and has several stems 2-8 inches tall, each stem ending in a long, spike-like inflorescence. Foliage is grayish, with soft, straight hairs.

Status of the Species and the Critical Habitat

Listing Status

Hairy Orcutt grass was federally listed as endangered in March 1997 (62 FR 14338). A detailed account of the taxonomy, ecology, and biology of hairy Orcutt grass are presented in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005) and in the final rule (62 FR 14338). Final Critical Habitat was designated in August 2003(68 FR 46684), and critical habitat units for this species were published in February 2006 (71 FR 7117). This species was listed as endangered by the California Department of Fish and Game in September 1979. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal
Stratification followed by temperatures of 59 to 90 degrees Fahrenheit is necessary for seed germination in hairy Orcutt grass. In particular, seeds of *Orcuttia* species germinate underwater in January and February (Griggs 1980, Griggs and Jain 1983, Keeley 1998), after being colonized by aquatic fungi (Griggs 1980, 1981). Flowering occurs May–September (California Native Plant Society 2001). The first two flowers on a given plant open simultaneously and do not produce pollen until the ovaries are no longer receptive. Thus, if they are fertilized it must be with pollen from another plant. Flowers that open subsequently may receive pollen from the same plant or others (Griggs 1980). Like other vernal pool annuals, the size of Hairy Orcutt grass populations fluctuates dramatically from year-to-year.

Habitat Affinities
Hairy Orcutt grass inhabits vernal pools in rolling topography on remnant alluvial fans and stream terraces in the eastern margins of the Central Valley. This species is found on high or low stream terraces and alluvial fans. Hairy Orcutt grass occurs in Northern Basalt Flow, Northern Claypan, and Northern Hardpan vernal pools (Sawyer and Keeler-Wolf 1995) within annual grasslands (CNDDB 2003). The median size of occupied pools measured in the late 1980s was 4.2 acres, with a range of 0.8 to 617.5 acres (Stone *et al.* 1988). At the Vina Plains, hairy Orcutt grass was found growing only in pools that held water until May, June, or July in 1995, and not in those that had dried by April (Alexander and Schlising 1997).

The vernal pool types and soils associated with the six areas of concentration of hairy Orcutt grass differ greatly across the geographic range of the species. Providing for a mosaic of habitat types both between and among vernal pool species occurrences is essential to the species' conservation because it would include the full extent of the physical and environmental conditions for the species. Conserving a broad distribution of hairy Orcutt grass across its geographical and elevational distribution protects the natural environmental processes for the species and provides the best chance for retaining the species across the full extent of its range.

Historical and Current Range, Distribution
Hairy Orcutt grass is endemic to the Central Valley. The historical range includes the eastern margins of Sacramento and San Joaquin Valleys from Tehama County south to Stanislaus County and through Merced and Madera counties (California Native Plant Society 2001).

There are 27 extant occurrences currently listed in the California Natural Diversity Database as "presumed extant" (CNDDB 2007). The six core areas for hairy Orcutt grass are distributed among three vernal pool regions: Northeast Sacramento Valley vernal pool region, Solano-Colusa vernal pool region, and Southern Sierra Foothills vernal pool regions. The main area of concentration for hairy Orcutt grass is the Vina Plains in Tehama County, which is in the Northeastern Sacramento Valley Vernal Pool Region (there are 9 extant occurrences in Tehama County). An isolated occurrence in central Butte County is in the same region. The six extant occurrences in the Solano-Colusa Vernal Pool Region are on the Sacramento National Wildlife Refuge in Glenn County. There are eleven occurrences in the Southern Sierra Foothills Vernal Pool Region, including nine in Madera County between the City of Madera and Millerton Lake, and two in eastern Stanislaus County. Two occurrences in Merced County are now extirpated. A total of 12 occurrences are listed in CNDDB as "extirpated" or "possibly extirpated" (CNDDB

2007). There may be more occurrences that have not yet been discovered, particularly on private lands, which are usually inaccessible to researchers and surveyors. Hairy Orcutt grass was introduced into created vernal pools in Madera County that are owned and managed by Caltrans as compensation for their State Highway 41 realignment project (Durgarian 1995, Stebbins et al. 1995). Fifty plants were seen in one of these pools in 1995 (CNDDB 2006).

The HCP estimated that the potential geographic range of hairy Orcutt grass inside the San Joaquin Valley totals 149,000 acres in Stanislaus, Merced, and Madera counties. The HCP calculated that 0.056 percent, or 86 acres, of this 149,000-acre potential geographic range are presently occupied by the species. There are 77,459 acres of hairy Orcutt grass designated Critical Habitat in the San Joaquin Valley.

Reasons for Decline and Threats to Survival
The main reason for the decline of hairy Orcutt grass has been the loss of vernal pool habitat to agriculture conversion and urbanization. Agricultural and residential developments are proceeding near the occurrences remaining Stanislaus and Madera counties and may lead to the destruction of additional populations in the foreseeable future. In addition, competition from invasive plants is believed to be an increasing problem throughout the range of the species.

Many extant hairy Orcutt grass sites are grazed. Livestock grazing and associated trampling may or may not adversely affect vernal pool plants depending on, among other things, the kind of livestock, stocking level, season of use, and grazing duration. The intensity and, more importantly, the timing of this activity affect how livestock grazing may adversely impact vernal pool plant species.

Hairy Orcutt grass is vulnerable to stochastic events, particularly flooding or drought (Bauder (2005). For example, a formerly occupied pool at the Sacramento NWR was inundated for an extended period of time in 1998, and no plants have been seen since then (J. Silveira, pers. comm. 2006).

Critical Habitat Status
Final Critical Habitat for hairy Orcutt grass was originally designated in August 2003(68 FR 46684). The designation was revised August 11, 2005 (70 FR 46923). The Service published species-specific Critical Habitat unit descriptions and maps on February 10, 2006 (71 FR 71117). The total designated Critical Habitat for Hairy Orcutt grass is 79,608 acres within 5 Critical Habitat Units in California (71 FR 7118). Hairy Orcutt grass critical habitat units are depicted for Tehama County (Unit 1), Butte County (Unit 2) , Stanislaus County (Unit 4B), Merced County (Unit 4A, 4C), Mariposa County (Unit 4A), Madera County (Unit 5A,B, Unit 6).,

The biological and physical features (primary constituent elements) that are essential to the conservation of hairy Orcutt grass in the designated critical habitat are the habitat components that provide: (1) 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 the next paragraph, providing for dispersal and promoting hydroperiods of adequate length in the pools; and (2) 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 non-native 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. The constituent elements include the associated watershed(s) and hydrologic features, including the pool basin, swales, and surrounding uplands (which may vary in extent depending on pool size and depth, soil type and depth, hardpan or claypan type and extent, topography, and climate) that contribute to the filling and drying of the vernal pool or ephemeral wetland, and that maintain suitable periods of pool inundation, water quality, and soil moisture for Orcuttia pilosa germination, growth and reproduction, and dispersal, but not necessarily every year.

Hairy Orcutt Grass Environmental Baseline within the Action Area

Species Baseline

There is one extant occurrence for Hairy Orcutt grass in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This occurrence is in the Tulare County portion of the action area. The one extant occurrence for this species occupies approximately 0.25 acre of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007). The HCP land-cover types utilized by hairy Orcutt grass are Seasonal Wetland and Grassland. The HCP classifies hairy Orcutt grass as a "narrowly endemic" plant covered-species.

Critical Habitat Baseline

Of the 79,608 acres of hairy Orcutt grass designated Critical Habitat (71 FR 7118), approximately 203 acres are located in existing PG&E right-of-ways the 276,350-acre action-area. Of these 203 acres, approximately 85.6 acres are located in electric transmission ROWs, and approximately 107 acres are located in electric distribution ROWs. No hairy Orcutt grass critical habitat is located in the gas transmission ROWs, but the HCP estimated that 17 acres of hairy Orcutt grass critical habitat could be located inside the gas distribution ROWs of the action area.

Of the five Critical Habitat units designated for hairy Orcutt grass, three units and four subunits are located in the 276,250-acre action area. These are: Unit 4A in Stanislaus, Merced and Mariposa counties (85.6 acres in action area), Unit 4C in Merced County (4.6 acres in action area), Unit 5A in Madera County (8.2 acres in action area), and Unit 6 Madera County (94 acres in the action area). The acreage of action area within each Critical Habitat unit is a small percentage of the total area in the Unit. Approximately 0.46% of Unit 4, approximately1.1% of Unit 5, and approximately 0.86% of Unit 6 are within the action area.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on hairy Orcutt grass using the methods discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to hairy Orcutt grass occupied habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a hairy Orcutt

grass survey is not possible during an appropriate period between May through September, and 1) any CNDDB hairy Orcutt-grass occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area could directly disturb 0.027 acre of hairy Orcutt grass occupied-habitat, and permanently remove (hardscape) 0.001 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur within the 0.25 acre of right-of-way currently occupied by hairy Orcutt grass (see *Species Baseline* above). Implementing the "minor construction" covered activities (outside the existing rights-of-way) could disturb an additional 0.027 acre of occupied hairy Orcutt grass habitat, and permanently remove an additional 0.001 acre of occupied hairy Orcutt grass habitat. In total, PG&E estimates that covered activities will directly disturb 0.054 acre and permanently remove 0.002 acre of Orcutt grass occupied-habitat over the 30-year term of the permit (0.056-acre total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in hairy Orcutt grass occupied-habitat within the existing rights-of-ways is not available to the Service.

Soil excavations or other ground disturbances in or near occupied hairy Orcutt grass habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, loss of vernal pool microhabitat-features essential to this species, or a permanent loss of hydrological integrity within that vernal pool or possibly within the entire vernal pool complex. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with hairy Orcutt grass for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied hairy Orcutt grass habitat likely to impacted by these indirect-effects, but the Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for hairy Orcutt grass that is present in the disturbance site.

To minimize direct and indirect effects on hairy Orcutt grass, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking exclusion zones 250 feet around the vernal pool (AMM 15) or

delaying the activity until after the plant species sets seed and senescences, and before the first significant rain fall (AMM 13). These AMMs will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of hairy Orcutt grass take over the term of the proposed Permit.

AMM14 would not be effective on this plant species, and it should not be considered an avoidance or minimization measure for this species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a hairy Orcutt grass extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual hairy Orcutt grass plants in subsequent seasons, possibly extirpating hairy Orcutt grass from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid occupied habitat for hairy Orcutt grass to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. If PG&E determines during a pre-construction survey that a ground-disturbing activity cannot completely avoid hairy Orcutt grass occupied habitat, PG&E will confer with the Service as described above under *Confer Process.* The Confer process will determine if the ground disturbance will result in a temporary or a permanent loss of hairy Orcutt grass habitat, discuss a proposed compensation approach, and discuss what compensatory mitigation would be appropriate for hairy Orcutt grass.

Compensation will be based the acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for hairy Orcutt grass. Therefore, PG&E might provide between 0.033 acre 0.17 acre of hairy Orcutt grass compensation over the 30-year Permit term.

Compensation lands for effects to hairy Orcutt grass will be located in areas that include occupied habitat, or PG&E could preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for hairy Orcutt grass will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Effects on Critical Habitat
Of the approximately 203 acres of hairy Orcutt grass critical habitat located within the existing PG&E right-of-ways (see *Critical Habitat Baseline* above), PG&E estimates that ground-disturbing covered activities will directly impact no critical habitat annually or over 30 years. PG&E also estimates that "other disturbance" covered activities (activities which do not disturb land-cover such as tree trimming or off-road travel) will affect only 0.02 acres of hairy Orcutt grass designated critical habitat annually (0.6 acres over 30 years). These effects would occur within the existing PG&E rights-of-ways located in the 3 critical habitat units.

The "minor construction" covered-activities will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries and will include the acquisition of additional right-of-way acres. PG&E cannot predict where these line extensions will be constructed, and some may be constructed inside designated hairy Orcutt grass critical-habitat. PG&E will confer with the Service prior to implementing any "minor construction" covered-activity or other medium or large covered-activities within a designated critical-habitat unit. During the Confer Process, PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Conclusion

We anticipate that the proposed action will directly and indirectly affect hairy Orcutt grass as described in the analysis above, including the permanent loss of up to 0.056 acres of occupied hairy Orcutt grass vernal-pool habitat over the 30-year Permit term.

Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to hairy Orcutt grass occupied habitat. Compensation will be provided for all impacts to occupied hairy Orcutt grass vernal pool habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to hairy Orcutt grass, preserving up to 0.17 acres of occupied habitat over 30 years.

No impacts from ground-disturbing covered-activities are expected in the three hairy Orcutt grass critical habitat units in the action area. The current ability of the primary constituent elements to support the function and conservation role of those critical habitat units will not change. The "other disturbance" effects of vehicle travel through dry vernal pools and associated upland areas are individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of hairy Orcutt grass or adversely modify its designated critical habitat.

We reached this conclusion because the small impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Endangered Greene's tuctoria (*Tuctoria greenei*) and its Critical Habitat

Greene's tuctoria (*Tuctoria greenei*), which is also known as Greene's Orcutt grass, Chico grass, awn-less spiral grass, and awn-less Orcutt grass, is a small, tufted annual grass that grows in vernal pools. The plant has several to many stems 2-6 inches tall, each ending in a spike-like inflorescence that may be partly enfolded in the upper leaf.

Status of the Species and the Critical Habitat

Listing Status

Greene's tuctoria was federally listed as Endangered in March 1997 (62 FR 14338). A detailed account of the taxonomy, ecology, and biology of Greene's tuctoria is presented in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005) and in the final rule (62 FR 14338). This species was listed as rare by the California Department of Fish and Game in September 1979. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Optimum germination of Greens tuctoria seed occurs when the seed is exposed to light and anaerobic conditions after stratification (Keeley 1988). Germination occurs about 2 months following inundation (Keeley 1998). The plants apparently do not tolerate inundation. Greene's tuctoria flowers from May to July (Skinner and Pavlik 1994), with peak flowering in June and July (Griggs 1981, Broyles 1987). As with other vernal pool annuals, population size in Greene's tuctoria varies widely from year to year, and populations that have no visible plants one year can reappear in large numbers in later years.

Habitat Affinities

Greene's tuctoria has been found in three types of vernal pools: Northern Basalt Flow, Northern Claypan, and Northern Hardpan (Sawyer and Keeler-Wolf 1995) on both low and high terraces (Stone *et al.* 1988). Occupied pools are or were underlain by iron-silica cemented hardpan, tuffaceous alluvium, or claypan (Stone *et al.* 1988). Stone *et al.* (1988) noted that *T. greenei* grew in shallower pools, or on the shallow margins of deeper pools, compared to other members of the tribe, but they did not quantify pool depth. In the Southern Sierra Foothills Vernal Pool Region, *T. greenei* is known to grow on a number of different soil series including Archerdale, Bear Creek, Exeter, Meikle, Ramona, Raynor, Redding, and San Joaquin.

Historical and Current Range, Distribution, Dispersal

After its initial discovery in Butte County in 1890, *Tuctoria greenei* was not reported again for over 40 years. However, during extensive surveys in the late 1930s, Hoover (1937, 1941) found the species at 12 sites. *Tuctoria greenei* has been reported from 41 widely separated occurrences in Shasta, Butte, Glenn, Tehama, San Joaquin, Stanislaus, Merced, Madera, Fresno, and Tulare counties. About 22 of the historical occurrences of Greene's tuctoria are presumed to be extant; 9 are certainly extirpated, and 10 others are possibly extirpated (Alexander and Schlising 1997, CNDDB 2005). The species has been extirpated from San Joaquin, Stanislaus, Madera, Fresno, and Tulare counties (Stone *et al.* 1988, Skinner and Pavlik 1994, CNDDB 2007).

The 60 percent of the 22 extant occurrences are in the Northeastern Sacramento Valley Vernal Pool Region, particularly in the Vina Plains of Tehama and Butte Counties (10 occurrences in Tehama and 4 in Butte counties). The next largest concentration (30 percent) is in the Southern Sierra Foothills Vernal Pool Region, where the only remaining occurrences (7 occurrences) are in eastern Merced County. One extant occurrence remains in the Modoc Plateau Vernal Pool Region of Shasta County (Oswald and Silveira 1995, J. Silveira *in litt.* 2000, CNDDB 2007).

The HCP estimated that the potential geographic range of Greene's tuctoria inside the San Joaquin Valley totals 222,000 acres in San Joaquin, Stanislaus, Merced, Madera, Fresno, and

Tulare counties. The HCP calculated that 0.24-percent, or 54 acres of this 222,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
Primary threats include agricultural conversion, inappropriate livestock grazing, and urbanization. Agricultural conversion and inappropriate livestock grazing practices pose threats to virtually all of the occurrences remaining in the San Joaquin Valley.

Soil disturbance from cattle grazing combined with competition from the introduced annual grasses and other non-native species appear to adversely affect many of the extant populations. Greene's tuctoria grows in the margins of vernal pools making it susceptible to livestock trampling and competition from non-native weeds. All remaining populations are subject to grazing. However, grazing can help control invasive species if timed correctly.

One factor unique to this and some other vernal pool plant species may be decimation by grasshopper outbreaks. Grasshoppers have been noted consuming entire populations of Tuctoria greenei before they set seed (Griggs 1980, Griggs and Jain 1983, Stone *et al.* 1988).

Small population size poses a continuing threat to seven occurrences in Butte, Glenn, and Merced Counties. Each of these populations numbered 110 or fewer *T. greenei* plants at its peak (Stone *et al.* 1988, CNDDB 2005). The Shasta County population also may have declined to the point where it could be extirpated by random causes (B. Corbin *in litt.* 2000).

Critical Habitat Status
Critical Habitat for Greene's tuctoria was designated in August 2003 (68 FR 46683), and revised in August 2005 (70 FR 46923). The Service published species-specific Critical Habitat unit descriptions and maps on February 10, 2006 (71 FR 71117). The total designated Critical Habitat for Greene's tuctoria is 145,118 acres within 6 Critical Habitat Units and 8 subunits in California (71 FR 7118). Critical habitat units are depicted for Butte, Madera, Mariposa, Merced, Shasta, Stanislaus, Tehama, and Tuolumne counties, California.

The primary constituent elements of critical habitat for Greene's tuctoria are the habitat components that provide: (1) 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 later in this paragraph), providing for dispersal and promoting hydroperiods of adequate length in the pools; and (2) 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 non-native 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.

Greene's tuctoria Environmental Baseline within the Action Area

Species Baseline

Of the 22 extant occurrences for Greene's tuctoria, one occurrence is within the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This occurrence is in the Merced County portion of the action area, and occupies approximately 0.46 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007). The HCP land-cover types utilized by Greene's tuctoria are Grassland and Seasonal Wetland. The HCP classified Greene's tuctoria as a "narrowly endemic" plant covered-species.

Critical Habitat Baseline

Of the 145,118 acres of Greene's tuctoria designated Critical Habitat (71 FR 7118), approximately 924 acres are located in existing PG&E right-of-ways the 250,350-acre action area. Most Greene's tuctoria critical habitat in the action area is in existing electric transmission rights-of-ways. Of the 924 acres, approximately 704 acres are located in electric transmission ROWs and 200 acres are located in electric distribution ROWs. No Greene's tuctoria Critical Habitat is located in the gas transmission ROWs, but the HCP estimated that 20 acres of Greene's tuctoria Critical Habitat could be located inside the gas distribution ROWs of the action area.

Of the six Critical Habitat units designated for Greene's tuctoria, portions of three units and six subunits are within the existing PG&E right-of-ways of the 276,250-acre action area. These are Units 6B and 6D in Stanislaus County (11- and 74 acres within the action area), Unit 6E in Stanislaus, Calaveras and Tuolumne counties (2.7 acres in the action area), Unit 7 in Merced County (802 acres in the action area), and Units 8A, 8B, and 8C in Madera County (14.4 acres in the action area).

The acreage of the action-area within each Critical Habitat unit is a small percentage of the total area of each Unit. Approximately 0.43% of Unit 6, approximately 2.3% of Unit 7, and approximately 1.1% of Unit 8 are within the existing PG&E right-of-ways in the HCP action area.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on Greene's tuctoria using the methods discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Greene's tuctoria occupied habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Greene's tuctoria survey is not possible during an appropriate period May through August, and 1) any CNDDB Greene's tuctoria occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and vernal pool habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area could directly disturb 0.049 acre of occupied Greene's tuctoria habitat,

and permanently remove (hardscape) 0.001 acre of occupied habitat over the 30-year term of the proposed permit (0.05 total in exiting rights of way). These effects would occur within the 0.46 acre of right-of-way currently occupied by Greene's tuctoria (see *Species Baseline* above), and would impact approximately 11% of that occurrence's population. Implementing the "minor construction" covered activities (outside the existing rights-of-way) could disturb an additional 0.049 acre of occupied Greene's tuctoria habitat, and permanently remove an additional 0.001 acre of occupied Greene's tuctoria habitat. In total, PG&E estimates that covered activities will directly disturb 0.098 acre and permanently remove 0.002 acre of Greene's tuctoria occupied habitat over the 30-year term of the permit (0.2 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Greene's tuctoria occupied-habitat within the existing PG&E rights-of-way is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Greene's tuctoria habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, loss of vernal pool microhabitat-features essential to this species, or a permanent loss of hydrological integrity within that vernal pool or possibly within the entire vernal pool complex. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species would compete with Greene's tuctoria for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Greene's tuctoria habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Greene's tuctoria that is present within the disturbance site.

To minimize direct and indirect effects on Greene's tuctoria, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking exclusion zones 250 feet around the vernal pool (AMM 15) or delaying the activity until after the plant species sets seed and senescences and before the first significant rain fall (AMM 13). These AMMs will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Greene's tuctoria take over the term of the proposed Permit.

AMM14 would not be effective on this plant species, and it should not be viewed as an avoidance or minimization measure for this plant covered-species. PG&E shall not implement

general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of any Greene's tuctoria extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual Greene's tuctoria plants in subsequent seasons, possibly extirpating Greene's tuctoria from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid occupied habitat for Greene's tuctoria to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. If PG&E determines during a pre-construction survey that a ground-disturbing activity cannot completely avoid Greene's tuctoria occupied habitat, PG&E will confer with the Service as described above under *Confer Process.* The Confer process will determine if the ground disturbance will result in a temporary or a permanent loss of Greene's tuctoria habitat, discuss a proposed compensation approach, and discuss what compensatory mitigation would be appropriate for Greene's tuctoria.

Compensation will be based the acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Greene's tuctoria. Therefore, PG&E may provide between 0.5 acre and 0.6 acre of Greene's tuctoria compensation over the 30-year Permit term.

Compensation lands for effects to Greene's tuctoria will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for Greene's tuctoria will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Effects on Greene's Tuctoria Critical Habitat
Of the approximately 924 acres of Greene's tuctoria critical habitat located within the existing PG&E right-of-ways (see *Critical Habitat Baseline* above), PG&E estimates that ground-disturbing covered activities will directly impact 1.52 acres annually (45.6 acres over 30 years). PG&E also estimates that "other disturbance" covered activities (activities which do not disturb land-cover such as tree trimming or off-road travel) will affect 7.84 acres of Greene's tuctoria designated critical habitat annually (235.2 acres over 30 years). These effects would occur within the existing PG&E rights-of-ways present in the 3 critical habitat units (see *Critical Habitat Baseline* above).

The "minor construction" covered-activities may also impact designated critical habitat. The "minor construction" activities (G14-G16 and E12-E15) will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries and will include the acquisition of additional right-of-way acres. PG&E cannot predict where these line extensions will be constructed, and some may be constructed inside designated Greene's tuctoria critical-habitat. PG&E will confer with the Service prior to implementing any "minor construction"

covered-activity or other medium or large covered-activities within a designated critical-habitat unit. During the Confer Process, PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Conclusion

We anticipate that the proposed action will directly and indirectly affect Greene's tuctoria as described in the analysis above, including the permanent loss of up to 0.2 acres of occupied Greene's tuctoria vernal-pool habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Greene's tuctoria occupied habitat. Compensation will be provided for all impacts to occupied Greene's tuctoria vernal pool habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Greene's tuctoria, preserving up to 0.6 acres of occupied habitat over 30 years.

The area of impact expected in three Greene's tuctoria critical habitat units is a small proportion of the total area in each unit (less than 2.3%); these impacts are not expected to change the current ability of the primary constituent elements to support the function and conservation role of those critical habitat units. The "other disturbance" effects of vehicle travel through dry vernal pools and associated upland areas are individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Greene's tuctoria or adversely modify its designated critical habitat.

We reached this conclusion because the small impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Threatened succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*) and its Critical Habitat

Succulent owl's-clover, also known as fleshy owl's-clover, is a vernal-pool annual herb in the snapdragon family (Scrophulariaceae). Its stems are erect, generally 2-10 inches tall, and may be branched or unbranched. Flowers are bright yellow to white, clustered near the ends of branches, and surrounded by leafy bracts. The leaves are succulent and brittle.

Status of the Species and the Critical Habitat

Listing Status

Succulent owl's-clover was federally listed as threatened in March 1997 (62 FR 14338). A detailed account of the taxonomy, ecology, and biology of the succulent owl's clover is presented in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005) and in the final rule (62 FR 14338). This subspecies was listed as endangered by

the California Department of Fish and Game in January 1990. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology
Flowers appear in April and May. Like other members of *Castilleja* and related genera, it is partly parasitic (hemiparasitic) on the roots of other plants. Some seedlings can survive to maturity without attaching to a host's roots, but in general, reproduction is enhanced by root connections (Asset and Strong 1970). The importance of pollinating insects is not known for certain. Some aspects of *C. campestris* ssp. *succulenta* biology suggest that it may be self-pollinating (Heckard 1977), but many related taxa of *Castilleja* are pollinated by generalist bees (Superfamily Apoidea) (Chuang and Heckard 1991).

Habitat Affinities
Succulent owl's-clover is found in Northern Claypan and Northern Hardpan vernal pools (Sawyer and Keeler-Wolf 1995) in annual grassland communities along the rolling lower foothills and valleys of the eastern San Joaquin Valley in the Southern Sierra Foothills Vernal Pool Region. It occurs on the margins of vernal pools, swales and some seasonal wetlands, often on acidic soils. It is never dominant and it is found in only a few of the pools in an area

Historical and Current Range, Distribution
The California Natural Diversity Data Base (CNDDB) had catalogued 90 extant occurrences of succulent owl's-clover. About one third of these occurrences are records from Merced County, catalogued in association with rare plant and wildlife surveys of eastern Merced County grass and ranch lands conducted during 2001 (Vollmar 2002). One occurrence in Fresno County is considered to be "possibly extirpated" (CNDDB 2005) because the site had been disced when it was last visited in 1981. Another unreported (to the database) site in Fresno County may also be extirpated (J. Stebbins *in litt.* 2000*a*). Currently, among the 90 extant reported occurrences, 70 percent are in Merced County (65 occurrences), 12 percent are in Fresno County (10 occurrences), 10 percent are in Madera County (9 occurrences), 5 percent are in Stanislaus County (5 occurrences), 1 percent is in San Joaquin County (one occurrence) and 1 percent in Tuolumne County (one occurrence)(M. Trask *in litt.* 1993, EIP Associates 1994b, C. Witham *in litt.* 2000*b*, CNDDB 2007). All but two of these occurrences are in the Southern Sierra Foothills Vernal Pool Region; one San Joaquin County site is in the Southeastern Sacramento Valley Vernal Pool Region (Keeler-Wolf *et al.* 1998).

The HCP estimated that the potential geographic range of succulent owl's-clover inside the San Joaquin Valley totals 216,000 acres in San Joaquin, Stanislaus, Merced, Mariposa, Madera, and Fresno counties. The HCP calculated that 0.68 percent, or 1479 acres, of this 216,000-acre potential geographic range are presently occupied by the species. The HCP determined that there are 62 extant occurrences of succulent owl's-clover in the 12.1 million-acre San Joaquin Valley HCP planning area (CNDDB 2002).

Reasons for Decline and Threats to Survival
Habitat loss and fragmentation are the largest threats to the survival and recovery of vernal pool species. Loss of habitat generally results from urbanization, agricultural conversion, and mining. Habitat loss also occurs in the form of habitat alteration and degradation as a result of changes to

natural hydrology, invasive species, incompatible grazing regimes, infrastructure projects (e.g., roads, water storage and conveyance, utilities), recreational activities (e.g., off-highway vehicles and hiking), erosion, contamination and inadequate management and monitoring. One significant specific threat is the proposed construction of the new University of California campus in Merced County. This project, plus associated residential development and access roads, are threats to the primary and relatively extensive population in that area. Additional urban developments threaten many other known occurrences, including planned housing subdivisions in Fresno, Madera, and San Joaquin Counties, a freeway expansion in Madera County, and a proposed landfill in Fresno County (CNDDB 2005).

Invasive non-native species pose a significant threat. Exclusion of grazing from sites that have been grazed historically may increase the threat of non-native plants. Threats due to alterations in natural hydrology include the Merced County Stream Channel Project proposed by the U.S. Army Corps of Engineers and proposed enlargement of Burns Reservoir in Merced County which collectively threaten seven occurrences of succulent owl's-clover (CNDDB 2003).

Threats posed by small population size may also be a significant continuing factor because small size makes populations more vulnerable to extirpation from chance events. Among the 24 populations of *Castilleja campestris* ssp. *succulenta* for which size estimates have been documented, 10 consisted of fewer than 100 plants each at their peak size (J. Stebbins *in litt.* 2000*b*, CNDDB 2003).

Critical Habitat Status
Critical Habitat for succulent owl's clover was designated in August 2003 (68 FR 46683), and revised in August 2005 (70 FR 46923). The Service published species-specific Critical Habitat unit descriptions and maps on February 10, 2006 (71 FR 71117). The total designated Critical Habitat for succulent owl's clover is 175,873 acres within 6 Critical Habitat Units and 11 subunits in California (71 FR 7118). Critical habitat units are depicted for Fresno, Madera, Mariposa, Merced, San Joaquin, Stanislaus, and Tuolumne Counties, California.

The primary constituent elements of critical habitat for succulent owl's-clover are the habitat components that provide: (1) 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 later in this paragraph), providing for dispersal and promoting hydroperiods of adequate length in the pools; and (2) 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 non-native 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.

Succulent owl's clover Environmental Baseline within the Action Area

Species Baseline

Of the total 90 extant occurrences for succulent owl's clover, 10 occurrences (11%) are within the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are in Merced County (six occurrences), Madera County (two occurrences), and the Fresno County (two occurrences) portions of the action area. The ten occurrences occupy approximately 20.8 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007). The HCP land-cover types utilized by succulent owl's-clover are Grassland and Seasonal Wetland. The HCP classified succulent owl's clover as a "narrowly endemic" plant covered-species.

Critical Habitat Baseline

Of the 175,873 acres of succulent owl's clover designated Critical Habitat (71 FR 7118), approximately 1,643 acres are located in existing PG&E right-of-ways the 250,350 acre action area. Most succulent owl's clover critical habitat in the action area is in existing electric transmission rights-of-ways. Of the 1,643 acres, approximately 1,289 acres are located in electric transmission ROWs and 321 acres are located in electric distribution ROWs. No succulent owl's clover Critical Habitat is located in the gas transmission ROWs, but the HCP estimated that 32 acres of succulent owl's clover Critical Habitat could be located inside the gas distribution ROWs of the action area.

Of the six Critical Habitat units designated for succulent owl's clover, portions of all 6 units and 10 subunits are within the existing PG&E right-of-ways of the 276,250-acre action area. These are: Unit 1 in Sacramento and San Joaquin Counties (46 acres within the action area), Unit 2A in Stanislaus and Tuolumne counties (37 acres within the action area), Units 3A and 3B in Merced and Mariposa counties (844 acres within the action area), Unit 4A and 4C in Madera, Merced and Fresno counties (175.4 acres within the action area), Unit 5A and 5B in Fresno County (474 acres within the action area), Unit 6A in and 6B in Madera and Fresno counties (34 acres within the action area).

The acreage of the action-area within each Critical Habitat unit is a small percentage of the total area of each Unit. Approximately 1.8% of Unit 1, approximately 0.1% of Unit 2, approximately 0.5% of Unit 3, approximately 0.2% of Unit 4, approximately 1.6% of Unit 5, and approximately 2.0% of Unit 6 are within the existing PG&E rights-of-way in the HCP action area.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on succulent owl's clover using the methods discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to succulent owl's clover occupied habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a succulent owl's clover survey is not possible during an appropriate period in April or May and 1) any CNDDB succulent owl's clover occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and vernal pool habitat is present at the

proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that the ground-disturbing covered-activities implemented within the existing right-of-ways of the action area could directly disturb 0.903 acre of occupied succulent owl's clover habitat, and permanently remove (hardscape) 0.008 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur within the 20.8 acres of PG&E right-of-way currently occupied by succulent owl's clover (see *Species Baseline* above). Implementing the "minor construction" covered activities (outside the existing rights-of-way) could disturb an additional 0.903 acre of occupied succulent owl's clover habitat, and permanently remove an additional 0.008 acre of occupied succulent owl's clover habitat. In total, PG&E estimates that covered activities will directly disturb 1.806 acre and permanently remove 0.16 acre of succulent owl's clover occupied habitat over the 30-year term of the permit (1.822 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in succulent owl's clover occupied-habitat within the existing PG&E rights-of-way is not available to the Service.

Soil excavations or other ground disturbances in or near occupied succulent owl's clover habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, loss of vernal pool microhabitat-features essential to this species, or a permanent loss of hydrological integrity within that vernal pool or possibly within the entire vernal pool complex. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species would compete with succulent owl's clover for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied succulent owl's clover habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for succulent owl's clover that is present within the disturbance site.

To minimize direct and indirect effects on succulent owl's clover, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking exclusion zones 250 feet around the vernal pool (AMM 15) or delaying the activity until after the plant species sets seed and senescences, and before the first significant rain fall (AMM 13). These AMMs will minimize direct effects and indirect effects of

the covered-activity, but will not eliminate the potential for a small amount of succulent owl's clover take over the term of the proposed Permit.

AMM14 would not be effective on this plant species, and it should not be considered an avoidance or minimization measure for succulent owl's clover. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of any succulent owl's clover extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual succulent owl's clover plants in subsequent seasons, possibly extirpating succulent owl's clover from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid occupied habitat for succulent owl's clover to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. If PG&E determines during a pre-construction survey that a ground-disturbing activity cannot completely avoid succulent owl's clover occupied habitat, PG&E will confer with the Service as described above under *Confer Process.* The Confer process will determine if the ground disturbance will result in a temporary or a permanent loss of succulent owl's clover habitat, discuss a proposed compensation approach, and discuss what compensatory mitigation would be appropriate for succulent owl's clover.

Compensation will be based the acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 0.5:1 for temporary loss of occupied habitat and 3:1 for permanent loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for succulent owl's clover. Therefore, PG&E may provide between 1.04 acres and 5.47 acres of succulent owl's clover compensation over the 30-year Permit term.

Compensation lands for effects to succulent owl's clover will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for succulent owl's clover will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Effects on Succulent owl's clover Critical Habitat
Of the approximately 1,643 acres of succulent owl's clover critical habitat located within the existing PG&E right-of-ways (see *Critical Habitat Baseline* above), PG&E estimates that ground-disturbing covered activities will directly impact 0.92 acres annually (27.6 acres over 30 years). PG&E also estimates that "other disturbance" covered activities (activities which do not disturb land-cover such as tree trimming or off-road travel) will affect 6.14 acres of succulent owl's clover designated critical habitat annually (184.2 acres over 30 years). These effects would occur within existing PG&E rights-of-ways present in the 6 critical habitat units (see *Critical Habitat Baseline* above).

The "minor construction" covered-activities may also impact designated critical habitat. The "minor construction" activities (G14-G16 and E12-E15) will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries and will include the acquisition of additional right-of-way acres. PG&E cannot predict where these line extensions will be constructed, and some may be constructed inside designated succulent owl's clover critical-habitat. PG&E will confer with the Service prior to implementing any "minor construction" covered-activity or other medium or large covered-activities within a designated critical-habitat unit. During the Confer Process, PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Conclusion

We anticipate that the proposed action will directly and indirectly affect succulent owl's clover as described in the analysis above, including the permanent loss of up to 1.82 acres of occupied succulent owl's clover vernal-pool habitat over the 30-year Permit term.

Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to succulent owl's clover occupied habitat. Compensation will be provided for all impacts to occupied succulent owl's clover vernal pool habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to succulent owl's clover, preserving up to 5.4 acres of occupied habitat over 30 years.

The area of impact expected in six succulent owl's clover critical habitat units is a small proportion of the total area in each unit (less than 2.0%); these impacts are not expected to change the current ability of the primary constituent elements to support the function and conservation role of those critical habitat units. The "other disturbance" effects of vehicle travel through dry vernal pools and associated upland areas are individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of succulent owl's clover or adversely modify its designated critical habitat.

We reached this conclusion because the small impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Threatened Colusa grass (*Neostapfia colusana*) and its Critical Habitat

Colusa grass is a robust, tufted annual in the grass family (Poaceae) that grows 3-12 inches tall. The lower portions of the stems lie on the ground; the upper portions are erect and terminate in dense cylindrical, spike-like inflorescences that superficially resemble small ears of corn. Colusa grass is the only species in the genus *Neostapfia*. The genus *Neostapfia* is in the Orcuttieae grass

tribe, and the closest relatives of this species are the Orcutt grasses. All grasses of the Orcuttiaea tribe are endemic to California vernal pool habitat.

Status of the Species and the Critical Habitat

Listing Status

Colusa grass was federally listed as threatened in March 1997 (62 FR 14338). A detailed account of the taxonomy, ecology, and biology of Colusa grass is presented in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005) and in the final rule (62 FR 14338). This species was listed as endangered by the California Department of Fish and Game in November 1978. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal

Long-term inundation of approximately three months is required for seed germination in this species, and it appears that deeper pools and stock ponds are most likely to provide the long inundation period required (Service 2005). It flowers May–July and is wind pollinated, but pollen is probably not carried long distances between populations. Local seed dispersal is by water, which breaks up the inflorescences. Long-distance dispersal is unlikely, but waterfowl may occasionally carry seeds. Seeds can remain dormant for at least 3-4 years. Population sizes of Colusa grass can vary widely from year to year (Service 2005).

Habitat Affinities

Colusa grass occurs in large or deep vernal pools with substrates of high mud content. It is sparingly restricted to the Sacramento and San Joaquin Valleys of California. Colusa grass has the broadest ecological range among the Orcuttiaea tribe; it occurs on the rim of alkaline basins in the Sacramento and San Joaquin Valleys, on acidic soils of alluvial fans and stream terraces along the eastern margin of the San Joaquin Valley and into the adjacent foothills, as well as in Northern Claypan and Northern Hardpan vernal pool types (Service 2005). It has been found growing in pools ranging in size from 0.02 to 617.5 acres (Service 2005).

Historical and Current Range, Distribution

Colusa grass was initially discovered in 1898. The species' historical distribution included Glenn, Colusa, Yolo, Solano, Stanislaus and Merced counties. Currently there are 42 extant occurrences reported in the CNDDB, these are located in Yolo County (2 occurrences), Solano County (2 occurrences), Stanislaus County (15 occurrences) and Merced County (23 Occurrences). The species has apparently been extirpated from Glenn and Colusa County (CNDDB 2007, Hogle 2002).

The core areas that pertain to Colusa grass are distributed among three vernal pool regions: Solano-Colusa region, San Joaquin Valley region, and the Southern Sierra Foothills region. At least one population remains in each of the vernal pool regions from which Colusa grass was known historically. However, only 7 percent of populations are currently protected (CNDDB 2006).

In the Solano-Colusa vernal pool region, four extant occurrences remain (two each in southeastern Yolo and central Solano Counties). Two of the extant occurrences in this region are

in southeastern Yolo County at the Davis Communications Annex site. Two occurrences are located within Jepson Prairie, in central Solano County (CNDDB 2006, C. Witham, In Literature, 2006).

In the San Joaquin Valley Vernal Pool Region, one or two occurrences remain in the central Merced County part of the region (Service 2005). One occurrence of Colusa grass is found on the Arena Plains parcel of the Merced NWR. The Merced NWR currently manages the vernal pool complex where the Colusa grass occurs for the preservation of this species (D. Woolington, Service, personal communication, 2006).

The majority of extant occurrences for Colusa grass are in the Southern Sierra Foothills Vernal Pool Region, where they are concentrated northeast of the City of Merced in Merced County and east of Hickman in Stanislaus County. The majority of the known extant occurrences (42 percent) are at the Flying M Ranch, the Ichord Ranches, and the Virginia Smith Trust site (Vollmar 2002).

It is likely that additional occurrences of Colusa grass exist, particularly on private lands in Merced and Stanislaus counties where the majority of known extant occurrences are located. At this time, the Service is not aware of surveys in these areas.

The HCP estimated that the potential geographic range of Colusa grass inside the San Joaquin Valley totals 102,000 acres in Stanislaus and Merced counties. The HCP calculated that 0.425 percent, or 435 acres, of this 102,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
Population trends for this species appear to be declining. Habitat loss and fragmentation are the largest threats to the survival and recovery of Colusa grass and other vernal pool species. Loss of habitat generally results from agricultural conversion, urbanization, and mining.

The largest continuing threat to this species is agricultural conversion, especially in Stanislaus County, where 15 extant populations are known to occur (36 percent) (CNDDB 2007). Urbanization is the second greatest threat, especially at the proposed University of California campus and associated community development in eastern Merced County. Four occurrences in the vicinity of the proposed campus are expected be developed within the next 15 years and two others are within the general "planning area" (EIP Associates 1999). Proposed construction of a new prison and a landfill also threaten other specific populations in Merced County (Service 1997).

Habitat loss also occurs in the form of habitat alteration and degradation as a result of changes to natural hydrology, invasive species, incompatible grazing regimes, infrastructure projects (e.g., roads, water storage and conveyance, utilities), recreational activities (e.g., off-highway vehicles and hiking), erosion, contamination and inadequate management and monitoring. Additional specific threats to Colusa grass include inundation by poultry manure, damage by herbicide applications, and groundwater becoming contaminated by industrial chemicals. Recent inundation by poultry manure is a threat to the population at the Arena Plains parcel within the Merced NWR (D. Woolington, Service, personal communication, 2006).

Almost all of the extant occurrences of Colusa grass are subject to livestock grazing. To the extent inappropriate grazing practices are still being followed at certain sites, these sites may be threatened. Competition from invasive native and non-native plants poses a problem at several sites, especially in combination with adverse hydrology changes and adverse grazing practices. Appropriate grazing can be a valuable component of invasive species control.

Fragmentation of habitat also threatens this species. Habitat for Colusa grass continues to be highly fragmented throughout its range due to conversion of vernal pool and other natural habitat for urban and agricultural uses. This fragmentation results in small isolated populations of this species. Such populations may be highly susceptible to extirpation due to chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soule 1988; Goodman 1987). If an extirpation event occurs in a population that has been fragmented, the opportunities for recolonization will be greatly reduced due to physical isolation from other source populations.

Critical Habitat Status
Critical Habitat for Colusa grass was designated in August 2003 (68 FR 46683), and revised in August 2005 (70 FR 46923). The Service published species-specific Critical Habitat unit descriptions and maps on February 10, 2006 (71 FR 71117). The total designated Critical Habitat for Colusa grass is 152,093 acres within 5 Critical Habitat Units and 16 subunits in California (71 FR 7118). Critical habitat units are depicted for Mariposa, Merced, Stanislaus, Tuolumne, and Yolo Counties, California,

The primary constituent elements of critical habitat for Colusa grass are the habitat components that provide: (1) 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 later in this paragraph), providing for dispersal and promoting hydroperiods of adequate length in the pools; and (2) 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 non-native 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.

Colusa Grass Environmental Baseline within the Action Area
Species Baseline
The Service has no specific information on the number of extant occurrences for Colusa grass that are within the existing PG&E right-of-ways of the 276,350-acre action area. Of the total 42 extant occurrences remaining for this species, 38 are located within Stanislaus and Merced counties. Existing PG&E pipelines, electric lines and other facilities are known to be located in the areas of Stanislaus and Merced Counties where extant occurrences of Colusa grass occur (figure 1). It is possible that most of the 38 occurrences for Colusa grass within Stanislaus and Merced counties occur within the 276,350-acre action area.

The HCP land-cover types utilized by Colusa grass are Grassland and Seasonal Wetland. The HCP classified Colusa grass as a "narrowly endemic" plant covered-species.

Critical Habitat Baseline
Of the 152,093 acres of Colusa grass designated Critical Habitat (71 FR 7118), approximately 150,000 acres are located in Stanislaus and Merced Counties (Units 4, 5, 6, and 7). The Service has no information on the acres existing PG&E right-of-ways located in Colusa grass Critical Habitat.

Colusa grass Critical Habitat Unit 4 and Unit 5 are located on or near the border between Stanislaus and Merced counties, just west of the Tuolumne and Mariposa county borders. It appears that few PG&E existing facilities are located in this area (Figure 1), and the proposed action may not affect Colusa Grass Unit 4 or Unit 5. Colusa grass Critical Habitat Unit 6 is located just north of the city of Merced and Merced College. The south portion of Unit 6 appears to overlap with PG&E facilities located just north and northwest of the city of Merced. Colusa grass Critical Habitat Unit 7 is located south and southwest of the city of Merced, and it appears to overlap existing PG&E facilities in those areas (Figure 1). The Service has no information on the acres of the action area (acres of existing PG&E right-of-ways) present within each Colusa grass Critical Habitat unit in the San Joaquin Valley.

Effects of the Action on Colusa Grass
Direct and Indirect Effects
PG&E estimated the effects of the proposed action on Colusa grass using the methods discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Colusa grass occupied habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Colusa grass survey is not possible during an appropriate period in May or June and 1) any CNDDB Colusa grass occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and vernal pool habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that the ground-disturbing covered-activities implemented within the existing right-of-ways of the action area could directly disturb 0.045 acre of occupied Colusa grass habitat, and permanently remove (hardscape) 0.001 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur within the acres of PG&E right-of-way currently occupied by Colusa grass. Implementing the "minor construction" covered activities (outside the existing rights-of-way) could disturb an additional 0.045 acre of occupied Colusa grass habitat, and permanently remove an additional 0.001 acre of occupied Colusa grass habitat. In total, PG&E estimates that covered activities will directly disturb 0.09 acre and permanently remove 0.002 acre of Colusa grass occupied habitat over the 30-year term of the permit (0.092 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Colusa grass occupied-habitat within the existing PG&E rights-of-way is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Colusa grass habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, loss of vernal pool microhabitat-features essential to this species, or a permanent loss of hydrological integrity within that vernal pool or possibly within the entire vernal pool complex. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species would compete with Colusa grass for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Colusa grass habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Colusa grass that is present within the disturbance site.

To minimize direct and indirect effects on Colusa grass, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking exclusion zones 250 feet around the vernal pool (AMM 15) or delaying the activity until after the plant species sets seed and senescences, and before the first significant rain fall (AMM 13). These AMMs will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Colusa grass take over the term of the proposed Permit.

AMM14 would not be effective on this plant species, and it should not be considered to be an avoidance or minimization measure for Colusa grass. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of any Colusa grass extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual Colusa grass plants in subsequent seasons, possibly extirpating Colusa grass from the disturbance site.

Effects of Compensation Measures

Although PG&E will avoid occupied habitat for Colusa grass to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. If PG&E determines during a pre-construction survey that a ground-disturbing activity cannot completely

avoid Colusa grass occupied habitat, PG&E will confer with the Service as described above under *Confer Process*. The Confer process will determine if the ground disturbance will result in a temporary or a permanent loss of Colusa grass habitat, discuss a proposed compensation approach, and discuss what compensatory mitigation would be appropriate for Colusa grass.

Compensation will be based the acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 0.5:1 for temporary loss of occupied habitat and 3:1 for permanent loss of occupied habitat, as outlined above in *Compensation Ratios*. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Colusa grass. Therefore, PG&E may provide between 0.05 acres and 0.3 acres of Colusa grass compensation over the 30-year Permit term.

Compensation lands for effects to Colusa grass will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms*. The Service refers to this type of compensation as "in-kind compensation". Compensation for Colusa grass will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Effects on Colusa Grass Critical Habitat
The Service has no information on the acres of Colusa grass critical habitat located within the action area, and the Service does not have an estimate of the amount of ground-disturbance or "other disturbance" likely to occur within designated Colusa grass critical habitat. However, based on the vernal pool impact analysis presented in the final HCP document, the Service anticipates that implementation of covered-activities within Colusa grass Critical Habitat would result in very small amounts of ground disturbance; the total impact in any Colusa grass Critical Habitat Unit would likely be less than 0.5 acres annually (15 acres cumulatively over 30 years). These effects would occur within existing PG&E rights-of-ways present in the Colusa grass Critical Habitat Units

The "minor construction" covered-activities may also impact designated critical habitat. The "minor construction" activities (G14-G16 and E12-E15) will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries and will include the acquisition of additional right-of-way acres. PG&E cannot predict where these line extensions will be constructed, and some may be constructed inside designated Colusa grass critical-habitat. PG&E will confer with the Service prior to implementing any "minor construction" covered-activity or other medium or large covered-activities within a designated critical-habitat unit. During the Confer Process, PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Colusa grass as described in the analysis above, including the permanent loss of up to 0.092 acres of occupied Colusa grass vernal-pool habitat over the 30-year Permit term.

Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Colusa grass occupied habitat. Compensation will be provided for all impacts to occupied Colusa grass vernal pool habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Colusa grass, preserving up to 0.28 acres of occupied Colusa grass habitat over 30 years.

The area of impact expected in Colusa grass critical habitat units will likely be a small proportion of the total area in each unit (less than 2.0%); these impacts are not expected to change the current ability of the primary constituent elements to support the function and conservation role of those critical habitat units. The "other disturbance" effects of vehicle travel through dry vernal pools and associated upland areas are individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Colusa grass or adversely modify its designated critical habitat.

We reached this conclusion because the small impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Threatened San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*) and its Critical Habitat

San Joaquin Valley Orcutt grass, also known as San Joaquin Valley Orcuttia and San Joaquin Orcutt grass, is a small, tufted annual grass found in vernal pools. The plant has several stems 2 to 6 inches tall, ending in a spike-like inflorescence. The foliage is grayish, with soft, straight hairs. At maturity, the spikelets of the plant are aggregated into a dense, hat-shaped cluster.

Status of the Species and the Critical Habitat

Listing Status

San Joaquin Valley Orcutt grass was federally listed as endangered in March 1997 (62 FR 14338). A detailed account of the taxonomy, ecology, and biology of the San Joaquin Valley Orcutt grass is presented in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005) and in the final rule (62-FR 14338). This species was listed as endangered by the California Department of Fish and Game in September 1979. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Distribution

Stratification followed by temperatures of 59 to 90 degrees Fahrenheit is necessary for seed germination in Orcutt grass. In particular, seeds of Orcuttia species germinate underwater in January and February (Griggs 1980, Griggs and Jain 1983, Keeley 1998), after being colonized by aquatic fungi (Griggs 1980, 1981). Flowering occurs May–September (California Native Plant Society 2001). The first two flowers on a given plant open simultaneously and do not produce pollen until the ovaries are no longer receptive. Thus, if they are fertilized it must be

with pollen from another plant. Flowers that open subsequently may receive pollen from the same plant or others (Griggs 1980). Like other vernal pool annuals, the size of San Joaquin Valley Orcutt grass populations fluctuates dramatically from year-to-year.

Habitat Affinities
This species grows in Northern Claypan, Northern Hardpan, and Northern Basalt Flow vernal pools (Sawyer and Keeler-Wolf 1995) within rolling grassland (Crampton 1959). San Joaquin Valley Orcutt grass has been reported from elevations of 30 to 755 meters (100 to 2,475 feet). Soils underlying San Joaquin Valley Orcutt grass pools are acidic and vary in texture from clay to sandy loam.

Historical and Current Range, Distribution
San Joaquin Valley Orcutt grass is the only Orcutt grass restricted to the Southern Sierra Foothills Vernal Pool Region of the San Joaquin Valley (CNDDB 2005). The earliest collection was made in 1927 from the Fresno-Madera County border near Lanes Bridge. Hoover (1941) mentioned collections from eight sites in Fresno, Madera, Merced, Stanislaus, and Tulare Counties.

This species has apparently been extirpated from Stanislaus County but remains in Fresno, Madera, Merced, Solano, and Tulare Counties (Stone *et al.* 1988, CNDDB 2007). Of the 52 occurrences of San Joaquin Valley Orcutt grass catalogued, 32 are presumed to be extant; 17 are extirpated and 3 others are considered possibly extirpated because the habitat has been modified (CNDDB 2005). However, only three of the occurrences presumed extant have been revisited within the past decade. The 32 extant occurrences remaining are: Fresno County (2), Madera County (7), Merced County (21), Solano (1), and Tulare (1).

The primary area of concentration of extant occurrences is northeast of Merced in Merced County, with 19 occurrences (59 percent) on the Flying M Ranch and adjacent lands (EIP Associates 1999, C. Witham *in litt.* 2000*b*, CNDDB 2005). The Lanes Bridge area of Madera and Fresno Counties has the second highest concentration, with seven occurrences (22 percent), including an introduced population. The remaining six occurrences include three in the Le Grand area of Merced County, two on the tabletops near the San Joaquin River in Madera and Fresno counties, and one in northwestern Tulare County (Stone *et al.* 1988, Stebbins *et al.* 1995, CNDDB 2003).

The HCP estimated that the potential geographic range of San Joaquin Valley Orcutt grass inside the San Joaquin Valley totals 165,000 acres in Stanislaus, Merced, Madera, Fresno, and Tulare counties. The HCP calculated that 0.22 percent, or 356 acres, of this 165,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
Habitat loss and fragmentation are the largest threats to the survival and recovery of vernal pool species. Loss of habitat generally results from urbanization, agricultural conversion, and mining. Habitat loss also occurs in the form of habitat alteration and degradation as a result of changes to natural hydrology, invasive species, incompatible grazing regimes, infrastructure projects (e.g.,

roads, water storage and conveyance, utilities), recreational activities (e.g., off-highway vehicles and hiking), erosion, contamination and inadequate management and monitoring.

A reason for some site-specific declines of this species may be foraging during grasshopper outbreaks, which can decimate entire plant populations before they set seed (Griggs and Jain 1983, Stone *et al.* 1988).

At least ten of the extant occurrences are threatened with habitat loss due to urbanization. Four of these are in the path of the extension of State Highway 41 in Madera County (R. Stone *in litt.* 1992). Three others are threatened by a proposed residential development in Madera and Fresno Counties (Stone *et al.* 1988, Stebbins *et al.* 1995, CNDDB 2003), and three more could be destroyed by construction of the proposed University of California campus and associated community in Merced County (EIP Associates 1999, CNDDB 2003). Most extant populations are still being grazed; thus to the extent inappropriate grazing practices are still being followed, certain sites may be threatened.

Currently, few occurrences of San Joaquin Valley Orcutt grass are protected permanently. Two occurrences are on the Flying M Ranch in Merced County, which is protected under a conservation easement with The Nature Conservancy. The extant Tulare County occurrence of San Joaquin Valley Orcutt grass is on a California Department of Fish and Game Ecological Reserve. Three other occurrences are wholly or partially on public land.

Critical Habitat Status
Final Critical Habitat for San Joaquin Valley Orcutt grass was originally designated in August 2003(68 FR 46684). The designation was revised August 11, 2005 (70 FR 46923). The Service published species-specific Critical Habitat unit descriptions and maps on February 10, 2006 (71 FR 71117). The total designated Critical Habitat for San Joaquin Valley Orcutt grass is 136,312 acres within 6 Critical Habitat Units and 9 subunits in California (71 FR 7118). San Joaquin Valley Orcutt grass critical habitat units are depicted for Merced, Mariposa, Madera, Fresno, and Tulare Counties, California.

The biological and physical features (primary constituent elements) that are essential to the conservation of San Joaquin Valley Orcutt grass in the designated critical habitat are the habitat components that provide: (1) 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 the next paragraph, providing for dispersal and promoting hydroperiods of adequate length in the pools; and (2) 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 non-native 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. The constituent elements include the associated watershed(s) and hydrologic features, including the pool basin, swales, and surrounding uplands (which may vary in extent depending on pool size and depth,

soil type and depth, hardpan or claypan type and extent, topography, and climate) that contribute to the filling and drying of the vernal pool or ephemeral wetland, and that maintain suitable periods of pool inundation, water quality, and soil moisture for Orcuttia pilosa germination, growth and reproduction, and dispersal, but not necessarily every year.

San Joaquin Valley Orcutt Grass Environmental Baseline within the Action Area

Species Baseline

Of the total 32 extant occurrences for San Joaquin Valley Orcutt grass, three occurrences (9.4%) are within the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are in Merced County (one occurrence) and Madera County (one occurrence). The two occurrences occupy approximately 2.1 acres of existing PG&E right-of-ways in the 276,350-acre action area (CNDDB 2007). An additional four occurrences are within 200 meters of the PG&E facilities in the action area (CNDDB 2002). The HCP land-cover types utilized by San Joaquin Valley Orcutt grass are Grassland and Seasonal Wetland. The HCP classified San Joaquin Valley Orcutt grass as a "narrowly endemic" plant covered-species.

Critical Habitat Baseline

Of the 136,312 acres of San Joaquin Valley Orcutt grass designated Critical Habitat (71 FR 7118), approximately 1,178 acres are located in existing PG&E right-of-ways the 250,350-acre action-area. Most San Joaquin Valley Orcutt grass critical habitat in the action area is in existing electric transmission rights-of-ways. Of the 1,178 acres, approximately 871.5 acres are located in electric transmission ROWs and 278.8 acres are located in electric distribution ROWs. No San Joaquin Valley Orcutt grass Critical Habitat is located in the gas transmission ROWs, but the HCP estimated that 27.87 acres of San Joaquin Valley Orcutt grass Critical Habitat could be located inside the gas distribution ROWs of the action area.

Of the six Critical Habitat units designated for San Joaquin Valley Orcutt grass, portions of all 6 units and 9 subunits are within the existing PG&E right-of-ways of the 276,250-acre action area. These are: Unit 1 in Merced and Mariposa counties (663 acres within the action area), Unit 2 in Merced, Mariposa and Madera counties (234 acres within the action area), Units 3A, 3B, and 3C in Merced Counties (157 acres within the action area), Unit 4 in Fresno Counties (20 acres within the action area), Unit 5 in Madera County (34 acres within the action area).

The acreage of the action area within each Critical Habitat unit is a small percentage of the total area of each Unit. Approximately 1.2% of Unit 1, approximately 0.7% of Unit 2, approximately 0.5% of Unit 3, approximately 4.2% of Unit 4, and approximately 0.8% of Unit 5 are within the existing PG&E rights-of-way in the HCP action area.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on San Joaquin Valley Orcutt grass using the methods discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to San Joaquin Valley Orcutt grass occupied habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a San Joaquin Valley Orcutt grass survey is not possible during an appropriate period

in May to September and 1) any CNDDB San Joaquin Valley Orcutt grass occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and vernal pool habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that the ground-disturbing covered-activities implemented within the existing right-of-ways of the action area could directly disturb 0.141 acre of occupied San Joaquin Valley Orcutt grass habitat, and permanently remove (hardscape) 0.003 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur within the 2.1 acres of PG&E right-of-way currently occupied by San Joaquin Valley Orcutt grass (see *Species Baseline* above). Implementing the "minor construction" covered activities (outside the existing rights-of-way) could disturb an additional 0.141 acre of occupied San Joaquin Valley Orcutt grass habitat, and permanently remove an additional 0.003 acre of occupied San Joaquin Valley Orcutt grass habitat. In total, PG&E estimates that covered activities will directly disturb 0.282 acre and permanently remove 0.006 acre of San Joaquin Valley Orcutt grass occupied habitat over the 30-year term of the permit (0.29 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in San Joaquin Valley Orcutt grass occupied-habitat within the existing PG&E rights-of-way is not available to the Service.

Soil excavations or other ground disturbances in or near occupied San Joaquin Valley Orcutt grass habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, loss of vernal pool microhabitat-features essential to this species, or a permanent loss of hydrological integrity within that vernal pool or possibly within the entire vernal pool complex. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species would compete with San Joaquin Valley Orcutt grass for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied San Joaquin Valley Orcutt grass habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for San Joaquin Valley Orcutt grass that is present within the disturbance site.

To minimize direct and indirect effects on San Joaquin Valley Orcutt grass, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking exclusion zones 250 feet around the vernal pool

(AMM 15) or delaying the activity until after the plant species sets seed and senescences, and before the first significant rain fall (AMM 13). These AMMs will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of San Joaquin Valley Orcutt grass take over the term of the proposed Permit.

AMM14 would not be effective on this plant species, and it should not be considered an avoidance or minimization measure for San Joaquin Valley Orcutt grass. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of any San Joaquin Valley Orcutt grass extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual San Joaquin Valley Orcutt grass plants in subsequent seasons, possibly extirpating San Joaquin Valley Orcutt grass from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid occupied habitat for San Joaquin Valley Orcutt grass to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. If PG&E determines during a pre-construction survey that a ground-disturbing activity cannot completely avoid San Joaquin Valley Orcutt grass occupied habitat, PG&E will confer with the Service as described above under *Confer Process.* The Confer Process will determine if the ground disturbance will result in a temporary or a permanent loss of San Joaquin Valley Orcutt grass habitat, discuss a proposed compensation approach, and discuss what compensatory mitigation would be appropriate for San Joaquin Valley Orcutt grass.

Compensation will be based the acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 0.5:1 for temporary loss of occupied habitat and 3:1 for permanent loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for San Joaquin Valley Orcutt grass. Therefore, PG&E may provide between 0.16 acres and 0.9 acres of San Joaquin Valley Orcutt grass compensation over the 30-year Permit term.

Compensation lands for effects to San Joaquin Valley Orcutt grass will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for San Joaquin Valley Orcutt grass will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Effects on San Joaquin Valley Orcutt Grass Critical Habitat
Of the approximately 1,178 acres of San Joaquin Valley Orcutt grass critical habitat located within the existing PG&E right-of-ways (see *Critical Habitat Baseline* above), PG&E estimates that ground-disturbing covered activities will directly impact 0.6 acres annually (18 acres over 30 years). PG&E also estimates that "other disturbance" covered activities (activities which do not disturb land-cover such as tree trimming or off-road travel) will affect 3.6 acres of San Joaquin Valley Orcutt grass designated critical habitat annually (108 acres over 30 years). These effects

would occur within the existing PG&E rights-of-ways present in the six critical habitat units (see *Critical Habitat Baseline* above).

The "minor construction" covered-activities may also impact designated critical habitat. The "minor construction" activities (G14-G16 and E12-E15) will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries and will include the acquisition of additional right-of-way acres. PG&E cannot predict where these line extensions will be constructed, and some may be constructed inside designated San Joaquin Valley Orcutt grass critical-habitat. PG&E will confer with the Service prior to implementing any "minor construction" covered-activity or other medium or large covered activities within a designated critical-habitat unit. During the Confer Process, PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Conclusion

We anticipate that the proposed action will directly and indirectly affect San Joaquin Valley Orcutt grass as described in the analysis above, including the permanent loss of up to 0.3 acres of occupied San Joaquin Valley Orcutt grass vernal-pool habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to San Joaquin Valley Orcutt grass occupied habitat. Compensation will be provided for all impacts to occupied San Joaquin Valley Orcutt grass vernal pool habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to San Joaquin Valley Orcutt grass, preserving up to 0.9 acres of occupied habitat over 30 years.

The area of impact expected in six San Joaquin Valley Orcutt grass critical habitat units is a relatively small proportion of the total area in each unit (less than 4.2%); these impacts are not expected to change the current ability of the primary constituent elements to support the function and conservation role of those critical habitat units. The "other disturbance" effects of vehicle travel through dry vernal pools and associated upland areas are individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of San Joaquin Valley Orcutt grass or adversely modify its designated critical habitat.

We reached this conclusion because the small impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Boggs Lake hedge-hyssop (*Gratiola heterosepala*)

Boggs Lake hedge-hyssop is a small, semi-aquatic, vernal pool herbaceous annual in the figwort family (Scrophulariaceae). It has opposite leaves, blunt, unequal sepals, and yellow and white flowers on short stalks.

Status of the Species

Listing Status

Boggs Lake hedge-hyssop is not federally listed. A detailed account of the taxonomy, ecology, and biology of the Boggs Lake hedge-hyssop is presented in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005). Boggs Lake hedge-hyssop was listed as Endangered by the California Department of Fish and Game in 1978. The California Native Plant Society has placed Boggs Lake hedge-hyssop on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal

The seeds of Boggs Lake hedge-hyssop most likely germinate in response to autumn or winter rains (Kaye *et al.* 1990, Corbin *et al.* 1994). It completes a rapid life cycle during the period when vernal pools have begun to dry but still contain shallow water. Boggs Lake hedge-hyssop germinates and begins growth underwater. By the time the water recedes, the plants already are in bud or in flower; flowering can begin when as much as 5 centimeters (2.0 inches) of water remains (Kaye *et al.* 1990, Corbin *et al.* 1994). It generally flowers between April and June in the Central Valley when shallow water is still present. Flowering at higher elevations occurs as late as August (Corbin et al. 1994). The plants disappear quickly after seed-set (Corbin *et al.* 1994). Kaye *et al.* (1990) determined that Boggs Lake hedge-hyssop is self-compatible and does not require insects for pollination. Seed dispersal agents are not known.

Habitat Affinities

Boggs Lake hedge-hyssop 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 (Kaye *et al.* 1990, Corbin *et al.* 1994, CNDDB 2001). It has been found in several types of vernal pools, including Northern Basalt Flow, Northern Claypan, Northern Hardpan, Northern Volcanic Ashflow, and Northern Volcanic Mudflow (Sawyer and Keeler-Wolf 1995). Occupied wetlands are amongst annual grassland, *Quercus* (oak) woodland, *Juniperus* (juniper) woodland, or coniferous forest (California Department of Fish and Game 1987, Kaye *et al.* 1990, Corbin *et al.* 1994, CNDDB 2001).

Historical and Current Range, Distribution

This species was first collected at Boggs Lake in Lake County, California, in 1923. The historical range included five vernal pool regions: the Modoc Plateau region, the Lake-Napa region, the Southeastern Sacramento Valley region , and the Southern Sierra Foothills region (Keeler-Wolf *et al.* 1998).

In addition to the four vernal pool regions where it was known historically, Boggs Lake hedge-hyssop is now known from the Northeastern and Northwestern Sacramento Valley region and the Solano-Colusa vernal pool region (Keeler-Wolf *et al.* 1998). Currently, Boggs Lake hedge-hyssop is known from 85 extant occurrences in California plus 1 in Oregon (CNDDB 2007). The 85 extant occurrences in California are located in 13 counties: Fresno (4), Lake (3), Lassen (2), Madera (2), Merced (1), Modoc (19), Placer (3), Sacramento (9), San Joaquin (4), Shasta

(14), Siskiyou (1), Solano (6), and Tehama (17). Only one of the historical occurrences is believed to have been extirpated, in Sacramento County

The primary area of concentration for *Gratiola heterosepala*, with 32 occurrences (37 percent), is the Modoc Plateau region, where occurrences are known from Lassen, Modoc, and Shasta Counties in California and Lake County in Oregon (Kaye *et al.* 1990, B. Corbin *in litt.* 2000, CNDDB 2005). Five (6 percent) occurrences in Solano County are within the Solano-Colusa Vernal Pool Region. The remaining occurrences include three (4 percent) in Lake County in California, and one in Siskiyou County, representing the Lake-Napa and Northwestern Sacramento Valley Vernal Pool Regions, respectively (CNDDB 2005).

Two secondary areas of occurrence are the northeastern Sacramento Valley and the southeastern Sacramento Valley regions, with 17 extant occurrences (20 percent) each. The northeastern Sacramento Valley concentration is in the vicinity of Dales, in Tehama County. The southeastern Sacramento Valley concentration is in Placer, Sacramento, and San Joaquin Counties, primarily between the cities of Roseville and Elk Grove (CNDDB 2005).

South of San Joaquin County, Boggs Lake hedge-hyssop has not been reported from any valley floor vernal pools, but it does occur in five vernal pools in the Table Mountain complex near Friant (Fresno and Madera County). The Southern Sierra Foothills Vernal Pool Region has a total of six occurrences (7 percent), including four in Fresno County , two in Madera, and one in Merced counties (C. Witham *in litt.* 2000*b,* CNDDB 2007).

The HCP estimated that the potential geographic range of Boggs Lake hedge-hyssop inside the San Joaquin Valley totals 204,000 acres in San Joaquin, Merced, Madera, and Fresno counties. The HCP calculated that 0.025-percent, or 52 acres, of this 204,000 acre potential range are presently occupied by the species. The HCP identifies 11 extant occurrences of Boggs Lake hedge-hyssop in the San Joaquin Valley. Three of these are in the Goose Creek watershed in northern San Joaquin County, one is near Haystack Mountain in Merced County, and six are in the vicinity of Big Table Mountain in northern Fresno County. One occurrence documented near Millerton Lake in Madera County has not been seen since 1961.

Reasons for Decline and Threats to Survival
Although the known number of occurrences of Boggs Lake hedge-hyssop has increased as more surveys have been conducted, its vernal pool habitat has been declining simultaneously from habitat conversion for farming or housing. Many of the known sites occur at the edges of reservoirs and stock ponds, which probably should be considered temporary habitat at best.

Four occurrences have been disturbed but not extirpated by hydrological alterations such as excavation and damming, and another three by surface disturbances such as discing and grading (CNDDB 2001). Although 48 California occurrences are subject to grazing by cattle, sheep, horses, or feral pigs, livestock grazing may or may not pose a threat to the survival of Boggs Lake hedge-hyssop (Corbin *et al.* 1994, B. Corbin *in litt.* 2000, CNDDB 2001). The species tolerates light to moderate levels of grazing, but higher levels appear to be detrimental. Cattle trampling has destroyed many immature plants at the Oregon occurrence (Kaye *et al.* 1990). Competition from *Taeniatherum caput-medusae* potentially threatens Boggs Lake hedge-hyssop

at five sites of occurrence on the Modoc Plateau (Corbin *et al.* 1994). The Boggs Lake population, managed by TNC, has been declining yearly and is now at very low levels. Reasons for the decline are unknown. Urban growth through residential development, shopping center construction, and landfill expansion threatens seven of the populations in Placer and Sacramento Counties (CNDDB 2001).

Nine of the extant occurrences contain fewer than 100 individuals at their maximum, and several are undergoing rapid declines (CNDDB 2001). These populations are sufficiently small that they are in danger of extirpation from chance events (Menges 1991).

Environmental Baseline within the Action Area

Species Baseline

There is one extant occurrence for Boggs Lake hedge-hyssop in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This occurrence is in the San Joaquin County portion of the action area. This occurrence occupies approximately 0.29 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007).

The HCP land-cover type utilized by Boggs Lake hedge-hyssop is Seasonal Wetland. The HCP classifies Boggs Lake hedge-hyssop as a "narrowly endemic plant covered-species.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on Boggs Lake hedge-hyssop as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Boggs Lake hedge-hyssop occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Boggs Lake hedge-hyssop survey is not possible during an appropriate period in April or June, and 1) any CNDDB Boggs Lake hedge-hyssop occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would not directly disturb any occupied Boggs Lake hedge-hyssop habitat, and would not permanently remove (hardscape) any occupied habitat over the 30-year term of the proposed permit. There would be no effect to the 0.29 acres of right-of-way currently occupied by Boggs Lake hedge-hyssop (see *Species Baseline* above). PG&E estimates that implementing the "minor construction" covered activities (outside the existing rights-of-way) could disturb 0.005 acre of occupied Boggs Lake hedge-hyssop habitat, and permanently remove 0.005 acre of occupied Boggs Lake hedge-hyssop habitat over the Permit term. In total, PG&E estimates that covered activities would impact 0.01 acre of occupied Boggs Lake hedge-hyssop over the 30-year term of the permit.

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Boggs Lake hedge-hyssop occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Boggs Lake hedge-hyssop habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, loss of vernal pool microhabitat-features essential to this species, or a permanent loss of hydrological integrity within that vernal pool or possibly within the entire vernal pool complex. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Boggs Lake hedge-hyssop for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Boggs Lake hedge-hyssop habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Boggs Lake hedge-hyssop that is present in the disturbance site.

To minimize direct and indirect effects on Boggs Lake hedge-hyssop, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking work-exclusion zones 250 feet around the vernal pool (AMM 15) or delaying the activity until after the plant species sets seed and senescences, and before the first significant rain fall (AMM 13). These AMMs will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Boggs Lake hedge-hyssop take over the term of the proposed Permit.

AMM14 would not be effective on Boggs Lake hedge-hyssop, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Boggs Lake hedge-hyssop extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Boggs Lake hedge-hyssop plants in the next and subsequent seasons, possibly extirpating Boggs Lake hedge-hyssop from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Boggs Lake hedge-hyssop occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities.

Compensation will be based the acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Boggs Lake hedge-hyssop. Therefore, PG&E may provide between 0.018 acres and 0.03 acres of Boggs Lake hedge-hyssop compensation over the 30-year Permit term.

Compensation lands for effects to Boggs Lake hedge-hyssop will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for Boggs Lake hedge-hyssop will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion

We anticipate that the proposed action will directly and indirectly affect Boggs Lake hedge-hyssop as described in the analysis above, including the permanent loss of up to 0.01 acres of occupied Boggs Lake hedge-hyssop vernal-pool habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Boggs Lake hedge-hyssop occupied habitat. PG&E will provide compensation if ground-disturbance occurs in Boggs Lake hedge-hyssop occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Boggs Lake hedge-hyssop vernal pool habitat, preserving between 0.018 acres and 0.03 acres of Boggs Lake hedge-hyssop occupied habitat over 30 years.

The "other disturbance" effects of vehicle travel through dry vernal pools and associated upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Boggs Lake hedge-hyssop.

We reached this conclusion because the small impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Pincushion navarretia (*Navarretia myersii* ssp. *myersii*)

Pincushion navarretia is a small annual herb in the phlox family (Polemoniaceae) that grows in vernal pools. The flowers are white and 17-21 millimeters in length (Hickman 1993; California Native Plant Society 2001).

Status of the Species

Listing Status

Pincushion navarretia is not federally listed, and is not listed by the California Department of Fish and Game. The California Native Plant Society has placed Pincushion navarretia on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Pincushion navarretia is an annual that blooms in May (Hickman 1993; California Native Plant Society 2001).

Habitat Affinities

Pincushion navarretia occurs in vernal pools at elevations of 66-1,083 feet in Valley and foothill grasslands in clay soil (California Native Plant Society 2001).

Historical and Current Range, Distribution

Pincushion navarretia is endemic to California where it is found in vernal pools in the central Sierra Nevada foothills, Sacramento Valley, and San Joaquin Valley. It is currently known from only 14 occurrences in Amador (3), Calaveras (1), Merced (4) Placer (1) and Sacramento (6) counties (Hickman 1993; California Native Plant Society 2007).

The HCP estimated that the potential geographic range of pincushion navarretia inside the San Joaquin Valley totals 93,000 acres, all in Merced County. The HCP calculated that 0.03-percent, or 29 acres, of this 93,000 acre potential range are presently occupied by the species. There are three extant occurrences of pincushion navarretia in the San Joaquin Valley. These three occurrences are on the privately owned Flying M Ranch in Merced County (California Natural Diversity Database 2002).

Reasons for Decline and Threats to Survival

The primary threat to pincushion navarretia is potential loss of vernal pool habitat due to development (California Native Plant Society 2001). According to the California Natural Diversity Database, the population trend of pincushion navarretia is unknown. There are no recent population counts for most sites (CNDDB 2002.).

Environmental Baseline and Status within the Action Area

There are two extant occurrences for pincushion navarretia in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are in the San Joaquin County portion of the action area. The two occurrences occupy approximately 0.76 acre of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007).

The HCP land-cover types utilized by pincushion navarretia are Seasonal Wetland, and Grassland. The HCP classifies pincushion navarretia as a "narrowly endemic" plant covered-species.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on pincushion navarretia as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to pincushion navarretia occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a pincushion navarretia survey is not possible during an appropriate period in May, and 1) any CNDDB pincushion navarretia occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that the ground-disturbing covered-activities implemented within the existing right-of-ways of the action area could directly disturb 0.019 acre of occupied pincushion navarretia habitat, but would not permanently remove (hardscape) any occupied habitat over the 30-year term of the proposed permit. These effects would occur within the 0.76 acre of PG&E right-of-way currently occupied by pincushion navarretia (see *Species Baseline* above). Implementing the "minor construction" covered activities (outside the existing rights-of-way) could disturb an additional 0.019 acre of occupied pincushion navarretia habitat, but would not permanently remove any occupied pincushion navarretia habitat. In total, PG&E estimates that covered activities will directly disturb 0.038 acre and would not permanently remove any pincushion navarretia occupied habitat over the 30-year term of the permit.

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in pincushion navarretia occupied-habitat within the existing PG&E rights-of-way is not available to the Service.

Soil excavations or other ground disturbances in or near occupied pincushion navarretia habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, loss of vernal pool microhabitat-features essential to this species, or a permanent loss of hydrological integrity within that vernal pool or possibly within the entire vernal pool complex. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species would compete with pincushion navarretia for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied pincushion navarretia habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-

disturbing covered-activities will permanently remove any occupied habitat for pincushion navarretia that is present within the disturbance site.

To minimize direct and indirect effects on pincushion navarretia, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking exclusion zones 250 feet around the vernal pool (AMM 15) or delaying the activity until after the plant species sets seed and senescences and before the first significant rain fall (AMM 13). These AMMs will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of pincushion navarretia take over the term of the proposed Permit.

AMM14 would not be effective on this plant species, and it should not be considered an avoidance or minimization measure for pincushion navarretia. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of any pincushion navarretia extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual pincushion navarretia plants in subsequent seasons, possibly extirpating pincushion navarretia from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid occupied habitat for pincushion navarretia to the maximum extent practicable, a small amount of adverse effects to occupied habitat may result from covered activities over the term of the permit. If PG&E determines during a pre-construction survey that a ground-disturbing activity cannot completely avoid pincushion navarretia occupied habitat, PG&E will confer with the Service as described above under *Confer Process.* The Confer Process will determine if the ground disturbance will result in a temporary or a permanent loss of pincushion navarretia habitat, discuss a proposed compensation approach, and discuss what compensatory mitigation would be appropriate for pincushion navarretia.

Compensation will be based the acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 0.5:1 for temporary loss of occupied habitat and 3:1 for permanent loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for pincushion navarretia. Therefore, PG&E may provide between 0.019 acres and 0.057 acres of pincushion navarretia compensation over the 30-year Permit term.

Compensation lands for effects to pincushion navarretia will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for pincushion navarretia will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion

We anticipate that the proposed action will directly and indirectly affect pincushion navarretia as described in the analysis above, including the permanent loss of up to 0.038 acres of occupied pincushion navarretia vernal-pool habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to pincushion navarretia occupied habitat. Compensation will be provided for all impacts to occupied pincushion navarretia vernal pool habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to pincushion navarretia, preserving up to 0.06 acres of occupied habitat over 30 years.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of pincushion navarretia.

We reached this conclusion because the small impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Mason's lilaeopsis (*Lilaeopsis masonii*)

Mason's lilaeopsis is a minute (1.5–7.5 centimeters [0.6–3 inches]), turf-forming, semi aquatic perennial herb in the carrot family (Apiaceae) that spreads by rhizomes and produces narrow jointed leaves (California Native Plant Society 2001).

Status of the Species

Listing Status

Mason's lilaeopsis is not federally listed. It was listed as Endangered by the California Department of Fish and Game in 1979. The California Native Plant Society has placed Mason's lilaeopsis on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal

Mason's lilaeopsis flowers April–November, but mostly spreads by rhizomes (California Native Plant Society 2001). Entire plants have been observed floating in the sloughs, suggesting that vegetative reproduction may be an important factor in colonization. It is likely that some populations are comprised mostly of clones from individuals that initially colonized the habitat (California Department of Fish and Game 2000).

Habitat Affinities

Mason's lilaeopsis grows in marshes, swamps (brackish or freshwater), and riparian scrub at elevations of 0-3 feet (California Native Plant Society 2001). It requires a substrate of saturated clay soils that are regularly inundated by waves and tidal action (California Department of Fish and Game 2000).

Historical and Current Range, Distribution
Mason's lilaeopsis is endemic to California. The known distribution extended from the margins of the Napa River in Napa County east to the channels and sloughs of the Sacramento–San Joaquin Delta from Yolo, Solano, and Contra Costa counties south to Sacramento, and San Joaquin Counties (California Natural Diversity Database 2002). The species is now extirpated in Marin County, and one extant occurrence is present in Napa County.

The California Natural Diversity Database (CNDDB 2007) presently lists 145extant occurrences, some as small as one square foot. The species is now know from six California counties: Napa (1) Solano (32), Sacramento (25), Contra Costa (59), San Joaquin (37), and Alameda (1).

Some of the largest and healthiest populations are on uninhabited islands in Suisun Bay, where there is no riprap and little human disturbance (Fielder and Golden 1990. Although much of the species' habitat is privately owned, several State and Federal agencies have jurisdiction over the Delta waterways where the species occurs. One extant occurrence is protected in Solano County on a California Department of Fish and Game (CDFG) Ecological Reserve (California Department of Fish and Game 2000. The status in 1999 of Mason's lilaeopsis was Stable to Declining (California Department of Fish and Game 2000).

The HCP estimated that the potential geographic range of Mason's lilaeopsis inside the 12.1 million-acre HCP San Joaquin Valley planning area totals 28,000 acres, in Stanislaus and San Joaquin Counties (HCP Table F-3). The HCP calculated that 0.001-percent, or approximately one acre of this 28,000 acre potential geographic range is presently occupied by the species. There are 44 extant occurrences of Mason's lilaeopsis on 278 acres of occupied habitat inside the 12.1 million-acre HCP San Joaquin Valley planning area (CNDDB 2002)(HCP Table F-2).

Reasons for Decline and Threats to Survival
Mason's lilaeopsis is threatened by erosion, levee maintenance and construction, channel stabilization, development, widening of Delta channels for water transport, dredging and dumping of spoils, flood control projects, recreation, shading resulting from marsh succession, and competition with non-native water hyacinth (*Eichhornia crassipes*) (California Native Plant Society 2001). In addition, saltwater intrusion and changes in water quality in the Delta resulting from decreased flows also reduce habitat suitability (California Department of Fish and Game 2000).

Environmental Baseline within the Action Area
There are 9 extant occurrences for Mason's lilaeopsis in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This is approximately 6% of the known occurrences for the species. These occurrences are in the San Joaquin County portion of the action area. The 7 occurrences occupy approximately 15 acre of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007).

The HCP land-cover types utilized by Mason's lilaeopsis are Permanent Freshwater Wetland, Seasonal Wetland, and Grassland. The HCP classifies Mason's lilaeopsis as an "other" plant covered-species (a plant covered species that is not a "narrowly endemic" species.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on Mason's lilaeopsis as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Mason's lilaeopsis occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Mason's lilaeopsis survey is not possible during an appropriate period of the year between April and November, and 1) any CNDDB Mason's lilaeopsis occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area could directly disturb 1.017 acre of occupied Mason's lilaeopsis habitat, and permanently remove (hardscape) 0.014 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur within the 15 acres of right-of-way currently occupied by Mason's lilaeopsis (see *Species Baseline* above). Implementing the "minor construction" covered activities (outside the existing rights-of-way) could disturb an additional 1.017 acre of occupied Mason's lilaeopsis habitat, and permanently remove an additional 0.014 acre of occupied Mason's lilaeopsis habitat. In total, PG&E estimates that covered activities would directly disturb 2.034 acre and permanently remove 0.028 acre of occupied Mason's lilaeopsis habitat over the 30-year term of the permit (2.063 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Mason's lilaeopsis occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Mason's lilaeopsis habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Individual occurrences of Mason's lilaeopsis are very small, and any disturbance would likely destroy the entire population at the occurrence. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native plant species following the ground-disturbing activities. PG&E did not quantify the acres of occupied Mason's lilaeopsis habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered activities will permanently remove any occupied habitat for Mason's lilaeopsis that is present in the disturbance site.

Because the HCP does not classify Mason's lilaeopsis as a "narrowly endemic" species, ground-disturbance in or near Mason's lilaeopsis occupied habitat would not trigger the "Confer Process". To minimize direct and indirect effects on Mason's lilaeopsis, PG&E will apply one

or more of the plant AMMs. Plant AMMs include staking a work-exclusion zone of 100 feet around individuals in the occupied habitat prior to beginning a ground-disturbing covered activity (AMM12). This AMM will minimize direct effects and indirect effects of the covered activity, but will not eliminate the potential for a small amount of Mason's lilaeopsis take over the term of the proposed Permit.

AMM14 and 13 would not be effective on this plant species, and they should not be considered for an avoidance or minimization measure for this species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Mason's lilaeopsis extant occurrence. Non-native grasses and other plants in the commercial seed-mix would not germinate at the water-soil interface where Mason's lilaeopsis is found. If other aquatic plant species are seeded or planted in Mason's lilaeopsis habitat, they would compete with and harm individuals Mason's lilaeopsis plants in subsequent seasons, possibly extirpating Mason's lilaeopsis from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Mason's lilaeopsis occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the acres of occupied plant-habitat actually directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Mason's lilaeopsis. Therefore, PG&E may provide between 1.06 acres and 2.07 acres of Mason's lilaeopsis compensation over the 30-year Permit term.

Compensation lands for effects to Mason's lilaeopsis will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for Mason's lilaeopsis will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Mason's lilaeopsis as described in the analysis above, including the permanent loss of up to 2.07 acres of occupied Mason's lilaeopsis habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Mason's lilaeopsis occupied habitat. PG&E will provide compensation if ground-disturbance occurs in Mason's lilaeopsis occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Mason's lilaeopsis, preserving between 1.06 acres and 2.07 acres of occupied Mason's lilaeopsis habitat over 30 years.

The "other disturbance" effects of vehicle travel through wetland and associated upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Mason's lilaeopsis.

We reached this conclusion because the small impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Slough thistle (*Cirsium crassicaule*)

Slough thistle is an annual or biennial species of the sunflower family (Asteraceae), generally with one stem one to three meters in height. Leaves are lobed and covered with thick grey hairs. Flowers are pale rose to purple in ovoid to bell-shaped thistle heads.

Status of the Species

Listing Status

Slough thistle is not federally listed and is not listed by the California Department of Fish and Game. The California Native Plant Society has placed Slough thistle on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Slough thistle blooms May-August. Seeds are dispersed by wind (Hickman 1993; California Native Plant Society 2001). Because slough thistle is an annual plant, population sizes vary from year to year depending on weather and habitat conditions (California Native Plant Society 2001).

Essential Habitat Components

Slough thistle grows in freshwater marshes and swamps, chenopod scrub, and riparian scrub at elevations of 10–328 feet (California Native Plant Society 2001). Slough thistle almost always occurs under natural conditions in wetlands.

Historical and Current Range,

Slough thistle is endemic to Kern, Kings, and San Joaquin Counties in the San Joaquin Valley of California. The California Natural Diversity Database (CNDDB) (2002) lists 17 extant occurrences and two possibly extirpated occurrences. The 17 extant occurrences are in Kern (14), Kings (2), and San Joaquin (1) counties. The two possibly extirpated occurrences are in Kings and San Joaquin counties.

Most populations contain fewer than 50 plants, but a few populations in Kern County contain several hundred, and the known extant population in Kings County was estimated to contain thousands of individuals in 1979 (California Natural Diversity Database 2002).

The HCP estimated that the potential geographic range of slough thistle inside the San Joaquin Valley 285,000 acres in San Joaquin, Kings, and Kern counties. The HCP calculated that 0.320-percent, or 911 acres, of this 285,000-acre potential range are presently occupied by the species.

Reasons for Decline and Threats to Survival
Conversion of habitat to agricultural use, non-native plants, grazing, and loss of water sources threaten current populations of slough thistle (California Native Plant Society 2001; California Natural Diversity Database 2002). According to the CNDDB, the population trend of slough thistle is unknown.

Environmental Baseline within the Action Area
There are 7 extant occurrences for slough thistle in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This is approximately 41% of the known occurrences for the species. These occurrences are in the San Joaquin County portion of the action area. The 7 occurrences occupy approximately 112.4 acre of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007).

The HCP land-cover type utilized by slough thistle is Permanent Freshwater Wetland. The HCP classifies slough thistle as an "other" plant covered-species (a plant covered species that is not a "narrowly endemic" species.

Effects of the Action
Direct and Indirect Effects
PG&E estimated the effects of the proposed action on slough thistle as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to slough thistle occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a slough thistle survey is not possible during an appropriate period of the year between May and August, and 1) any CNDDB slough thistle occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would not disturb or permanently remove (hardscape) nay occupied slough thistle habitat over the 30-year term of the proposed permit. There would be no ground-disturbing impacts within the 112 acres of right-of-way currently occupied by slough thistle (see *Species Baseline* above). Implementing the "minor construction" covered activities (outside the existing rights-of-way) could disturb 0.5 acre of occupied slough thistle habitat, and permanently remove an additional 0.5 acre of occupied slough thistle habitat. In total, PG&E estimates that covered activities would directly disturb 0.5 acre and permanently remove 0.5 acre of occupied slough thistle habitat over the 30-year term of the permit (1.0 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in slough thistle occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied slough thistle habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native plant species following the ground-disturbing activities. PG&E did not quantify the acres of occupied slough thistle habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for slough thistle that is present in the disturbance site.

Because the HCP does not classify slough thistle as a "narrowly endemic" species, ground-disturbance in or near slough thistle occupied habitat would not trigger the "Confer Process". To minimize direct and indirect effects on slough thistle, PG&E will apply one or more of the plant AMMs. Plant AMMs include staking a work-exclusion zone of the maximum practical distance, up to 100 feet around individuals in the occupied habitat prior to beginning a ground-disturbing covered activity (AMM12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of slough thistle take over the term of the proposed Permit.

AMM14 and 13 would not be effective on this plant species, and they should not be considered for an avoidance or minimization measure for this species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a slough thistle extant occurrence. Non-native grasses and other plants in the commercial seed-mix would not germinate at the water-soil interface where slough thistle is found. If other aquatic plant species are seeded or planted in slough thistle habitat, they would compete with and harm individuals slough thistle plants in subsequent seasons, possibly extirpating slough thistle from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid slough thistle occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the acres of occupied plant-habitat actually directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for slough thistle. Therefore, PG&E may provide between 1.75 acres and 3.0 acres of slough thistle compensation over the 30-year Permit term.

Compensation lands for effects to slough thistle will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for slough thistle will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion

We anticipate that the proposed action will directly and indirectly affect slough thistle as described in the analysis above, including the permanent loss of up to 1.0 acres of occupied slough thistle habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to slough thistle occupied habitat. PG&E will provide compensation if ground-disturbance occurs in slough thistle occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to slough thistle, preserving between 1.75 acres and 3.0 acres of occupied slough thistle habitat over 30 years. The "other disturbance" effects of vehicle travel through wetland and associated upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of slough thistle..

We reached this conclusion because the small impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Delta button-celery (*Eryngium racemosum*)

Delta button-celery, a member of the carrot family (Apiaceae), is a slender, prostrate herb with greenish, rounded flower heads.

Status of the Species

Listing Status

Delta button-celery is not federally listed. It was listed as Endangered by the California Department of Fish and Game in 1981. The California Native Plant Society has placed Delta button-celery on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Delta button-celery blooms June to August (California Native Plant Society 2001). Winter flooding was determined to be critical to the survival of Delta button-celery. Population locations and population characteristics differ in dry and wet years. In dry years, many populations occur only as annual plants

Habitat Affinities
Delta button-celery grows in vernal mesic-clay depressions (subalkaline swales) in riparian scrub habitat at elevations of 10-98 feet (California Native Plant Society 2001). It occurs on clay soils on sparsely vegetated margins of seasonally flooded flood plains and swales. Periodic flooding maintains the species' habitat through sustenance of seasonal wetlands and reduction of competition due to scouring (California Department of Fish and Game 2000).

Historical and Current Range, Distribution
Delta button-celery is endemic to California and is known historically from only 26 occurrences. The historical distribution of Delta button-celery includes Calaveras, Merced, Stanislaus, and San Joaquin counties. Of the 26 occurrences, six may have been extirpated, including all the occurrences in San Joaquin County and most of those in Stanislaus County.

Currently there are 20 extant occurrences for Delta button-celery in three California counties: Calaveras (1), Contra Costa (1), Merced (17), and Stanislaus (2) (CNDDB 2007). Most extant occurrences are found in Merced County along the historical floodplain of the San Joaquin River. Known extant populations occur on private land, National Wildlife Refuges, and the Los Baños Wildlife Area. One occurrence in Stanislaus County, located on the eastern shore of Turlock Lake, is of unknown ownership. Additionally, one occurrence on the Merced-Stanislaus county boundary west of the San Joaquin River is in CDFG's North Grasslands Wildlife Area.

The HCP estimated that the potential geographic range of Delta button-celery inside the 12.1 million acre HCP San Joaquin Valley planning area totals 86,000 acres in San Joaquin, Stanislaus, and Merced counties (HCP Table F-3). The HCP calculated that 1.8-percent, or 1,558 acres, of this 86,000 acre potential geographic range are presently occupied by the species. The HCP identified 19 occurrences of Delta button-celery inside the 12.1 million acre HCP San Joaquin Valley planning area (HCP Table F-2).

Reasons for Decline and Threats to Survival
About a fourth of the 26 historically-known Delta button-celery occurrences have been extirpated by flood control activities and by conversion of lowlands to agriculture. Friant Dam on the San Joaquin River and an extensive levee system has greatly reduced the frequency and intensity of flooding of Delta button-celery's floodplain habitat.

Riparian restoration or waterfowl enhancement projects could also threaten the species if habitat areas are artificially flooded during critical stages in the Delta button-celery's life cycle (CNDDB 2000; California Native Plant Society 2001).

Population locations and characteristics differ in dry and wet years. In dry years, many populations exist only as annual plants. A strong population of plants that were perennial during the drought disappeared during wet years (California Department of Fish and Game 2000). In 1999, CDFG described Delta button-celery as stable to declining.

Environmental Baseline within the Action Area
There are three extant occurrences for Delta button-celery in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These three occurrences are in the Merced County

portion of the action area. The three occurrences occupy approximately 6.7 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). These three occurrences are approximately 15% of all known occurrences for the species.

The HCP land-cover type utilized by Delta button-celery is Woody Riparian and Permanent Freshwater Wetland. The HCP classifies Delta button-celery as a "narrowly endemic plant covered-species.

Effects of the Action

PG&E estimated the effects of the proposed action on Delta button-celery as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Delta button-celery occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Delta button-celery survey is not possible during an appropriate period in June, July and August, and 1) any CNDDB Delta button-celery occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 0.518 acres of occupied Delta button-celery habitat, and would permanently remove (hardscape) 0.009 acres of occupied habitat over the 30-year term of the proposed permit. These effects would occur on the 6.7 acres of right-of-way currently occupied by Delta button-celery (see *Species Baseline* above). PG&E estimates that implementing the "minor construction" covered activities (outside the existing rights-of-way) could disturb an additional 0.518 acre of occupied Delta button-celery habitat, and permanently remove 0.009 acre of occupied Delta button-celery habitat over the Permit term. In total, PG&E estimates that covered activities will directly disturb 1.036 acres and permanently remove 0.018 acre of Delta button-celery occupied habitat over the 30-year term of the permit (1.054 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Delta button-celery occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Delta button-celery habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Delta button-celery for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season,

which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Delta button-celery habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Delta button-celery that is present in the disturbance site.

To minimize direct and indirect effects on Delta button-celery, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Delta button-celery take over the term of the proposed Permit. AMM14 would not be effective on Delta button-celery, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Delta button-celery extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Delta button-celery plants in the next and subsequent growing seasons, possibly extirpating Delta button-celery from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Delta button-celery occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Delta button-celery. Therefore, PG&E may provide between 0.6 acres and 3.2 acres of Delta button-celery compensation over the 30-year Permit term.

Compensation lands for effects to Delta button-celery will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for Delta button-celery will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Delta button-celery as described in the analysis above, including the permanent loss of up to 1.06 acres of occupied Delta button-celery habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Delta

button-celery occupied habitat. PG&E will provide compensation if ground-disturbance occurs in Delta button-celery occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Delta button-celery occupied-habitat, preserving between 0.06 acre and 3.2 acres of Delta button-celery occupied habitat over 30 years.

The "other disturbance" effects of vehicle travel through floodplain or riparian upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Delta button-celery.

We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

PLANTS – UPLAND SPECIES

Endangered large-flowered fiddleneck (*Amsinckia grandiflora*) and its Critical Habitat

Large-flowered fiddleneck is an annual herb in the forget-me-not family (Boraginaceae). Petals are 0.5-0.7 inch long, bright orange, forming trumpet-shaped flowers conspicuously marked with deep orange spots on the corolla tips. Flowers grow in dense, two-ranked clusters along a curved stem or "fiddleneck", hence the generic vernacular name. The erect plants grow 1-2 feet high and branch at the middle or above. Coarse stiff hairs densely cover the leaves and stems.

Status of the Species and the Critical Habitat

Listing Status

Large-flowered fiddleneck was federally listed in May 1985 (50 FR 19374). A detailed account of the taxonomy, ecology, and biology of the large-flowered fiddleneck is presented in the *Large-flowered Fiddleneck (Amsinckia grandiflora) Recovery Plan* (USFWS 1997b) and in the final rule (50 FR 19374). Critical Habitat for the large-flowered fiddleneck was designated in May 1985 (50 FR 19374). The species was listed as endangered by the California Department of Fish and Game in April 1992. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal

Large-flowered fiddleneck flowers April–May (California Native Plant Society 2001). The species has a heterostylous pollination system, meaning that two types of flowers are produced. Seed production appears to be low, and seed germination appears to be sensitive to temperature and presence or absence of a litter layer (USFWS 1997b). Large-flowered fiddleneck is an annual plant, germinating from seed each growing season.

Populations fluctuate greatly in size from year to year, presumably in response to environmental factors, such as rainfall and temperature, which affect seed germination and seedling growth; pollination; seed production; and growth of competing plants, particularly non-native grasses (USFWS 1997b).

Little information is available on pollination and seed biology, including pollination requirements, insect visitors, seed production, seed predation, seed bank dynamics, dispersal, and effective population size.

Habitat Affinities
Large-flowered fiddleneck grows in cismontane woodland and valley and foothill grassland at elevations of 902-1001 feet (California Native Plant Society 2001). It occurs on neutral to slightly basic soils with a loamy or clayey structure that are high in organic matter (USFWS 1997b).

Historical and Current Range, Distribution.
Historically, the species was reported from a few locations in the northern Diablo range, which is part of the Inner South Coast range of California. At present, two natural populations exist. One consists of two colonies on Lawrence Livermore National Laboratory property in the hills east of Livermore in Alameda and San Joaquin counties, California. The other is a recently discovered population on private land in San Joaquin County.

Besides the two extant natural populations, there are also several experimentally reintroduced populations. Populations have been introduced into the species' former range in Contra Costa and San Joaquin Counties. The CNDDB currently identifies 6 extant occurrences for the large-flowered fiddleneck in three California counties: Alameda (1), Contra Costa (2), and San Joaquin (3) (CNDDB 2007)

The HCP estimated that the potential geographic range of large-flowered fiddleneck inside the 12.1 million acre HCP San Joaquin Valley planning area totals 44,000 acres, all in San Joaquin County. The HCP calculated that 0.06 percent, or approximately 2 acres of this range is presently occupied by the species.

Reasons for Decline and Threats to Survival
Large-flowered fiddleneck has been reduced by agriculture, development, and grazing. Large-flowered fiddleneck is currently threatened by competition from non-native annual grasses, grazing, and possibly alteration of natural fire frequency and loss of natural pollinators (California Native Plant Society 2001).

Critical Habitat Status
One critical habitat unit has been designated for large-flowered fiddleneck. This Unit is at the remaining occurrence site on U.S. Department of Energy land (Droptower) in San Joaquin County. The critical habitat unit includes an area of approximately 160 acres, located entirely on DOE land. Large-flowered fiddleneck constituent elements include steep west and south-facing slopes with light-textured but stable soils.

Environmental Baseline within the Action Area

Species Baseline

There are no extant occurrences for large-flowered fiddleneck in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). The HCP land-cover types utilized by large-flowered fiddleneck are Grassland and Blue Oak Woodland. The HCP classifies large-flowered fiddleneck as a "narrowly endemic plant covered-species.

Critical Habitat Baseline

None of the 160 acres of large-flowered fiddleneck designated Critical Habitat is within the existing PG&E right-of-ways of the 276-350-acre action area.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to large-flowered fiddleneck occupied habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a large-flowered fiddleneck survey is not possible during an appropriate period in April or May and 1) any CNDDB large-flowered fiddleneck occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that the ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would not directly disturb or permanently remove (hardscape) any large-flowered fiddleneck occupied-habitat over the 30-year term of the proposed permit. Implementing the "minor construction" covered activities (outside the existing rights-of-way) could permanently remove 0.01 acre of occupied large-flowered fiddleneck habitat. In total, PG&E estimates that covered activities will impact 0.01 acre of large-flowered fiddleneck occupied habitat over the 30-year term of the permit.

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in large-flowered fiddleneck occupied-habitat within the existing PG&E rights-of-way is not available to the Service.

Soil excavations or other ground disturbances in or near occupied large-flowered fiddleneck habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, and loss of cryptogamic soils or other microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species would compete with large-flowered fiddleneck for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next

and subsequent growing seasons. PG&E did not quantify the acres of occupied large-flowered fiddleneck habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for large-flowered fiddleneck that is present within the disturbance site.

To minimize direct and indirect effects on large-flowered fiddleneck, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of large-flowered fiddleneck take over the term of the proposed Permit.

AMM14 would not be effective on large-flowered fiddleneck and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for large-flowered fiddleneck. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of any large-flowered fiddleneck extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual large-flowered fiddleneck plants in subsequent seasons, possibly extirpating large-flowered fiddleneck from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid occupied habitat for large-flowered fiddleneck to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. If PG&E determines during a pre-construction survey that a ground-disturbing activity cannot completely avoid large-flowered fiddleneck occupied habitat, PG&E will confer with the Service as described above under *Confer Process.* The Confer process will determine if the ground disturbance will result in a temporary or a permanent loss of large-flowered fiddleneck habitat, discuss a proposed compensation approach, and discuss what compensatory mitigation would be appropriate for large-flowered fiddleneck.

Compensation will be based the acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 0.5:1 for temporary loss of occupied habitat and 3:1 for permanent loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for large-flowered fiddleneck. Therefore, PG&E may provide up to 0.03 acres of large-flowered fiddleneck compensation over the 30-year Permit term.

Compensation lands for effects to large-flowered fiddleneck will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as

discussed above in *Compensation Mechanisms*. The Service refers to this type of compensation as "in-kind compensation". Compensation for large-flowered fiddleneck will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Effects on Critical Habitat
None of the 160 acres of large-flowered fiddleneck critical habitat located is located within the existing PG&E right-of-ways. Ground-disturbing or "other disturbance" covered- activities (activities which do not disturb land-cover such as tree trimming or off-road travel) within the existing PG&E right of ways will not impact Critical Habitat for large-flowered fiddleneck.

However, the "minor construction" covered-activities may impact designated critical habitat. The "minor construction" activities (G14-G16 and E12-E15) will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries and will include the acquisition of additional right-of-way acres. PG&E cannot predict where these line extensions will be constructed, and some may be constructed inside designated large-flowered fiddleneck critical-habitat. PG&E will confer with the Service prior to implementing any "minor construction" covered-activity or other medium or large covered-activities within a designated critical-habitat unit. During the Confer Process, PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Conclusion
We anticipate that the proposed action will directly and indirectly affect large-flowered fiddleneck as described in the analysis above, including the permanent loss of up to 0.01 acres of occupied large-flowered fiddleneck habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to large-flowered fiddleneck occupied habitat. PG&E will provide compensation if ground-disturbance occurs in large-flowered fiddleneck occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to large-flowered fiddleneck occupied-habitat, preserving up to 0.03 acre of large-flowered fiddleneck occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

The 1,110 miles of "minor construction" covered-activities are unlikely to occur within the 160 acres of designated large-flowered fiddleneck critical habitat. If a "minor construction" covered activity cannot completely avoid designated critical habitat, the Confer Process would be used to minimize effects to the maximum extent practicable. If effects occur, the Service expects that only a small proportion of the single Critical Habitat Unit (less than 1%) would be affected. These impacts are not likely to change the current ability of the primary constituent elements to support the function and conservation role of the critical habitat unit.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of large-flowered fiddleneck or adversely modify its designated critical habitat. We

reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Endangered California jewelflower (*Caulanthus californicus*)

California jewelflower is an annual herb in the mustard family (Brassicaceae) that branches from the base. The flowers are white with purple-tips and are arranged along one side of the stem.

Status of the Species

Listing Status

California jewelflower was federally listed as an endangered species on July 19, 1990 (55 FR 29361). A detailed account of the taxonomy, ecology, and biology of the California jewelflower is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998) and in the final rule (55 FR 29361). No Critical Habitat has been designated for the California jewelflower. This species was listed as endangered by the California Department of Fish and Game in January 1987. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range). The U.S. Bureau of Land Management Bakersfield and Holister field offices have it on their sensitive species lists.

Life History, Reproductive Ecology, Dispersal

California jewelflower is an annual species. Seeds begin to germinate in the fall, and seedlings may continue to emerge for several months. The seedlings develop into rosettes of leaves during winter months, after which stems elongate and flower buds appear in February or March. Translucent white flowers with purple to green tips may continue blooming as late as May if rainfall and temperatures are favorable.

It is thought that this species forms a persistent seed bank, but seeds appear to germinate only when exposed to conditions simulating prolonged weathering. Seed dispersal agents are unknown, but may include gravity, seed-eating animals such as giant kangaroo rats, wind, and water (Cypher and Sandoval 1997).

Habitat Affinities

California jewelflower is native only to California's San Joaquin and Cuyama Valleys. California jewelflower populations have been reported from subalkaline, sandy loam soils at elevations of approximately 240 to 2,950 feet. Known populations of California jewelflower occur in non-native grassland, upper Sonoran subshrub scrub, and cismontane juniper woodland and scrub communities. Historical records suggest that in the past California jewelflower also occurred in the valley saltbush scrub-community.

Historical and Current Range, Distribution

California jewelflower is endemic to California, and historically occurred in Fresno, Kings, Tulare, Kern, San Luis Obispo, Ventura and Santa Barbara counties (USFWS 1998), and ranged over an area of approximately 4,888,960 acres. Approximately half of the 40 historical collection sites were on the floor of the San Joaquin Valley in Fresno, Kern, and Tulare

Counties. Several other collections came from two smaller valleys southwest of the San Joaquin Valley: the Carrizo Plain (San Luis Obispo County) and the Cuyama Valley (Santa Barbara and Ventura Counties). Three other occurrences (i.e., collection sites separated by 0.4 kilometer [0.25 mile] or more) were in the Sierra Nevada foothills at the eastern margin of the San Joaquin Valley in Kern County. The remainders of the historical sites were in foothills west of the San Joaquin Valley, in Fresno, Kern, and Kings Counties. By 1986, all the occurrences on the San Joaquin and Cuyama Valley floors had been eliminated. The California Natural Diversity Database (CNDDB 20076) reports 63 total occurrences collected between 1893 and 1998.

Today, naturally occurring populations of California jewelflower are only known from the western edge of its range, primarily in Fresno (Kreyenhagen Hills), San Luis Obispo (Carrizo Plain), and Santa Barbara (Santa Barbara Canyon) counties. The California Natural Diversity Database (CNDDB 2007) currently reports 34 extant occurrences occurring discontinuously within five California counties: San Luis Obispo (22), Santa Barbara (7),Fresno (3), Kern (1), and Kings (1) counties. Undiscovered naturally occurring populations may persist in the foothills of Fresno, Kern, and Kings Counties where habitat remains in rangeland (USFWS 2002).

The HCP estimated that the potential geographic range of California jewelflower inside the San Joaquin Valley totals 263,000 acres in Fresno, Kings, Tulare, and Kern counties. The HCP calculated that 0.001 percent, or 38 acres of this 263,000 acre potential geographic range are presently occupied by the species.

Several experimental introductions of California jewelflower have been attempted in Kern, Santa Barbara, and Tulare Counties, and in the Los Padres National Forest lands of Santa Barbara County. There is no evidence that any of these attempts have succeeded.

As is typical of annual plant species, plant and population size can vary from year to year, depending on site and weather conditions. Surveys of known populations to determine abundance have been irregular with years of no reported surveys. Fresno County colonies reportedly ranged from 7 to 225 plants in the period of 1991 through 1993 (CNDDB 2006). Santa Barbara County colonies ranged from an estimated 4,500 in 1988 to 50,000+ plants in 1993 (CNDDB 2006). San Luis Obispo County colonies ranged between 2,443 individual plants in 1991 and 1,336 in 1992 (CNDDB 2006). In a 2003, a total of 8,748 plants occurred on the Carrizo Plain on the BLM public lands and private in-holdings.

Given the infrequent gathering of information on abundance, it would be highly speculative to assert any conclusions regarding population trends. The lack of long-term annual abundance data disallows consideration of short-term environmental effects such as losses due to low precipitation, high ambient temperatures, predation, or fire.

Reasons for Decline and Threats to Survival
Approximately 98% of historical San Joaquin Valley California jewelflower habitat has been lost. Threats to remaining populations include competition from non-native plants, pesticide effects on pollinators, small population size, and development on private land in the Santa Barbara Canyon area.

The threat from destruction or modification of the habitat and curtailment of the range of California jewelflower is more severe and more imminent now than when it was listed in 1990. By 1990, 96% of the native habitat, including California jewelflower habitat, in the San Joaquin Valley, had been modified to accommodate agriculture and urbanization (FR Vol.55, No. 138, 1990). The 1998 Recovery Plan estimated the conversion to be 98% in 1996. In a 2005 report, the U.S. Bureau of Reclamation states that approximately 15,708 acres of grassland within Central Valley Project water and irrigation districts were converted to agriculture during the years 1993 to 2000 (U.S. Bureau of Reclamation 2005). Many of these acres were likely and/or occupied habitat for California jewelflower. Destruction and modification of habitat continues to hamper recovery of California jewelflower, as no new populations have been discovered or re-established on the floor of the San Joaquin Valley. Although a recently protected 1,700 acre preserve has been established in the form of a conservation bank near historical habitat in the Kreyenhagen Hills, Fresno County, it is not situated such that it would appear to satisfy the requirements for unoccupied habitat to function as facilitator for pollinators and seed dispersers. It is not located between or among known occupied areas of the species. No occurrences of California jewelflower are known to occur on the conservation bank site.

Cattle grazing may be a direct threat if the grazing occurs between the rosette stage and seed set. Grazing can promote establishment of non-native annual grasses, which can in turn competitively exclude California jewelflower. In Fresno County, the habitat of California jewelflower is grazed after the dispersal of its seeds in late spring and prior to the new growth of its basal rosettes in late winter. In the Carrizo Plain National Monument in San Luis Obispo County, most California jewelflower colonies are fenced and excluded from grazing by cattle. The fencing does not, however, prohibit the grazing by sheep which trespass into California jewelflower colonies from private lands within the Monument. Sheep grazing is reportedly a yearly problem adversely affecting California jewelflower (Lewis 2003). Effects due to cattle and sheep grazing on California jewelflower and habitat on lands under private ownership in Santa Barbara County are unknown; however, direct effects to California jewelflower from domestic cattle grazing are reported to be detrimental because cattle seek out and show preference for eating the plant (USFWS 1998). There is no specific information as to the effects of soil compaction resulting from cattle grazing in California jewelflower habitat.

On the Carrizo Plain in San Luis Obispo County, California jewelflower frequently occurs on precincts of giant kangaroo rat (*Dipodomys ingens*); a species listed as endangered under both California and Federal Endangered Species Acts. Although the kangaroo rats destroy some jewelflowers, their feeding behavior reduces mulch and non-native seeds within their precincts, especially during the dry season; this effect may promote California jewelflower the following year (California Department of Fish and Game 2000). Giant kangaroo rat (*Dipodomys ingens*) precincts were found to be significantly associated with California jewelflower on the Carrizo Plain; however, due to the apparent yearly influences of temperature and precipitation upon California jewelflower in both its vigor and abundance, no conclusions regarding predation or disturbance effects to California jewelflower from the giant kangaroo rats were attempted by the investigator (Cypher 1993). The giant kangaroo rat is not known to occur with the Fresno County California jewelflower colonies; its occurrence with the Santa Barbara County California jewelflower colonies is unknown.

The California jewelflower is likely threatened by alteration of its natural fire regime (55 FR 29361). Fire helps maintain open habitat for seedling establishment, and may reduce competition from non-native species (Hessl and Spackman 1995). Attempts to replicate historic fire regimes are complicated by the near complete replacement of native California grasslands and perennial species, with non-native, primarily annual species from the Mediterranean region (USFWS 1998). This loss of native biodiversity affects the structure of the biotic community with an increase in biomass or thatch (accumulated grass stems). Wildfires tend to burn with greater intensity in thatch and may reduce the viability of California jewelflower seeds stored in the soil. Changes in temperature and precipitation likely will alter the structure, composition, and productivity of vegetation communities and wildfire may become more frequent and intense (Lenihan *et al.* 2006). Given the currently reduced range of California jewelflower, an increase in wildfire frequency could result in extirpation of one or all of the three centers of concentration.

The parasites and pathogens that plague apiaries and have caused the national decline in honeybees also infest other colonial bees, such as bumble bees (Goka *et el.* 2001, Kraus and Page 1998, Colla *et al.* 2006, Genersch *et al.* 2006, Otterstatter and Whidden 2003, Otterstater *et al.* 2005). In addition to the problem of infections spreading from honey bees to bumblebees, recent commercial use of bumble bees for greenhouse pollination threatens bumblebees with intestinal protozoans (*Crithidia bombi*) from the high rate of infected, escaping commercial bumblebees (Colla *et al.* 2006). Wild bumblebees, native pollinators of the California jewelflower, can be extirpated by varroa mites or have their flight or foraging impaired by intestinal protozoans (Otterstatter *et al.* 2005), tracheal mites (*Locustacarus buchneri*)(Otterstatter and Whidden 2003,Otterstatter *et al.* 2005), and viruses (Colla *et al.* 2006, Genersch *et al.* 2006, Otterstatter *et al.* 2005). Infections by tracheal mites cause bumblebees to forage a restricted sub-set of host plants with yellow or blue flowers (Otterstatter *et al.* 2005). This type of infestation could cause bumblebees to avoid pollinating California jewelflower, which are white. The loss and reduction of supplemental pollinators (*i.e.*, the national and state shortage of honeybees), elevated atmospheric nitrogen, wildfire, invasive non-native grasses, drought, and the inclination for beekeepers to move their apiaries at least five-miles from malathion treatment areas (removing honeybees from their role as supplemental pollinators) all contribute to the ongoing decline of the California jewelflower. The decline in domestic bee populations across North America has been attributed to introduced parasites, in particular the varroa mite which affects the honey bee (*Apis millifera*) (Bessin 2001, Kraus and Page 1998). A host of microbes that cause colony collapse disorder (Cox-Foster *et al.* 2007, Oldroyd 2007), such as *Nosema apis* and *N. ceranae*, have been implicated in global honey bee and bumble bee declines.

The Kreyenhagen Hills occurrences are approximately 75 miles from the San Luis Obispo County Carrizo Plain occurrences, and approximately 92 miles from the Santa Barbara County occurrences. The Carrizo Plain occurrences are approximately 15 miles from the Santa Barbara County occurrences and are separated by the Caliente range of mountains. The highest point in the Caliente range is Caliente Mountain at 1,556 meters (5,104.9 ft.) and presents a substantial barrier to seed dispersal and cross-pollination between the Carrizo Plain occurrences and the Santa Barbara County occurrences, in addition to the 15-mile separation. Considering the reduction of the range of the species and fragmentation of habitat, cross-pollination between

populations of the three remaining localities appears unlikely. This may result in the loss of genetic diversity, which may reduce the adaptability of the plant to current and future environmental conditions. Loss of genetic diversity and adaptability is likely to reduce the long-term survival of plant species (Huenneke 1991).

Status with Respect to Recovery
Most of the Santa Barbara Canyon site is under private ownership. An agreement that fostered protection for California jewelflower on private lands in Santa Barbara County between the landowner and The Nature Conservancy is reported in the CNDDB (2006). According to The Nature Conservancy staff, this protection agreement is no longer in existence (pers. comm., The Nature Conservancy, P. McNutt). The Fresno and San Luis Obispo County sites are under mostly public ownership.

Following the listing of the species, reintroduction was attempted several times. Each has apparently failed. Reintroduction was attempted at the Paul Paine Preserve in Kern County. This preserve was originally owned by The Nature Conservancy is now incorporated into the Semi-Tropic Ridge Preserve and owned by The Center for Natural Lands Management (CNLM). This Kern County population was transplanted there in 1975; 13 plants were counted in 1986. CNLM's Greg Warrick (pers. com.) reports no occurrences of California jewelflower on-site currently.

Another preserve owned by CNLM is the 40 acre Pixley Vernal Pool Preserve located in Tulare County. An attempted reintroduction there has failed as well (pers. comm. G. Warrick). Biologists of the Los Padres National Forest report no finding of California jewelflower in the national forest areas of Santa Barbara County (pers. comm., U.S. Fish and Wildlife Service, L. Simpson), despite introduction of seeds there in 1988 (CNDDB 2006).

Environmental Baseline within the Action Area
There is one extant occurrence for California jewelflower in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This occurrence is in the Kings County portion of the action area. The one occurrence occupies approximately 14.2 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). This single occurrence is approximately 3% of all remaining occurrences for the species.

The HCP land-cover types utilized by California jewelflower are Grassland and Blue-Oak Woodland. The HCP classifies California jewelflower as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
PG&E estimated the effects of the proposed action on California jewelflower as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to California jewelflower occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a California jewelflower survey is not possible during an appropriate period in June, July and August, and 1)

any CNDDB California jewelflower occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 2.2 acres of occupied California jewelflower habitat, and would permanently remove (hardscape) 0.035 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur on the 14.2 acres of PG&E right-of-way currently occupied by California jewelflower (see *Species Baseline* above). PG&E estimates that implementing the "minor construction" covered activities (outside the existing rights-of-way) would not disturb or permanently remove any additional occupied California jewelflower habitat over the term of the permit. In total, PG&E estimates that covered activities will directly disturb 2.2 acres and permanently remove 0.035 acre of California jewelflower occupied habitat over the 30-year term of the permit (2.24 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in California jewelflower occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied California jewelflower habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with California jewelflower for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied California jewelflower habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for California jewelflower that is present in the disturbance site.

To minimize direct and indirect effects on California jewelflower, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will

minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of California jewelflower take over the term of the proposed Permit.

AMM14 would not be effective on California jewelflower, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a California jewelflower extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals California jewelflower plants in the next and subsequent growing seasons, possibly extirpating California jewelflower from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid California jewelflower occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios*. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for California jewelflower. Therefore, PG&E will provide between 1.2 acres and 6.72 acres of California jewelflower compensation over the 30-year Permit term.

Compensation lands for effects to California jewelflower will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms*. The Service refers to this type of compensation as "in-kind compensation". Compensation for California jewelflower will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect California jewelflower as described in the analysis above, including the permanent loss of up to 2.24 acres of occupied California jewelflower habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to California jewelflower occupied-habitat. PG&E will provide compensation if ground-disturbance occur in California jewelflower occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to California jewelflower occupied-habitat, preserving between 1.2 acres and 6.7 acres of California jewelflower occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of California jewelflower.

We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Endangered palmate-bracted bird's-beak (*Cordylanthus palmatus*)

Palmate-bracted bird's-beak is an annual herb in the snapdragon family (Scrophulariaceae). The plants are highly branched and 4-12 inches tall. The stems and leaves are grayish green and sometimes covered with salt crystals excreted by glandular hairs. Palmate-bracted bird's-beak has small pale whitish flowers, ½-inch to 1-inch long arranged in dense clusters (spikes) and densely surrounded by herbaceous leaf-like bracts. Like other species in this family, the flower petals are divided into two lips. The upper one is shaped like a bird's-beak, leading to the common name of the genus.

Status of the Species

Listing Status

Palmate-bracted bird's-beak was federally listed as endangered in July 1986 (51 FR 23765). A detailed account of the taxonomy, ecology, and biology of the palmate-bracted bird's-beak is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998) and in the final rule (51 FR 23765). Critical Habitat for this species has not been designated. This species was listed as endangered by the California Department of Fish and Game in May 1984. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal

Seedlings grow in late March or April. Flowers bloom from late spring through summer (May-October). Stability of pH, salinity, and moisture content maintain the specialized habitat and enable individuals to complete their life cycle (California Department of Fish and Game 2000). Like other members of *Cordylanthus* and related genera, palmate-bracted bird's-beak is partially parasitic on the roots of other plants. Its host plant may be salt grass (*Distichlis spicata*). The combination of hemiparasitism, salt excretion, and a deep root system allows palmate-bracted bird's-beak to grow during the hot, dry months after most other annuals have died (Coats et al. 1993).

Palmate-bracted bird's beak is associated with a cryptogamic or biological soil-crust (Ellen Cypher *in litt* 2007b, Betty Warene pers. comm. 2007). Terrestrial-type biological soil-crusts are a complex mosaic of cyanobacteria, green algae, lichens, mosses, microfungi and other bacteria (Belnap et.al. 2001). Biological soil-crusts fix nitrogen, prevent soil erosion, and inhibit invasion of weeds, benefiting some native plant species. Underwater fungal action has been shown to break down seed coats of certain species and facilitate seed germination. Once a terrestrial-type biological-crust is disturbed, the complex composition of the crust community can begin changing, eliminating the lichen, bacteria, moss and fungal components, and perhaps cryptic algal filaments in the soil (Ellen Cypher *in litt* 2007b). Simple blue-green or green algal crusts can return relatively quickly after disturbance, but without the entire crust community. Belnap and Rosentreter recommend that cattle grazing and other disturbance to plant-species associated

with biological-crusts stop several weeks before the end of the rainy season so the biological-crusts can recover from any damage (Ellen Cypher *in litt* 2007b).

Habitat Affinities
Palmate-bracted bird's-beak grows on seasonally-flooded, saline alkali soils in lowland plains and basins of the Central Valley at elevations of less than 500 feet. Within these areas, it grows primarily along the edges of channels and drainages, with a few individuals scattered in seasonally-wet depressions, *alkali scalds* (barren areas with a surface crust of salts), alkali meadows or grassy areas. Palmate-bracted bird's-beak grows in natural communities in association with other species tolerant of high salt concentrations, such as iodine bush (*Allenrolfea occidentalis*), alkali heath (*Frankenia salina*), glasswort (*Salicornia subterminalis*), seepweed (*Suaeda moquinii*) and salt grass (*Distichlis spicata*).

Population fluctuations are common in the palmate-bracted bird's-beak. These oscillations may be a result of changes in pollination success, rainfall patterns, freshwater influence, and marsh pollution (USFWS 1998).

Historical and Current Range, Dispersal
Historical populations were scattered throughout the San Joaquin Valley in Fresno and Madera counties, the Livermore Valley in Alameda County, and the Sacramento Valley in Colusa and Yolo counties (California Department of Fish and Game 2000).

The extant occurrences of palmate-bracted bird's-beak (CNDDB 2007) are in seven metapopulations in the Sacramento, Livermore, and San Joaquin Valleys. In approximate order from north to south, these are located at (1) the Sacramento National Wildlife Refuge in Glenn County, (2) the Delevan National Wildlife Refuge in Colusa County, (3) the Colusa National Wildlife Refuge in Colusa County, (4) the Woodland area, (5) the Springtown Alkali Sink near Livermore, (6) western Madera County, and (7) the combined Alkali Sink Ecological Reserve and Mendota Wildlife Management Area in Fresno County. The total occupied surface area over the seven metapopulations is estimated at less than 741 acres.

The palmate-bracted bird's-beak population on private land in western Madera County was discovered in 1993 (USFWS 1998). A small transplant colony was established at the Mendota Wildlife Management Area in 1973 using seed collected from a nearby population that was about to be eliminated (CDFG 1995a, Heckard 1977). The rarity of saline-alkali soils with natural vegetation and the intensive agricultural and urban development within the species' range make the likelihood of finding additional colonies remote.

The CNDDB identifies 18 extant occurrences in 6 counties: Alameda (1), Colusa (7), Fresno (2), Glenn (2), Madera (4), and Yolo (2). A single occurrence in San Joaquin County has been extirpated (CNDDB 2007).

The HCP estimated that the potential geographic range of palmate-bracted bird's-beak inside the San Joaquin Valley totals 121,000 acres in Madera and Fresno counties. The HCP calculated that 0.052 percent, or 63 acres, of this 121,000 acre potential geographic range are presently

occupied by the species. The HCP identified eight are extant occurrences, one possibly extirpated, and two extirpated occurrences in the San Joaquin Valley.

Reasons for Decline and Threats to Survival
Palmate-bracted bird's-beak is threatened by agriculture, urbanization, vehicles, altered hydrology, grazing, bicycle use, and industrial development (California Native Plant Society 2001). Road maintenance is a threat at the Alkali Sink Ecological Reserve in Fresno County. The occupied habitat in Madera County is not in imminent danger of destruction (USFWS 1998).

Because of the lack of genetic variability within and among the Sacramento Valley populations and the limited number of individuals in the Alkali Sink Ecological Reserve, the western Madera County, and the Woodland populations, random or catastrophic events could result in elimination of the species at any of these sites (USFWS 1998).

Environmental Baseline within the Action Area
There is one extant occurrence for palmate-bracted bird's-beak in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This occurrence is in the Fresno County portion of the action area. The one occurrence occupies approximately 0.2 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). This single occurrence is approximately 5.5% of all remaining occurrences for the species.

The HCP land-cover types utilized by palmate-bracted bird's-beak are Grassland, Seasonal Wetland, and Upland Scrub. The HCP classifies palmate-bracted bird's-beak as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
PG&E estimated the effects of the proposed action on palmate-bracted bird's-beak as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to palmate-bracted bird's-beak occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a palmate-bracted bird's-beak survey is not possible during an appropriate period May through October, and 1) any CNDDB palmate-bracted bird's-beak occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 0.021 acres of occupied palmate-bracted bird's-beak habitat, and would permanently remove (hardscape) 0.001 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur on the 0.2 acre of PG&E right-of-way currently occupied by palmate-bracted bird's-beak (see *Species Baseline* above). PG&E estimates that implementing the "minor construction" covered activities (outside the existing right-of-ways) would directly disturb an additional 0.021 acre of occupied palmate-bracted bird's-beak habitat, and permanently remove an additional 0.001cre of occupied habitat over the

30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 0.042cre and permanently remove 0.002 acre of palmate-bracted bird's-beak occupied habitat over the 30-year term of the permit (0.044 acre total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in palmate-bracted bird's-beak occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied palmate-bracted bird's-beak habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of cryptogamic biological soil-crusts and other microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with palmate-bracted bird's-beak for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied palmate-bracted bird's-beak habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for palmate-bracted bird's-beak that is present in the disturbance site.

To minimize direct and indirect effects on palmate-bracted bird's-beak, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of palmate-bracted bird's-beak take over the term of the proposed Permit.

AMM14 would not be effective on palmate-bracted bird's-beak, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. AMM13 also would not be effective on palmate-bracted birds-beak because it would allow soil-disturbance after the plant senescences and prior to the first significant rainfall, which could destroy the biological soil-crust and other microhabitat features essential to this species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a palmate-bracted bird's-beak extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual palmate-bracted bird's-beak plants in the next

and subsequent growing seasons, possibly extirpating palmate-bracted bird's-beak from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid palmate-bracted bird's-beak occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios*. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for palmate-bracted bird's-beak. Therefore, PG&E may provide between 0.027 acre and 0.132 acre of palmate-bracted bird's-beak compensation over the 30-year Permit term.

Compensation lands for effects to palmate-bracted bird's-beak will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms*. The Service refers to this type of compensation as "in-kind compensation". Compensation for palmate-bracted bird's-beak will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect palmate-bracted bird's-beak as described in the analysis above, including the permanent loss of up to 0.044 acre of occupied palmate-bracted bird's-beak habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to palmate-bracted bird's-beak occupied-habitat. PG&E will provide compensation if ground-disturbance occur in palmate-bracted bird's-beak occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to palmate-bracted bird's-beak occupied-habitat, preserving between 0.03 acre and 0.13 acre of palmate-bracted bird's-beak occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of palmate-bracted bird's-beak.

We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Endangered Kern mallow (*Eremalche kernensis*)(*Eremalche parryi* ssp. *kernensis*)
Kern mallow is a small, annual herb belonging to the mallow family (Malvaceae) . It has predominantly white to sometimes pale-lavender, hollyhock-like flowers.

Status of the Species
Listing Status
Kern mallow was federally listed as endangered in July 1990 (55 FR 29361). A detailed account of the taxonomy, ecology, and biology of the Kern mallow is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998) and in the final rule (55 FR 29361). No Critical habitat has been designated. The California Native Plant Society has placed this species on List 1B (rare or endangered throughout its range). Although the species has not been officially listed by the State of California, the Department of Fish and Game considers it "very threatened".

Life History, Reproductive Ecology, Dispersal
Kern mallow seeds typically germinate in January and February, and plants begin flowering in March. Fruit production begins within a few days after flowers appear. Flowering and fruit production may continue into May under favorable moisture and temperature conditions. The duration of seed viability in the soil is unknown and it is thought that at least some seeds remain ungerminated in the following growing season.

Seed dispersal agents are unknown, but may include animals and wind. Like many annual plants, population size varies with rainfall and has been observed to fluctuate dramatically from one year to another, to the point that it may not be detected at all at known locations in years of below average rainfall.

Kern mallow is strongly associated with a cryptogamic or biological soil-crust (Ellen Cypher *in litt* 2007b, Betty Waren pers. comm. 2007). Terrestrial-type biological soil-crusts are a complex mosaic of cyanobacteria, green algae, lichens, mosses, microfungi and other bacteria (Belnap et.al. 2001). Biological soil-crusts fix nitrogen, prevent soil erosion, and inhibit invasion of weeds, benefiting some native plant species. Underwater fungal action has been shown to break down seed coats of certain species and facilitate seed germination. Once a terrestrial-type biological-crust is disturbed, the complex composition of the crust community can begin changing, eliminating the lichen, bacteria, moss and fungal components, and perhaps cryptic algal filaments in the soil (Ellen Cypher *in litt* 2007b). Simple blue-green or green algal crusts can return relatively quickly after disturbance, but without the entire crust community. Belnap and Rosentreter recommend that cattle grazing and other disturbance to plant-species associated with biological-crusts stop several weeks before the end of the rainy season so the biological-crusts can recover from any damage (Ellen Cypher *in litt* 2007b).

Habitat Affinities
Kern mallow typically occurs in valley saltbush scrub-communities, where it grows under, around spiny and common saltbushes, and in patches with other herbaceous plants. It typically grows in areas where shrub cover is less than 25 percent, on alkaline sandy loam or clay soils, and at elevations of 315 to 900 feet.

Kern mallow is restricted to the finer-textured soils (Kimberlina sandy loam, Kimberlina fine sandy loam, and Panoche clay loam) near Lokern Road in western Kern County near Buttonwillow, while the similar desert mallow (*Eremalche exilis*) occurs primarily in the coarser-textured soils (Kimberlina gravelly sandy loam) further south of Lokern Road (Cypher 2002a). Kern mallow grows on soils that are more alkaline, less saline, and less sandy than Parry's mallow (*E. parryi*) (Leonelli 1986).

Historical and Current Range, Distribution
Because of the previous misidentification of the morphologically similar and more widespread desert mallow (*Eremalche exilis*) as Kern mallow (Andreasen *et al.* 2002, Cypher 2002a), the current distribution of Kern mallow is only 9,760 acres (Cypher 2004). Therefore, Kern mallow is more narrowly endemic than previously thought.

Kern mallow is now known from a single metapopulation consisting of approximately 15 intermittent occurrences within an area of approximately 40 square miles at the eastern base of the Temblor range in the Lokern area of western Kern County. The distribution runs from the vicinity of McKittrick to near Buttonwillow. No confirmed populations of Kern mallow exist outside of the Lokern Natural Area

The range of Kern mallow is restricted by soil type and the conversion of suitable habitat into agricultural fields. Kern mallow occurs only on the finer-textured alkaline sandy loam and clay loam soils of the Lokern area. Kern mallow expansion to the south is restricted by the coarser-textured gravelly sandy loam soils which support desert mallow (*Eremalche exilis*) but not Kern mallow (Cypher 2002a, 2004, Andreasen *et al.* 2002). Kern mallow expansion to the north and east is restricted by the conversion of suitable habitat into irrigated agricultural fields. Kern mallow expansion to the west is restricted by the less alkaline, more saline, and more sandy soils of the Temblor range which support Parry's mallow (*Eremalche parryi*) but not Kern mallow (Leonelli 1986).

The CNDDB (2007) identifies 21 occurrences of Kern mallow, of which 19 are extant and 2 are extirpated (CNDDB 2007). Eighteen of the extant occurrences are from Kern County. One extant occurrence from Tulare County west of Delano was last seen in 1962. Eighty-five percent of the extant occurrences are located on private land; the others are on Bureau of Land Management lands and land of unknown ownership.

The HCP estimated that the potential geographic range of Kern mallow inside the HCP San Joaquin Valley planning area totals 429,000 acre in Kern County. The HCP calculated that 0.21percent, or 889 acre, of this 429,000-acre potential geographic range are presently occupied by the species (HCP Table F-3). The actual range of Kern mallow inside the San Joaquin Valley totals 9,760 acres, all at the eastern base of the Temblor Range in the Lokern area of western Kern County.

Reasons for Decline and Threats to Survival
Kern mallow is more narrowly endemic than previously thought, and no identified populations of Kern mallow exist outside of the Lokern area to protect (Cypher 2002a, 2004, Andreasen *et al.*

2002, USFWS 1998, E. Cypher). Because of the limited range of Kern mallow, the species is even more vulnerable and at risk of extinction than previously thought.

Population and plant size can vary dramatically, depending on site and weather conditions. Several botanists familiar with Kern mallow were unable to find it at known locations during below average rainfall years.

Approximately 79 percent of the Kern mallow habitat is unprotected on private land and is vulnerable to effects of many uses, particularly oil and gas exploration and development. Threats to Kern mallow habitat identified in the Recovery Plan include the conversion of native habitat into irrigated agricultural fields, the construction of hazardous waste disposal facilities, oil and gas extraction activities, installation of pipelines and transmissions lines, and off-road vehicle use. Another threat to Kern mallow stated in the Recovery Plan is the loss of pollinators through the spraying of malathion and other pesticides.

Either uncontrolled grazing or the absence of grazing may threaten the Kern mallow. Sheep have grazed private land in the Lokern area for decades, and continue to do so during the growing season. While grazing can remove leaves, flowers, and fruits of Kern mallow, it also reduces competition in areas dominated by aggressive non-native plants, where Kern mallow does not thrive. Cattle grazing is used as a habitat management tool in the Lokern area to control the growth of exotic annual grasses that threaten federally-listed species such as the giant kangaroo rat and blunt-nosed leopard lizard. Annual studies of the impacts of cattle grazing on Kern mallow, however, have been inconclusive (Germano *et al.* 2005). Therefore, cattle grazing may still be a threat to Kern mallow. On the other hand, the cessation of grazing may also threaten Kern mallow by allowing the dense growth of exotic annual grasses that reduces the survival rate of Kern mallow seedlings (USFWS 1998, Cypher 1994). Trespass by sheep grazing in the Lokern area threatens Kern mallow plants in areas that are not protected by fencing. Cypher (2005) found that Kern mallow plants in areas that have burned are less tolerant of disturbance from grazing and road corridors than those on unburned areas. The author recommends that sheep should not be trailed, penned, or bedded in parts of the Lokern area that have burned because intensive grazing severely reduces Kern mallow survival and reproduction in burned areas.

Natural gas pipelines, electric transmission lines, and road corridors were also identified in the Recovery Plan as threats to Kern mallow. In 1996, the biological opinion for the Southern California Gas Pipeline (USFWS 1996) authorized the permanent destruction of 24 acres of Kern mallow habitat for pipeline construction and routine maintenance including the application of herbicides. The biological opinion for the AT&T Coaxial/Fiber/Optic Cable upgrade project authorized the permanent disturbance of 121 acres of Kern mallow habitat (USFWS 1999). In a report for the California Energy Commission, Cypher (2005) found that the survival rate of Kern mallow was significantly lower within 10 meters (33 feet) of road corridors than in control areas, but Kern mallow abundance, flower production, and seed-to-ovule ratios were not. It has been estimated that 109 acres of Kern mallow habitat have been destroyed or degraded by gas and electric transmission line construction to date (Cypher 2005).

Off-road vehicle use is also a threat to Kern mallow. Both the BLM and CNLM report the degradation of habitat by trespass of tractors and other vehicles on their preserves due to the lack of fencing (L. Saslaw, BLM, pers. comm.; G. Warrick, CNLM, pers. comm.).

Since the publishing of the Recovery Plan (USFWS 1998), new threats to Kern mallow have been identified that have not been addressed. These new threats include climate change, elevated atmospheric nitrogen deposition, increased fire frequency, ozone, and excessive dust.

An additional threat to the Kern mallow is excessive dust. Dust may affect photosynthesis, respiration, and transpiration and allow the penetration of phytotoxic gaseous pollutants (Farmer 1993). However, no research has analyzed the effects of dust on Kern mallow. From 1996-2005, Bakersfield on average surpassed the state of California 24-hour PM10 (particulate matter with an aerodynamic diameter of 10 microns or less) standard 170 days per year and surpassed the national 24-hour PM2.5 (particulate matter with an aerodynamic diameter of 2.5 microns or less) standard 16 days per year (California Air Resources Board 2006). In 2005, the primary sources of particulate matter (PM10 and PM2.5) in Kern County were farming operations, road dust, and fugitive windblown dust (California Air Resources Board 2006).

Other research found that the activities of the co-occurring endangered giant kangaroo rat (*Dipodomys ingens*) are significantly beneficial to Kern mallow (Cypher and Cypher 2004). Kern mallow was found to be twice as abundant on giant kangaroo rat precincts, especially in the center, than off precincts. Kern mallow plants were also twice as large on precincts, especially on the edges, than off of precincts. This research provides additional evidence for the keystone role of giant kangaroo rats in the Valley Saltbush Scrub ecosystem. Therefore, conservation strategies targeted for giant kangaroo rats in the Lokern area should be beneficial to Kern mallow. However, the Bakersfield Office of the BLM currently uses cattle grazing as a habitat management tool to control exotic annual grasses that are believed to contribute to the decline of giant kangaroo rats during wet years. The results of the impacts of cattle grazing on Kern mallow were inconclusive in a 1997-2005 annual Lokern grazing study (Germano *et al.* 2005). Cypher (2005), however, warns of the harmful effects of excessive grazing on Kern mallow survival and reproductive rates, particularly in burned areas.

Kern Mallow Environmental Baseline and Status within the Action Area

There are six extant occurrences for the Kern mallow in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). Five of these occurrences are in Kern County and one is in Tulare County. These six occurrences occupy approximately 340 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). These six occurrences are approximately 33% of the extant occurrences for the species.

The HCP land-cover types utilized by Kern mallow are Grassland, Upland-Scrub, and Valley Oak Woodland. The HCP classifies Kern mallow as a "narrowly endemic plant covered-species.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on Kern mallow as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Kern mallow

occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Kern mallow survey is not possible during an appropriate period between late March through late April-early May, and 1) any CNDDB Kern mallow occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

Appendix F of the HCP estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 2.0 acre of occupied Kern mallow habitat over the term of the Permit. PG&E also estimated that covered-activities implemented within the existing right-of-ways would permanently remove (hardscape) 0.067 acre of occupied habitat over the 30-year term of the Permit. These effects would occur on the 340 acres of PG&E right-of-way currently occupied by Kern mallow (see *Species Baseline* above). PG&E also estimates that implementing the "minor construction" covered activities (outside the existing right-of-ways) would not disturb or permanently remove any occupied Kern mallow habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 2.0 acre and permanently remove 0.067 acre of Kern mallow occupied habitat over the 30-year term of the permit (2.067 acre total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Kern mallow occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Kern mallow habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of cryptogamic biological soil-crusts and other microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Kern mallow for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Kern mallow habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Kern mallow that is present in the disturbance site.

To minimize direct and indirect effects on Kern mallow, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant

occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Kern mallow take over the term of the proposed Permit.

AMM14 would not be effective on Kern mallow, therefore, this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. AMM13 also would not be effective on palmate-bracted birds-beak because it would allow soil-disturbance after the plant senescences and prior to the first significant rainfall, which could destroy the biological soil-crust and other microhabitat features essential to this species. PG&E shall not implement general AMM 10 (broadcast-seeding disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Kern mallow extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Kern mallow plants in the next and subsequent growing seasons, possibly extirpating Kern mallow from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Kern mallow occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Kern mallow. Therefore, PG&E may provide between 1.2 acres and 6.2 acres of Kern mallow compensation over the 30-year Permit term.

Compensation lands for effects to Kern mallow will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for Kern mallow will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Kern mallow as described in the analysis above, including the permanent loss of up to 2.1 acres of occupied Kern mallow habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Kern mallow occupied-habitat.

PG&E will provide compensation if ground-disturbance occur in Kern mallow occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Kern mallow occupied-habitat, preserving between 1.2 acres and 6.2 acres of Kern mallow occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland

areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Kern mallow.

We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Endangered San Joaquin wooly-threads (*Monolopia [Lembertia] congdonii*)

San Joaquin wooly-threads (*Monolopia congdonii*), is an annual herb in the sunflower family (Asteraceae). It has tiny yellow flower heads clustered at the tips of erect to trailing stems covered with tangled hairs (i.e. wooly threads).

Status of the Species

Listing Status

San Joaquin wooly-threads was federally listed as endangered in July 1990 (55 FR 29362) under the old name of *Lembertia congdonii*. A detailed account of the taxonomy, ecology, and biology of the San Joaquin wooly-threads is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998) and in the final rule (55 FR 29362). Critical Habitat has not been designated. Although the species has not been officially listed by the State of California, the Department of Fish and Game considers it to be "very threatened". The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal

Seeds of San Joaquin woolly-threads may germinate as early as November, but usually germinate in December and January. Flowering generally occurs between late February and early April, and may continue into May. Population and plant size can vary depending on site and weather conditions. Seed production depends on plant size and number of flower heads. In years of below average precipitation, few seeds of this species germinate, and those that do typically produce tiny plants. Seed dispersal agents are unknown, but may include wind, water, and animals. Seed-dormancy mechanisms apparently allow the formation of a substantial seed bank in the soil (Twisselmann 1967, Taylor 1989, R. Lewis 1993, Mazer and Hendrickson 1993*b*, Cypher 1994*a*).

Habitat Affinities

San Joaquin wooly-threads grow on neutral to subalkaline soils that were deposited in geologic times by flowing water. It typically is found on sandy or sandy loam soils in the San Joaquin Valley floor, and on silty soils in the Carrizo Plain.

San Joaquin wooly-threads occupy microhabitats in Valley saltbush-scrub, interior Coast range saltbush-scrub, upper Sonoran-sub-shrub communities, and non-native grassland with less than 10 percent shrub cover, although herbaceous cover may be either sparse or dense, and a biological soil crust may or may not be present. Plant species that often occur with San Joaquin wooly-threads include red brome, red stemmed filaree, goldfields, Arabian grass (*Schismus* spp.), and mouse-tail fescue (*Vulpia myuros*). It has been reported from elevations ranging from 200 to 850 feet on the San Joaquin Valley floor, and from 2,000 to 2,600 feet in San Luis Obispo and Santa Barbara counties.

Historical and Current Range, Distribution ,
The historical range of San Joaquin wooly-threads were concentrated in eight areas: (1) the inner Coast ranges of western Fresno and eastern San Benito Counties, (2) the plains between Avenal and Mendota in Kings and Fresno Counties, (3) the type locality by Congdon near Deer Creek (Tulare County), (4) from north of Lokern to the Lost Hills in Kern County, (5) east of Edison in Kern County,(6) from Bakersfield to Shafter in Kern County, (7) the Carrizo and Elkhorn Plains in San Luis Obispo County and, (8) the Cuyama Valley in Santa Barbara County. However, 33 of the historical 47 occurrences had been eliminated by 1989 (USFWS 1989, Taylor 1989).

This species currently exists as four metapopulations (separate populations between which there is some migration and gene flow) and several small, isolated populations. The largest metapopulation occurs on the Carrizo Plain in San Luis Obispo County, where occupied habitat varies from a high of 2,800 acres in a favorable year to much less in years of lower rainfall. Much smaller metapopulations occur in the Jacalitos Hills of Fresno County, in the Kettleman Hills of Fresno and Kings counties, and in Kern County near the Lost Hills. Isolated extant occurrences are known from the Panoche Hills in Fresno and San Benito counties, near the city of Bakersfield, and the Cuyama Valley in Santa Barbara County (USFWS 1989). The CNDDB (2007) identifies 64 extant occurrences in 6 California counties: Fresno (19), Kern (6), Kings (22), San Benito (1), San Luis Obispo (16), and Santa Barbara (2).

The HCP estimated that the potential geographic range of San Joaquin wooly-threads inside the San Joaquin Valley totals 802,000 acres in Fresno, Kings, and Kern counties. The HCP calculated that 0.2-percent, or 1,626 acres, of this 802,000 acre potential range are presently occupied by the species.

Reasons for Decline and Threats to Survival
Habitat loss was responsible for the decline of San Joaquin wooly-threads on the floors of the San Joaquin and Cuyama Valleys, where the majority of the occurrences were eliminated by intensive agriculture. In addition, several sites in and around Bakersfield were eliminated by urban development, and two others in western Kern County between Lokern and Lost Hills apparently were destroyed as a result of intensive oilfield development (CDFG 1995a, Taylor 1989).

Threats to one or more sites of the four metapopulations of San Joaquin wooly-threads include commercial development, conversion of natural habitat to agriculture, increased petroleum production, competition from non-native plants, and either complete removal of grazing or

uncontrolled grazing. The Lost Hills metapopulation in Kern County is on private land in an area of high value for commercial development and agriculture (Taylor 1989, Taylor and Buck 1993). Several occurrences in the Jacalitos Hills, Kettleman Hills, and west of Bakersfield are in low-density oilfields; the plants do not seem to be threatened by the current level of activity but could be destroyed by more-intensive use of the areas (R. Lewis 1993, E. Cypher unpublished observation. 1998).

Preliminary studies of San Joaquin wooly-threads suggested that both competition from exotic plants and spring grazing reduced survival rates, but not flower production (E. Cypher unpublished data). Trampling also reduces survival in areas where livestock congregate, such as around water troughs (Taylor 1989, R. Lewis 1993, Mazer and Hendrickson 1993*b*, Cypher 1994*a,b*).

San Joaquin wooly-threads Environmental Baseline within the Action Area

There are five extant occurrences for the San Joaquin wooly-threads in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). Two of these occurrences are located in Fresno County, two in Kings County, and one is located in the Kern County portion of the of the action area. These five occurrences occupy approximately 26 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). These six occurrences are approximately 9% of the extant occurrences for the species.

The HCP land-cover types utilized by San Joaquin wooly-threads are Grassland and Upland Scrub. The HCP classifies San Joaquin wooly-threads as a "narrowly endemic plant covered-species.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on San Joaquin wooly-threads as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to San Joaquin wooly-threads occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a San Joaquin wooly-threads survey is not possible during an appropriate period late between late February through early April, and 1) any CNDDB San Joaquin wooly-threads occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 3.35 acres of occupied San Joaquin wooly-threads habitat and permanently remove (hardscape) 0.029 acre of occupied habitat over the 30-year term of the Permit. These effects would occur on the 26 acres of PG&E right-of-way currently occupied by San Joaquin wooly-threads (see *Species Baseline* above). PG&E also estimates that implementing the "minor construction" covered activities (outside the existing right-of-ways) would not disturb or permanently remove any occupied San Joaquin wooly-threads habitat over the 30-year term of the proposed permit. In total, PG&E estimates that

covered activities will directly disturb 3.35 acres and permanently remove 0.029 acre of San Joaquin wooly-threads occupied habitat over the 30-year term of the permit (3.38 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in San Joaquin wooly-threads occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied San Joaquin wooly-threads habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with San Joaquin wooly-threads for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied San Joaquin wooly-threads habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for San Joaquin wooly-threads that is present in the disturbance site.

To minimize direct and indirect effects on San Joaquin wooly-threads, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of San Joaquin wooly-threads take over the term of the proposed Permit.

AMM14 would not be effective on San Joaquin wooly-threads; therefore, this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a San Joaquin wooly-threads extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals San Joaquin wooly-threads plants in the next and subsequent growing seasons, possibly extirpating San Joaquin wooly-threads from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid San Joaquin wooly-threads occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for San Joaquin wooly-threads. Therefore, PG&E may provide between 1.8 acres and 10.1 acres of San Joaquin wooly-threads compensation over the 30-year Permit term.

Compensation lands for effects to San Joaquin wooly-threads will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for San Joaquin wooly-threads will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect San Joaquin wooly-threads as described in the analysis above, including the permanent loss of up to 3.38 acres of occupied San Joaquin wooly-threads habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to San Joaquin wooly-threads occupied-habitat. PG&E will provide compensation if ground-disturbance occur in San Joaquin wooly-threads occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to San Joaquin wooly-threads occupied-habitat, preserving between 1.8 acres and 10.1 acres of San Joaquin wooly-threads occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of San Joaquin wooly-threads.

We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Endangered Bakersfield cactus (*Opuntia basilaris* var. *treleasei*)
Bakersfield cactus (*Opuntia treleasei*) is a perennial low growing cactus (Cactaceae). It typically spreads to form extensive thickets. It generally forms fleshy green flattened-stems 3 to 4 inches wide by 5 to 7 inches long that produce showy magenta flowers. The eye-spots on the pads contain spines in addition to bristles.

Status of the Species

Listing Status

The Bakersfield cactus was federally listed as endangered in July 1990 (55 FR 29361). A detailed account of the taxonomy, ecology, and biology of the Bakersfield cactus is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998) and in the final rule (55 FR 29361). No Critical Habitat has been designated. This species was listed as endangered by the California Department of Fish and Game in January 1990. It is on the sensitive plants list of the Bureau of Land Management's Bakersfield field office. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal

The life span of wild plants has not been determined, but clumps in cultivation have survived for 48 years. The reproductive biology of Bakersfield cactus has not been studied. Vegetative reproduction is thought to be typical, as the plants produce seeds only infrequently. Bakersfield cactus seeds require warm, wet conditions to germinate, a combination that is rare in the Bakersfield area. The cactus commonly reproduces vegetatively by pads (fleshy flattened-stems) falling from the plant and rooting. This makes individual populations difficult to distinguish because pads from adjacent plants may overlap; accordingly, populations are referred to as clusters. Pads may be dispersed by floodwaters, but seed dispersal agents are unknown.

Habitat Affinities

Soils supporting Bakersfield cactus typically are sandy, although gravel, cobbles, or boulders also may be present. The species occurs on flood plains, ridges, bluffs, and rolling hills in saltbush scrub plant-communities, and occasionally in blue oak woodland or riparian woodland at elevations from 460 to 1,800 feet.

Historical and Current Range, Distribution

Bakersfield cactus is endemic to the southern San Joaquin Valley. It once formed extensive colonies around Bakersfield, along the bluffs of the Kern River, extending up the Kern River Canyon to the northeast, through the Caliente Creek drainage to the southeast and nearby foothills of the Tehachapi Mountains, and the Tejon Hills about 20 miles to the south. The total population of Bakersfield cactus was not estimated historically, but photographs and reports show that populations of Bakersfield cactus were more or less continuous east of Bakersfield (Britton and Rose 1920, Benson 1982). Densely-spaced clumps of cactus once covered and estimated area of 2 square miles from the Caliente Creek flood plain onto Sand Ridge.

Today Bakersfield cactus is restricted to a limited area of central Kern County near Bakersfield. Current distribution is fragmented and much reduced. Approximately one-third of the historical occurrences of Bakersfield cactus have been extirpated and the remaining populations are highly fragmented. About one-fourth of the historical occurrences of Bakersfield cactus have been eliminated (CDFG 2006). When known sites were last inventoried, fewer than 20,000 clumps of Bakersfield cactus were estimated to remain.

The CNDDB identifies 29 extant occurrences of Bakersfield cactus, all within Kern County. Remaining occurrences can be grouped into eleven general areas with only four core areas

containing populations of greater than 1,000 clumps: the Kern Bluffs-Hwy 178 Area, Sand Ridge, Wheeler Ridge, and Comanche Point (Moe 1989, Cooley 1995, CDFG 2006). Population surveys have not been conducted since 1989 at most of these sites (CDFG 2006, Cooley 1995).

The HCP estimated that the potential geographic range of Bakersfield cactus inside the San Joaquin Valley totals 398,000 acres, all in Kern County. The HCP calculated that 0.4percent, or 1,636 acres, of this 398,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
The primary threats to Bakersfield cactus continue to be residential development, urban sprawl, and conversion of habitat to agriculture. Other localized threats include oil and gas development (Oildale Area and Wheeler Ridge), off road vehicle (ORV) use (North of Airport and Cottonwood Creek), road expansion and maintenance (Oildale Area, Wheeler Ridge, and Sand Ridge), California Aqueduct ROW maintenance (Wheeler Ridge), sand and gravel mining (Sand Ridge), and expansion of the Kern River Power Plant (Kern Canyon), the county airport (North of Airport), and the Bena landfill (Bena Hills). All of these activities continue to threaten the cactus by the modification of its habitat, the removal of cactus clumps, and the further fragmentation of existing populations.

Other threats include periodic inundation of flood plain populations, pesticide drift, air pollution, and competition from non-native annual grasses. Populations within the Caliente Creek floodplain have been extirpated due to flooding, and flooding continues to be a threat for the Caliente-Bena Hills populations (CDFG 2006, USFWS 1998). In 2002-2004, mortality of Bakersfield cactus clumps and low rates of vegetative and sexual reproduction at Sand Ridge Preserve were attributed to competition with exotic annual grasses for water during years with below average precipitation (Cypher and Fiehler 2006; E. Cypher). Exotic annual grasses also indirectly affect Bakersfield cactus. Indirect effects from exotic annual grasses include increased fire frequency (USFWS 1998, Brooks 1999, Brooks and Pyke 2001, Brooks 2003), damage from insects (Burger and Louda), and rot of cactus pads during wet years (USFWS 1998). Fire suppression has allowed for the extensive growth of exotic grasses in some areas to the detriment of Bakersfield cactus (Moe 1989, CDFG 1989).

The destruction of Bakersfield cactus habitat by agriculture and urban sprawl has left the remaining populations highly fragmented and small. The small size of many of the populations (Moe 1989, CDFG 2006), lack of flow gene flow between populations, and infrequent sexual reproduction (Menges 1987) result in a lack of genetic diversity (USFWS 1998). Populations that are low in genetic variation are more vulnerable to diseases and parasites (Burdon and Marshall 1981) and to chance events, including environmental fluctuations, catastrophes, and genetic drift (Menges 1991). Lack of genetic diversity and small population size increase the species' vulnerability to diseases, parasites, and chance events such as environmental fluctuations, catastrophes, and genetic drift.

Many cacti are collected and cultivated by plant collectors, or offered for sale or trade by cactus growers. Although there have been no reports of such trade in Bakersfield cactus, the species may be collected and cultivated for its showy, magenta flower (55 FR 29361).

An additional threat to the Bakersfield cactus is excessive dust. Dust may affect photosynthesis, respiration, and transpiration and allow the penetration of phytotoxic gaseous pollutants (Farmer 1993). However, no research has analyzed the effects of dust on Bakersfield cactus or related species. From 1996-2005, Bakersfield on average surpassed the state of California 24-hour PM10 (particulate matter with an aerodynamic diameter of 10 microns or less) standard 170 days per year and surpassed the national 24-hour PM2.5 (particulate matter with an aerodynamic diameter of 2.5 microns or less) standard 16 days per year (California Air Resources Board 2006). In 2005, the primary sources of particulate matter (PM10 and PM2.5) in Kern County were farming operations, road dust, and fugitive windblown dust (California Air Resources Board 2006).

Bakersfield Cactus Environmental Baseline within the Action Area

There are 14 extant occurrences for the Bakersfield cactus in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). All of these occurrences are located in the Kern County portion of the of the action area. These 14 occurrences occupy approximately 30 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). These 14 occurrences are approximately 48.3% of the remaining occurrences for the species.

The HCP land-cover types utilized by San Joaquin wooly-threads are Grassland and Upland Scrub. The HCP classifies Bakersfield cactus as a "narrowly endemic plant covered-species.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on Bakersfield cactus as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Bakersfield cactus occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Bakersfield cactus survey is not possible, and 1) any CNDDB Bakersfield cactus occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area and the "minor construction" covered activities (outside the existing right-of-ways) would permanently remove 1.5 acres of occupied habitat over the 30-year term of the proposed permit.

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Bakersfield cactus occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Bakersfield cactus habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Ground disturbances in occupied habitat are likely to fragment the occurrence, which could

isolate individuals and affect genetic variability within that plant population or cluster. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Bakersfield cactus for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, and result in harm or mortality to individual plants. PG&E did not quantify the acres of occupied Bakersfield cactus habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Bakersfield cactus that is present in the disturbance site.

To minimize direct and indirect effects on Bakersfield cactus, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Bakersfield cactus take over the term of the proposed Permit.

AMM14 would not be effective on Bakersfield cactus; therefore, this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. Likewise, AMM 13 would not be effective because Bakersfield cactus is a perennial plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Bakersfield cactus extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Bakersfield cactus plants in the next and subsequent growing seasons, possibly extirpating Bakersfield cactus from the disturbance site.

Effects of Compensation Measures

Although PG&E will avoid Bakersfield cactus occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Bakersfield cactus. Therefore, PG&E may provide 4.5 acres of Bakersfield cactus compensation over the 30-year Permit term.

Compensation lands for effects to Bakersfield cactus will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation

as "in-kind compensation". Compensation for Bakersfield cactus will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion

We anticipate that the proposed action will directly and indirectly affect Bakersfield cactus as described in the analysis above, including the permanent loss of up to 4.74 acres of occupied Bakersfield cactus habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Bakersfield cactus occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Bakersfield cactus occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Bakersfield cactus occupied-habitat, preserving between 2.5 acres and 14.2 acres of Bakersfield cactus occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Bakersfield cactus.

We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Endangered Hartweg's golden-sunburst (*Pseudobahia bahiifolia*)

Hartweg's golden-sunburst, also called Hartweg's pseudobahia, is a slender, wooly annual in the sunflower family (Asteraceae). It has one or a few stems 2-6 inches tall, with mostly narrow, undivided leaves. The flowers are yellow and daisy-like. Hartweg's golden-sunburst is distinguished from other members of the *Pseudobahia* genus by the shape of its largest leaves, which are entire or three-lobed.

Status of the Species

Listing Status

Hartweg's golden-sunburst was federally listed as endangered in February 1997 (62 FR 5542). A detailed account of the taxonomy, ecology, and biology of Hartweg's golden-sunburst is presented in this final rule. No critical habitat has been designated. This species was listed as endangered by the California Department of Fish and Game in August 1981. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Hartweg's golden-sunburst is a small annual plant that flowers in March and April (California Native Plant Society 2001). There is no information on aspects of life history such as pollination biology or germination requirements.

Habitat Affinities
Hartweg's golden-sunburst occurs in open grasslands and grasslands at the margins of blue oak woodland, primarily on shallow, well-drained, fine-textured soils (Hickman 1993, California Department of Fish and Game 2000). The majority of the occurrences are associated with Mima mound topography. Mima mounds are small hillocks or mounds of earth, roughly 1-6 feet high and 10-100 feet in diameter at the base, that have formed in dense concentrations. Mima mounds are interspersed with basins that may pond water in the rainy season. The plants are nearly always found on the north or northeast-facing slopes of the mounds with highest plant densities on the upper slopes where grass cover is minimal. The species occurrences are found at an elevation of 50 to 460 feet. Hartweg's golden-sunburst grows in loam or sandy loam soil associated with Amador and Pentz series (Stanislaus County), Rocklin series (Fresno and Madera County), and Amador and Hornitos soils (Merced County) (Stebbins 1991).

Surveys indicate that population numbers can fluctuate widely from one survey year to another. This fluctuation is believed to depend on annual climatic conditions, specifically the amount of seasonal rainfall, and also is due to competition from non-native plants (Stebbins 1989, 1991; E. Cypher, California Department of Fish and Game [CDFG], pers. comm. 2007a)

Historical and Current Range, Distribution
The historic distribution of *P. Hartweg's golden-sunburst* is not known since the range was not documented before occurrences began to be extirpated. However, the historic distribution was probably spread approximately200 miles along the eastern San Joaquin Valley and foothills from Fresno County in the south to Yuba County in the Sacramento Valley to the north (Stebbins 1991). The distribution once extended north to the Marysville area of Yuba County in the Sacramento Valley based on the 1847 type collections of Karl Hartweg; however, these occurrences are now extirpated (Stebbins 1991).

The species has been reported from two locations in Tuolumne County in 1937 and 1963; however, no field work has been done at these sites to verify the presence or location of the species. The species has been apparently extirpated by levee construction and residential and industrial development from the type locality in Yuba County in the lower Sacramento Valley (CNDDB 2007). In addition to the extirpation of the type locality, four other occurrences of Hartweg's golden-sunburst have been or may have been extirpated in Madera, Stanislaus, and Sutter counties by conversion to orchards or residential development (CNDDB 2007).

The CNDDB identifies 19 extant occurrences within six California counties: El Dorado (1), Fresno (3), Madera (2), Merced (5), Stanislaus (8), and Tuolumne (1). Today, there are 16 populations on the eastern edge of the San Joaquin Valley in Stanislaus, Madera, Merced, and Fresno Counties. Remaining populations are concentrated in two isolated clusters in the Friant region of Fresno and Madera counties, and in the La Grange region in Stanislaus County. Six extant occurrences near Friant occur along both sides of the San Joaquin River in high pumice content soils (Fresno and Madera Counties) and six occurrences are near Cooperstown in Stanislaus County.

The HCP estimated that the potential geographic range of Hartweg's golden-sunburst inside the San Joaquin Valley totals 320,000 acres in Stanislaus, Merced, Madera, and Fresno counties.

The HCP calculated that approximately 0.10 percent, or 326 acres, of this 320,000-acre potential geographic range is presently occupied by the species. The HCP identified 16 extant occurrences of Hartweg's golden-sunburst in the San Joaquin Valley.

Reasons for Decline and Threats to Survival
Hartweg's golden-sunburst has declined because of habitat loss caused by agricultural and urban development, levee construction, pumice mining, cattle grazing, and competition with non-native weeds, road widening, and off-road vehicle use. All but one of the remaining populations continues to be threatened by some or all of the above activities.

Habitat for this species is highly fragmented throughout its range due to conversion of natural habitat for urban and agricultural uses. This fragmentation has resulted in small isolated populations of these species. Such populations may be highly susceptible to extirpation due to chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soule 1988; Goodman 1987). If an extirpation event occurs in a population that has been fragmented, the opportunities for recolonization will be greatly reduced due to physical isolation from other source populations.

There is only one occurrence of Hartweg's golden-sunburst found on public land in Fresno County near the city of Friant and the Friant canal. This occurrence is split between private property owned by The Nature Conservancy and the U.S. Bureau of Reclamation (BOR). Presence/absence surveys are conducted annually and the occurrence appears to be stable (Mike Kinsey, biologist, BOR pers. comm. 2007).

Hartweg's Golden Sunburst Environmental Baseline within the Action Area
There is one extant occurrence for the Hartweg's golden-sunburst in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This single occurrence is located in the Fresno County portion of the of the action area. This occurrence occupies approximately 6.6 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). This occurrence is approximately 6% of the remaining occurrences for the species.

The HCP land-cover types utilized by Hartweg's golden-sunburst are Grassland and Blue Oak Woodland. The HCP classifies Hartweg's golden-sunburst as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
The actual acres of impact to Hartweg's golden-sunburst occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Hartweg's golden-sunburst survey is not possible during an appropriate period in March or April, and 1) any CNDDB Hartweg's golden-sunburst occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

Ground-disturbing covered-activities implemented within the existing right-of-ways of the action area and the "minor construction" covered activities (outside the existing right-of-ways) would permanently remove 0.01 acre of occupied Hartweg's golden-sunburst habitat over the 30-year term of the proposed permit.

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Hartweg's golden-sunburst occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Hartweg's golden-sunburst habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Hartweg's golden-sunburst for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Hartweg's golden-sunburst habitat likely to impacted by these indirect-effects, but the Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Hartweg's golden-sunburst that is present in the disturbance site.

To minimize direct and indirect effects on Hartweg's golden-sunburst, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Hartweg's golden-sunburst take over the term of the proposed Permit.

AMM14 would not be effective on Hartweg's golden-sunburst; therefore, this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Hartweg's golden-sunburst extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Hartweg's golden-sunburst plants in the next and subsequent growing seasons, possibly extirpating Hartweg's golden-sunburst from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Hartweg's golden-sunburst occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Hartweg's golden-sunburst. Therefore, PG&E may provide 0.03 acres of Hartweg's golden-sunburst compensation over the 30-year Permit term.

Compensation lands for effects to Hartweg's golden-sunburst will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for Hartweg's golden-sunburst will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Hartweg's golden-sunburst as described in the analysis above, including the permanent loss of up to 0.01 acres of occupied Hartweg's golden-sunburst habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Hartweg's golden-sunburst occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Hartweg's golden-sunburst occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Hartweg's golden-sunburst occupied-habitat, preserving 0.03 acres of Hartweg's golden-sunburst occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Hartweg's golden-sunburst. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Threatened San Joaquin adobe-sunburst (*Pseudobahia peirsonii*)
San Joaquin adobe-sunburst, also called Tulare pseudobahia, is a slender, wooly annual in the sunflower family (Asteraceae) with solitary yellow, daisy-like flower heads and alternate leaves. It grows 4 to 18 inches tall and is loosely covered with white, wooly hairs.

Status of the Species

Listing Status

San Joaquin adobe-sunburst was federally listed as threatened in February 1997 (62 FR 5542). No Critical Habitat has been designated. This species was listed as endangered by the California Department of Fish and Game in January 1987. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal

San Joaquin adobe-sunburst is a small annual plant that flowers in March and April (California Native Plant Society 2001). There is no information on aspects of life history such as pollination biology or germination requirements.

Habitat Affinities

Pseudobahia peirsonii received its common name, 'San Joaquin adobe-sunburst' because early collectors found this plant exclusively in "heavy clay" or "dark adobe" soils of the San Joaquin Valley (Stebbins 1991). Soil type is the most important factor in determining suitable habitat for this plant species (Stebbins 1991). Although San Joaquin adobe-sunburst was successfully grown on a variety of soil types in the greenhouse, all known wild occurrences are associated with the following soil types: Cibo clay, Porterville clay, Centerville clay, and Mt. Olive clay (Stebbins 1991). The probable reason for the plant/soil association is the capability of these clay soils to retain moisture longer into the summer dry season than most other soil textures (Stebbins 1991). These soil types also have neutral to slightly alkaline pH. Stebbins (1989) suggested that seed germination for this plant might require a high moisture threshold that can only be found in the clay soils in this relatively arid region.

San Joaquin adobe-sunburst grows in grasslands and in the transition zone between grassland and blue oak woodland at elevations between 119 meters (390 feet) and 792 meters (2,600 feet) on level or gently sloping areas between low hills (Stebbins 1989). San Joaquin adobe-sunburst can grow in fairly dense grass cover, but optimal habitat appears to be a landscape sparsely vegetated with a mixture of grasses and forbs (Stebbins 1989). Associated grasses and forbs include *Avena* sp. (wild oats), *Erodium cicutarium* (red-stemmed filaree), *Amsickia menziesii* var. *intermedia* (fiddelneck), *Bromus madritensis* ssp *rubens* (foxtail chess), *Bromus hordeaceus* (soft brome), *Hordeum murinum* (foxtail barley), and *Achyrachaena mollis* (blow-wives) (Stebbins 1991). These non-native species successfully compete for space, water, and nutrients to the detriment of the San Joaquin adobe-sunburst (E. Cypher pers. comm. 2007b).

Historical and Current Range, Distribution

San Joaquin adobe-sunburst is restricted to the eastern San Joaquin Valley. San Joaquin adobe sunburst occurs only on heavy adobe clay soils over a range of approximately 120 miles through Fresno, Tulare, and Kern counties. These soils are mainly distributed in the valleys and flats near the foothills of the southeastern San Joaquin Valley. Historical occurrences were scattered from northern Kern County north to Tulare and Fresno counties. The historic distribution of San Joaquin adobe-sunburst is not known because when the species was first described in 1949, extensive areas with suitable habitat for this species in the lower San Joaquin Valley were already converted to agriculture. This extensive land conversion precluded establishing a

meaningful baseline survey of San Joaquin adobe-sunburst (Stebbins 1991). Historical occurrences were scattered from northern Kern County to Tulare and Fresno counties.

Today the species is limited to a few populations in valleys and flats and the foot of the Sierra Nevada. Extant populations are concentrated in three areas: the Round Mountain-Wahtoke area east of Fresno in Fresno County, the Porterville-Visalia region west of Lake Success in Tulare County, and the Pine Mountain-Woody region northeast of Bakersfield in Kern County.

The plant is currently limited to 32 extant occurrences in Fresno (6), Tulare (18), and Kern (8) counties (CNDDB 2007). The available population trend information for San Joaquin adobe-sunburst indicates this species appeared to be stable at only four of the recorded occurrences. Of the 44 originally recorded occurrences, seven occurrences are extirpated, two are possibly extirpated, three were removed from the record, and the remaining 32 occurrences are listed as "presumed extant" (CNDDB 2007).

Surveys of San Joaquin adobe-sunburst reveal that population numbers can fluctuate widely from one survey year to another. This fluctuation is believed to depend on annual climatic conditions, specifically the amount of seasonal rainfall, and also due to competition from non-native plants (Stebbins 1989, 1991; E. Cypher, California Department of Fish and Game [CDFG], pers. comm. 2007a). Because of these fluctuations, population trends for these species are difficult to deduce and can not be reliably completed in a few years of surveys (Stebbins 1989).

The HCP estimated that the potential geographic range of San Joaquin adobe-sunburst inside the San Joaquin Valley totals 991,000 acres in Fresno, Tulare, and Kern counties. The HCP calculated that 0.87-percent, or 862 acres, of this 991,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival

San Joaquin adobe-sunburst is faced with imminent reduction in population sizes by a variety of present-day threats. Conversion of natural habitat to residential development is the primary threat to San Joaquin adobe-sunburst. In addition, road maintenance projects, recreational activities, competition from non-native plants, agricultural land development, incompatible grazing practices, a flood control project, transmission line maintenance, and other human impacts also may threaten the species.

At the time of listing, a primary threat to the species was the conversion of natural habitat to residential development. The threat to San Joaquin adobe-sunburst was primarily due to the planned 462 acre combined Quail Lakes housing development and recreational lake in Fresno County that would affect the large occurrence (CNDDB occurrence number 31) of 5000 plants surveyed in 1990. Completion of this project included mitigation which involved off-site wetland construction, transplantation of San Joaquin adobe-sunburst and top soil translocation to protected areas within the development site, and preservation of two high density sub-populations of San Joaquin adobe-sunburst (EIP associates 1994). In 2003, John Stebbins surveyed this mitigation site and found no plants and commented that the habitat was notably degraded since his previous surveys (J. Stebbins *in litt.* 2007).

A proposed parcel split of a privately owned 65 acre parcel in Fresno County near the city of Clovis and the proposed residential development of these sub-parcels is located within the area

described to contain San Joaquin adobe-sunburst occurrence number 36 (Halstead and Associates 2006, CNDDB 2007). Surveys for San Joaquin adobe-sunburst are currently not planned to be performed on this property prior to development, yet 46 plants were seen here during the most recent survey in 1994 (Halstead and Associates 2006, CNDDB 2007).

The proposed Round Mountain Estates project would develop a 600 acre parcel at Round Mountain in Fresno County, an area occupied by about 40 acres of San Joaquin adobe-sunburst. Surveys in 1993 and 1996 revealed the 40 acres supports an apparently stable population and that current land use continues to be moderate cattle grazing (J. Gurule, Live Oak Associates, pers. comm. 2007). Mitigation recommended for this project is to protect in perpetuity the 40 acres that contain the San Joaquin adobe-sunburst occurrence (Hartesveldt Ecological Consulting Services [now Live Oak Associates] 1996).

Inundation of San Joaquin adobe-sunburst caused by the creation of Lake Success extirpated two of the originally recorded occurrences of San Joaquin adobe-sunburst (CNDDB 2007). Three occurrences of San Joaquin adobe-sunburst are now found at the Lake Success area which is managed by the U.S. Army Corps of Engineers. Two of these occurrences are historically recorded and one occurrence is believed to be a relict of one of the original occurrences that were documented as extirpated when the Lake was first filled (EDAW 2006). Flooding at Lake Success continues to be a threat to the three local occurrences of San Joaquin adobe-sunburst (E. Cypher in litt. 2007). Excessive rainfall during an exceptionally wet year could raise the level of Lake Success and cause inundation of at least one of the occurrences (E. Cypher in litt. 2007). Two proposals for the improvement of the Lake Success dam could affect at least one occurrence of San Joaquin adobe-sunburst. The U.S. Army Corps of Engineers planned to move the dam 300 feet downstream of its current location and then increase the size of the new spillway (E. Cypher in litt. 2007). Mitigation by transplanting was addressed, but is not considered a reliable option for saving the affected populations of San Joaquin adobe-sunburst owing to the limited success of previous transplanting efforts (E. Cypher in litt. 2007).

The Fancher Creek flood control project, completed in the mid-1990's, impacted about 40 percent of the second largest population of San Joaquin adobe-sunburst (CNDDB occurrence 30, 62 FR 5548). However, San Joaquin adobe-sunburst is still found at the Francher Creek site and surveys are conducted on a regular basis (P. Bryan in litt. 2007). The possible inundation of at least part of the existing local occurrence during an exceptionally heavy rainfall season remains a threat to this occurrence (Stebbins 1991, P. Bryan pers. comm. 2007).

Transmission Line Maintenance. Two occurrences of San Joaquin adobe-sunburst (CNDDB occurrence numbers 23 and 24) inhabit areas beneath two electric transmission lines supported by Southern California Edison (SCE) power company and are considered "right of ways", mostly within privately owned lands. Entrix, Inc. (1997) conducted a survey and found only one occurrence along the Vestal transmission line. Stebbins (1991) recognized that these populations would need to be protected from the machinery and traffic (human and vehicular) that would impact the area when maintenance actions were performed on the transmission lines. Routine maintenance activities include patrol road maintenance, line maintenance and overhead canopy maintenance. Routine maintenance actions are scheduled by SCE annually and avoid the active time periods for local listed plants and require a minimum of off-road activities (Entrix 1997). A more substantial threat to San Joaquin adobe-sunburst is from emergency repairs to the power

lines due to catastrophic failure, natural disasters, or vandalism where the need to conduct repairs expeditiously would increase the chances of incidental damage to the plants during the repair effort. SCE maintenance personnel are provided with environmental and endangered species training (Entrix 1997).

In 1997, when first listed, about fifty percent of known occurrences of San Joaquin adobe-sunburst were found on private property that was used primarily for cattle grazing. Moderate grazing regimes are not believed to seriously affect the species, but may actually enhance their growth due to the removal of non-native, aggressive, invasive grasses and forbs (Stebbins 1989, Marty 2004). Cattle do not preferentially target San Joaquin adobe-sunburst while grazing (E. Cypher pers. comm. 2007b). Profitable cattle ranching may indirectly benefit the species by discouraging residential development of ranch land (E. Cypher pers. comm. 2007b). Cattle grazing and trampling are no longer considered a serious threat to the species unless the grazing regime is mismanaged.

Fragmentation of habitat has resulted in small isolated populations of the species. Such small populations may be highly susceptible to extirpation due to chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soule 1988; Goodman 1987). If an extirpation event occurs in a population that has been fragmented, the opportunities for re-colonization will be greatly reduced due to physical isolation from other source populations. The small size and fragmentation of populations remains a threat (E. Cypher pers. comm. 2007b).

San Joaquin Adobe-sunburst Environmental Baseline within the Action Area

There is one extant occurrence for the San Joaquin adobe-sunburst in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This single occurrence is located in the Fresno County portion of the of the action area. This occurrence occupies approximately 1.7 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). This occurrence is approximately 3% of the remaining occurrences for the species.

The HCP classifies San Joaquin adobe-sunburst as a "narrowly endemic plant covered-species. The HCP land-cover types utilized by San Joaquin adobe-sunburst are Grassland and Blue Oak Woodland.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to San Joaquin adobe-sunburst occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a San Joaquin adobe-sunburst survey is not possible during an appropriate period in March or April, and 1) any CNDDB San Joaquin adobe-sunburst occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

Ground-disturbing covered-activities implemented within the existing right-of-ways of the action area and the "minor construction" covered activities (outside the existing right-of-ways) would

permanently remove 0.01 acre of occupied San Joaquin adobe-sunburst habitat over the 30-year term of the proposed permit.
Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in San Joaquin adobe-sunburst occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied San Joaquin adobe-sunburst habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with San Joaquin adobe-sunburst for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied San Joaquin adobe-sunburst habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for San Joaquin adobe-sunburst that is present in the disturbance site.

To minimize direct and indirect effects on San Joaquin adobe-sunburst, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of San Joaquin adobe-sunburst take over the term of the proposed Permit.

AMM14 would not be effective on San Joaquin adobe-sunburst; therefore, this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a San Joaquin adobe-sunburst extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals San Joaquin adobe-sunburst plants in the next and subsequent growing seasons, possibly extirpating San Joaquin adobe-sunburst from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid San Joaquin adobe-sunburst occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios*. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for San Joaquin adobe-sunburst. Therefore, PG&E may provide 0.03 acres of San Joaquin adobe-sunburst compensation over the 30-year Permit term.

Compensation lands for effects to San Joaquin adobe-sunburst will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms*. The Service refers to this type of compensation as "in-kind compensation". Compensation for San Joaquin adobe-sunburst will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Hartweg's golden-sunburst as described in the analysis above, including the permanent loss of up to 0.01 acres of occupied Hartweg's golden-sunburst habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Hartweg's golden-sunburst occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Hartweg's golden-sunburst occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Hartweg's golden-sunburst occupied-habitat, preserving 0.03 acre of Hartweg's golden-sunburst occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Hartweg's golden-sunburst. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Endangered Keck's checkermallow (*Sidalcea keckii*) and its Critical Habitat
Keck's checkermallow, also known as Keck's sidalcea or Keck's checkerbloom, is an annual herb in the mallow family (Malvaceae) that is endemic to California. Plants grow 6 to 14 inches tall, with slender, erect stems that are hairy along their entire length. Leaves towards the base of the plant have a roughly circular outline with seven to nine plamately arranged leaflets. Flowers

have five petals that are either solid pink or pink with a maroon center. Petals are 0.4 to 0.8 inches long. They are often shallowly notched at their outermost margins.

Status of the Species and the Critical Habitat

Listing Status

Keck's checkermallow was federally listed as endangered in February 2000 (65 FR 7757). A detailed account of the taxonomy, ecology, and biology of the Keck's checkermallow is presented in the final rule (65 FR 7757). The California Native Plant Society has placed Keck's checkermallow on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal

Keck's checkermallow blooms in April and early May. The primary pollinators of Keck's checkermallow are unknown, but related species are pollinated by various solitary bees, bumblebees, and bee flies. Fruits consist of four to five wedge shaped sections arranged in a disk. Each section contains a single seed. Sections mature and separate in May, but their methods of dispersal are currently unknown. They may simply rely on gravity. Also unknown are the seeds' requirements for germination, their typical germination dates, and how long the seeds remain viable in the soil. Based on what we know about other Malvaceae species and on the extreme yearly fluctuations in above-ground plants, it is likely that seeds remain viable for several years and form a soil seed bank.

Habitat Affinities

Keck's checkermallow grows in relatively open areas on grassy slopes of the Sierra foothills in Fresno and Tulare counties. It is associated with serpentine and other soils that tend to restrict competing vegetation (Kirkpatrick 1992; Cypher 1998; 65 FR 7757). Serpentine soils are unusually low in primary plant nutrients, nitrogen, phosphorus, and potassium; and high in heavy metals. These soil properties tend to restrict the growth of many competing plants. As with many serpentine species, Keck's checkermallow appears to compete poorly with densely growing non-native annual grasses (Stebbins 1992; Weiss 1999).

Historical and Current Range, Distribution

The species is adapted to grow on serpentine soils, which are fairly rare soils. This habitat requirement limits the range of Keck's checkermallow. There are four historic occurrences, two from Tulare County one from Merced and one from Fresno County. Botanists first collected Keck's checkermallow from a site near White River in Tulare County in the 1930s (Wiggins 1940; CNDDB 2006). After having been collected there in the 1930s, it was not collected or seen by botanists again for over 50 years. Keck's checkermallow was presumed extinct until it was rediscovered in 1992 at a site near Mine Hill in Tulare County (Mine Hill population)(Stebbins 1992). Unfortunately, the Mine Hill population in seems to have been extirpated by 2002 due to agricultural conversion to a citrus orchard and reservoir (CNDDB 2006).

The CNDDB (2007) identifies three extant occurrences for Keck's checkermallow within three California counties: Fresno (1), Merced (1), and Tulare (1). Plants were last seen at the Merced County site in 2005, but the species identification has not been confirmed. The Tulare County

site is the specie's type locality, but Keck's checkermallow has not been confirmed at that site since 1939, although habitat still exists in the area.

Currently, only one population of Keck's checkermallow is currently confirmed to be extant - at Tivy Mountain near the community of Piedra, in southern Fresno County (Piedra population). Most of the Piedra population is on the Sierra Foothills Conservancy (SFC) Tivy Mountain Preserve (65 FR 7757), with small portions on land administered by the U.S. Bureau of Reclamation (Cypher 1998; R. Faubion, Bureau of Reclamation, pers. comm. 2001) and on private land (J. Stebbins, pers. comm. 2001). This remaining occurrence of Keck's checkermallow includes 6 groups of plants on an area approximately 25.2 acres in size (CNDDB 2007).

The HCP estimated that the potential geographic range of Keck's checkermallow inside the San Joaquin Valley totals 103,000 acres in Fresno and Tulare counties. The HCP calculated that 0.003 percent, or 3 acres of this 103,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
Keck's checkermallow is threatened by urban development, competition from non-native grasses, and agricultural land conversion, Cattle grazing at the current level does not appear to be detrimental and may be an important factor protecting the plant from encroachment by non-native grasses. Cattle do damage plants directly by eating and trampling them; however, so unmanaged increases in grazing during months of flowering or seed maturation could pose a threat.

The species' low population numbers leave it vulnerable to random environmental events ranging from bad weather to disease to damaging insect infestations. The isolation of remaining population exacerbates these vulnerabilities by precluding recolonization of extirpated populations. Inbreeding depression and loss of genetic variability may also be causes for concern in such small isolated populations.

The absence of Keck's checkermallow from dense grasslands, even those on serpentine clay soils, suggests that it is a poor competitor (Stebbins 1992; J. Stebbins, pers. comm. 2001). Thus, aggressive, non-native grasses such as *Bromus madritensis* ssp. *rubens,* and *Bromus hordeaceus* that are present at the extant site could out-compete Keck's checkermallow if conditions changed to favor non-native grasses. Conditions that could favor the grasses include soil disturbance and increased availability of soil nutrients. The non-native grasses also create fuel that could carry fires (E. Cypher, California Department of Fish and Game, pers. comm. 2006).

Critical Habitat Status
Final Critical Habitat for Keck's checkermallow was designated in March 2003 (68 FR 12863). The total designated Critical Habitat for Keck's checkermallow is 1,085 acres consisting of three separate units: the Piedra Unit in Fresno County (510 acres), The Mine Hill Unit in Tulare County (213acres), and the White River unit in Tulare County (362 acres).

The Piedra Unit is on the western slopes of Tivy Mountain in the Piedra area of southern Fresno County. It contains 510 acre, of which 503 acres are privately owned and 7 acre are managed by the BOR (R.Faubion, pers. comm., 2002). Of the privately owned land, 189 acre of proposed critical habitat is on the Tivy Mountain Reserve, which is owned by the SFC and established for the conservation of *Sidalcea keckii* and other rare plants. This unit is essential to the conservation of the species because it is one of two sites at which the species has been observed since the 1930s. When the number of populations or geographic distribution of a species are severely limited, as is the case when plants have only been observed recently at two locations, possible extinction or extirpation due to random events become a concern. Examples of random events that are a concern include fire and disease (Shaffer 1981, 1987; Primack 1993, Meffe and Carroll 1994). This unit is also essential because it includes the most northerly location known for S. keckii, and is the only location where aboveground plants with maroon-centered flowers have been documented (Cypher 1998).

The Mine Hill Unit is about 2 miles south of Success Dam and 3 miles east of Porterville in Tulare County and contains 213 acres, all of which are on privately owned land. This unit encompassed a single known patch of *Sidalcea keckii*, which contained approximately 60 plants when last surveyed in 1992. The standing population (above ground individuals) at Mine Hill may have been extirpated by conversion of the habitat to an orange grove. Approximately 20 percent of the designated critical habitat at Mine Hill has been destroyed. Nearly 40 percent of the critical habitat was surveyed for Keck's checkermallow during surveys conducted from 2002 to 2006 (J. Stebbins pers. comm. 2006). Although the highest quality habitat was destroyed, habitat in the Mine Hill Critical Habitat Unit still exists that has not yet been surveyed due to lack of access (J. Stebbins pers. comm. 2006). At the request of the landowner, those areas have not been surveyed since 1992. It is possible that plants or a seed bank of this species could occur in the unsurveyed portion of the Mine Hill critical habitat. The Coarsegold rock outcrop soils of the area are best suited to rangeland (SCS 1982), which is the current use of the area where not converted to orchard. However, the site is also zoned for mobile home development (R. Brady, Tulare County Planning Department, pers. comm., 1997). This unit is essential to the conservation of the species because it is one of the two known locations where *Sidalcea keckii* plants have been observed since the 1930s. As is the case with the Piedra Unit, when the number of populations or the geographic distribution of a species is severely limited, possible extinction or extirpation due to random events becomes a concern.

The White River Unit is located near the town of White River in southern Tulare County. It contains 362 acres, all of which is private land. This unit contains the ``type" location, specimens from which were used to first describe the species in 1940 (Wiggins 1940). This site is the only one not closely associated with serpentine rock, but contains the primary constituent elements that would support the species. This may be due to the presence of currently unknown and unmapped serpentine areas, or it may be due to an increased ability to compete on non-serpentine Cibo soils. As noted above, the White River site is one of the extremely few locations where Sidalcea keckii has ever been observed and may be occupied by a seed bank. *Sidalcea keckii* plants may still occur here, but none has been documented recently. Even if the species is not rediscovered at the White River site, we believe the site is essential to the conservation of the species. Because *S. keckii* has been observed at the site, it is the most appropriate site at which a reestablishment effort might be attempted. Establishment of a third location for S. keckii is

likely to be an important component in reducing the risk of extinction due to such catastrophic events. This location also represents the southernmost extent of the known historical range of the species.

The primary land use activity within the three units is grazing. Additionally, Pacific Gas & Electricity also maintains two powerlines in the Piedra Unit, and Southern California Gas operates and maintains oil pipelines within the boundaries of its Northern Service Territory, which includes the White River Unit.

The designated critical habitat is designed to provide sufficient habitat to maintain self-sustaining populations of *S. keckii* throughout its range and allow for the expansion of populations in order to help reach the primary goal of conservation, and to provide those habitat components essential for the conservation of the species. These habitat components provide for: (1) individual and population growth, including sites for germination, pollination, reproduction, pollen and seed dispersal, and seed dormancy; (2) areas that allow gene flow and provide connectivity or linkage within larger populations; (3) areas that provide basic requirements for growth, such as water, light, and minerals; and (4) areas that support populations of pollinators and seed dispersal organisms. We believe the long-term conservation of *Sidalcea keckii* is dependent upon the protection of existing population sites and the maintenance of ecological functions within these sites, including connectivity between colonies (i.e., groups of plants within sites) within close geographic proximity to facilitate pollinator activity and seed dispersal. The areas we are designating as critical habitat provide some or all of the habitat components essential for the conservation of *S. keckii.* Based on the best available information at this time, the primary constituent elements of critical habitat for *S. keckii* are: (1) Minimally shaded annual grasslands in the foothills of the Sierra Nevada Mountains containing open patches in which competing vegetation is relatively sparse; and (2) Serpentine soils or other soils that tend to restrict competing vegetation.

Keck's Checkermallow Environmental Baseline within the Action Area

Species Baseline

The only known occurrence of Keck's checkermallow is within the 276,350-acre action area, and overlaps with two existing PG&E right-of-ways. The two existing right-of-ways occupy approximately 6.94 acres, or 28% of the 25.2-acre occurrence in the Piedra area (CNDDB 2007). The number of individual standing (aboveground) plants within the existing right-of-ways is unknown, and the likelihood of a viable seed-bank (belowground) in the existing right-of-ways is unknown. It is the Service's understanding that the 6.94-acre portion of the PG&E right-of-ways located in this occurrence has never been surveyed for the species.

The HCP land-cover types utilized by Keck's checkermallow are Grassland and Blue Oak Woodland. The HCP classifies Keck's checkermallow as a "narrowly endemic" plant covered-species.

Critical Habitat Baseline

Of the 71,085 acres of Keck's checkermallow designated Critical Habitat (71 FR 7118), approximately 49.25 acres are located in existing PG&E right-of-ways the 276,350-acre action-area. Of these 49.25 acres, approximately 48.63 acres are located in electric transmission

ROWs, and approximately 0.56 acre are located in electric distribution ROWs. No Keck's checkermallow critical habitat is located in the gas transmission ROWs, but the HCP estimated that 0.06 acre of Keck's checkermallow critical habitat could be located inside the gas distribution ROWs of the action area.

Of the three Critical Habitat units designated for Keck's checkermallow, only the Piedra Unit is located in the 276,250-acre action area. The Piedra Unit is the only critical habitat unit known to be occupied by Keck's checkermallow. All 49.25 acres of PG&E right-of-way are in the Piedra Unit. The 49.25 acres of existing PG&E right-of-ways within this Critical Habitat Unit cover approximately 9.7% of the unit.

The status of the constituent elements within the 49.25 acres of existing right-of-ways is unknown, and the condition of the seed-bank (belowground) or standing individuals in the existing right-of-ways is unknown. It is the Service's understanding that the 49.25-acre portion of the PG&E right-of-ways located in this Critical Habitat Unit has never been surveyed for the species.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to Keck's checkermallow occupied habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Keck's checkermallow survey is not possible during an appropriate period in April and early May, and 1) any CNDDB Keck's checkermallow occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and vernal pool habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

Ground-disturbing covered-activities implemented within the existing right-of-ways of the action area and the "minor construction" covered activities (outside the existing rights-of-way) could permanently remove 0.01 acres of occupied Keck's checkermallow habitat.
Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Keck's checkermallow occupied-habitat within the PG&E existing rights-of-way is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Keck's checkermallow habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Keck's checkermallow for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Weedy grass species could lead to an accumulation of duff, which would inhibit germination of Keck's checkermallow from the seed

bank and could extirpate the species from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Keck's checkermallow habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Keck's checkermallow that is present in the disturbance site.

To minimize direct and indirect effects on Keck's checkermallow, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Keck's checkermallow take over the term of the proposed Permit.

AMM14 would not be effective on Keck's checkermallow; therefore, this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. AMM13 also would not be effective on Keck's checkermallow because it would allow soil-disturbance after the plant senescences and prior to the first significant rainfall, which could destroy the biological soil-crust and other microhabitat features essential to this species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Keck's checkermallow occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Keck's checkermallow plants in the next and subsequent growing seasons, possibly extirpating Keck's checkermallow from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Keck's checkermallow occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Keck's checkermallow. Therefore, PG&E may provide 0.03 acres of Keck's checkermallow compensation over the 30-year Permit term.

Compensation lands for effects to Keck's checkermallow will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation

as "in-kind compensation". Compensation for Keck's checkermallow will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Effects on Keck's Checkermallow Critical Habitat
Of the approximately 49.25 acres of Keck's checkermallow critical habitat located within the existing PG&E right-of-ways (see *Critical Habitat Baseline* above), PG&E estimates that ground-disturbing covered activities will directly disturb 0.4 acre annually (12 acres over the 30-year Permit term), but will not permanently remove (hardscape) any critical habitat acres over 30 years. The 12 acres of impact over the term of the permit would affect approximately 2.4% of the total area in the Piedra Unit.

PG&E also estimates that the "other disturbance" covered activities (activities which do not disturb land-cover such as tree trimming or off-road travel) will affect 1.14 acres of Keck's checkermallow designated critical habitat annually (34.2 acres over 30 years). These effects would occur within the 49.25 acres of existing PG&E rights-of-ways located in the Piedra Critical Habitat Unit.

The "minor construction" covered-activities will extend existing pipelines, electric lines, or other facilities beyond the existing PG&E ROW boundaries and will include the acquisition of additional right-of-way acres. PG&E cannot predict where these line extensions will be constructed, and some may be constructed inside designated Keck's checkermallow critical-habitat. PG&E will confer with the Service prior to implementing any "minor construction" covered-activity or other medium or large covered-activities within a designated critical-habitat unit. During the *Confer Process*, PG&E and the Service will discuss likely impacts, species effects, appropriate AMMs, and ways to ensure that the critical habitat unit is not adversely modified.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Keck's checkermallow as described in the analysis above, including the permanent loss of up to 0.01 acres of occupied Keck's checkermallow habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Keck's checkermallow occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Keck's checkermallow occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Keck's checkermallow occupied-habitat, preserving 0.03 acres of Keck's checkermallow occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

The area of impact expected in the Piedra Critical Habitat Unit over the Permit term (12 acres) is a relatively small proportion of the total area in the unit (2.4%). This area of impact not expected to change the current ability of the primary constituent elements to support the function and conservation role of that critical habitat unit. The "other disturbance" effects of vehicle travel through dry vernal pools and associated upland areas are individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Keck's checkermallow or adversely modify its designated critical habitat.

We reached this conclusion because the small impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Threatened Mariposa pussypaws (*Calyptridium pulchellum*)

Mariposa pussypaws is a small, compact, prostate, annual herb belonging to the purslane family (Portulacaceae). The plant has fibrous roots and many prostrate stems. The smooth, slender stems are 2 to 8 inches long. The stems form a small rosette and the leaves are spatula-shaped. Both stems and the spatula-shaped leaves have smooth surfaces. Four-petaled rose-colored flowers grow in loose clusters at the end of stems.

Status of the Species

Listing Status

Mariposa pussypaws was federally listed as threatened in September 1998 (63 FR 49022). Critical Habitat has not been designated. The California Native Plant Society has placed this species on List 1B (rare or endangered throughout its range). Although the species has not been officially listed by the State of California, the Department of Fish and Game considers it "very threatened".

Life History, Reproductive Ecology, Dispersal

Flowers appear in April and May and may bloom until August. Seed production is somewhat low for an annual. The conditions for seed germination and seedling survival vary depending on weather conditions (E. Cypher, California Department of Fish and Game, pers. comm., 2007). The plants grow at an elevation of between 1,500 and 3,600 feet.

Habitat Affinities

Mariposa pussypaws grows in sparsely vegetated areas such as granite domes and gravelly openings within Sierra Nevada foothill woodland plant communities (J. Clines, Sierra National Forest, *in litt.* 1998; CNDDB 2006. Although trees such as *Pinus sabiniana* (foothill pine), *Quercus douglasii* (blue oak), and *Q. wislizenii* (interior live oak) comprise the surrounding woodlands, *Calyptridium pulchellum* is restricted to treeless areas (Hoover 1940; CNDDB 2006). Its adaptation to a harsh, exposed setting makes it unusual. Little else grows on these shallow, bare substrates. Occurrences range in elevation from a low of 442 meters (1,450 feet) in Mariposa County to a high of 1,097 meters (3,600 feet) in Fresno County (D. Hamon, Sierra National Forest, *in litt.* 1980; CNDDB 2006).

Historical and Current Range, Distribution

Judging from early botanical literature, this plant has never been much more widely distributed than it is today.

Currently, seven small populations are patchily distributed over a 750 square mile area in Mariposa, Madera and Fresno counties (CNDDB 2002). Collectively, the seven populations are estimated to occupy a total of only 14 acres. Six of the seven populations are on private land. Five of these populations are marginal in quality and contain fewer than 300 plants. The sixth population on private land has about 900 plants. The seventh population of is on lands administered by the Sierra National Forest. It is fenced to protect it from livestock trampling and grazing.

The CNDDB identifies eight extant occurrences of Mariposa pussypaws in three California counties: Mariposa (2), Madera (5), and Fresno (1) (CNDDB 2007). The main center of distribution for *Calyptridium pulchellum* is in Mariposa County, south of the town of Mariposa. Although this area of concentration includes only Element Occurrences 1 and 2, it incorporates more than half of the individual plants (CNDDB 2006). Another area of concentration for the species is near Coarsegold in Madera County (Element Occurrences 4, 5, 8, and 9). A minor area of concentration is the Jose Basin in Fresno County (Element Occurrence 6 and one unnumbered). The remaining occurrence (Element Occurrence 3) is isolated near Ahwahnee in Madera County. The two Fresno County occurrences are on public land managed by the Sierra National Forest; all other occurrences are on private land (CNDDB 2006).

The HCP estimated that the potential geographic range of Mariposa pussypaws inside the San Joaquin Valley totals 361,000 acres in Mariposa and Madera counties. The HCP calculated that 0.005 percent, or 19 acres, of this 361,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
Mariposa pussypaws occurrences are threatened by urbanization, grazing, extirpation from random events, and the inadequacy of regulatory mechanisms. Its prostrate growth habit makes it a poor competitor with taller grasses and any other dense vegetation.

The habitat for Mariposa pussypaws is becoming more fragmented. A road had been constructed through the Madera County Ahwahnee population (Element Occurrence 3) before Hamon first discovered it in 1980 (Hamon 1981); he surmised that the plants remaining in 1980 were just a remnant of the former population (CNDDB 2006). In recent years (1993 through 2006), dirt bikes have been creating trails through the Mariposa pussypaws and driving over the plants (J. Clines *in litt.* 1993*a*; J. Clines, pers. comm. 2001; A. Mendershausen pers. comm. 2001). Construction of a firebreak has further damaged the population (J. Clines *in litt.* 1998).

One Coarsegold population of Mariposa pussypaws (Element Occurrence 4 in Madera County) may have been extirpated by activities associated with residential development. The highest population size (701 plants) was recorded in 1983, but later that year a house and driveway were constructed on the lot (CNDDB 2006). The remaining plants may have been buried when the yard was covered with decorative gravel, but the exact location of the plants relative to the landscaping is not known (M.A. McCrary, California Department of Fish and Game, pers. comm. 2001). Foot traffic from the house, vehicular travel, and burrowing animals have disturbed the soil and allowed encroachment of weedy plants (J. Clines *in litt.* 1993*a*; CNDDB

2006). The Mariposa pussypaws population size declined to fewer than 100 plants in 1988 and 1989, then to 1 plant in 1990, and none have been found since (California Natural Diversity Database 2006).

Mariposa pussypaws has not been found at Coarsegold Element Occurrence 5 (Madera County) since 1983, despite visits in years that were favorable for other populations (J. Clines *in litt.* 1993*b*; J. Clines, pers. comm. 2001; CNDDB 2006). The reason for decline of Element Occurrence 5 is unknown. Additionally, shading from encroaching shrubs and trees apparently has reduced the suitability of the habitat for Mariposa pussypaws (J. Clines *in litt.* 1998; A. Mendershausen, pers. comm. 2001). The habitat for Mariposa pussypaws located near Coarsegold, in Madera County, will likely continue to be fragmented due to increased infrastructure associated with the need for housing and services for this area, and the construction of a gaming casino and hotel on the Chukchansi Tribal Lands (Madera County 2006).

Activities associated with residential development such as dirt bike riding, landscaping, or foot traffic are a threat at Element Occurrence 3 near Ahwahnee, and Coarsegold Element Occurrences 4 (if extant), and 5 in Madera County, all of which are in subdivisions (CNDDB 2006). Even if Mariposa pussypaws was not affected directly during house or driveway construction, viability of the populations could be reduced. The dirt bikes and shading that contributed to the decline of Mariposa pussypaws at the Ahwahnee site continue to degrade the habitat there (J. Clines, pers. comm. 2001; A. Mendershausen, Sierra Foothills Chapter California Native Plant Society, pers. comm. 2001, 2007), so that occurrence is particularly vulnerable.

Demographic events that may put small populations at risk involve random fluctuations in survival and reproduction of individuals (Shaffer 1981, 1987; Lande 1988. Small populations may also be subject to increased genetic drift and inbreeding (Menges 1991; Ellstrand and Elam 1993).

Mariposa Pussypaws Environmental Baseline and Status within the Action Area

There are there are 3 extant occurrences for Mariposa pussypaws in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). All three occurrences are located in the Madera County portion of the of the action area. These occurrences occupy approximately 0.807 acre of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). These three occurrences are approximately 43% of the remaining occurrences for the species.

The HCP land-cover types utilized by Mariposa pussypaws are Foothill Pine and Blue Oak. The HCP classifies Mariposa pussypaws as a "narrowly endemic plant covered-species.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to Mariposa pussypaws occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Mariposa pussypaws survey is not possible during an appropriate period beginning

in April or May, and continuing until August, and 1) any CNDDB Mariposa pussypaws occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would not directly disturb or permanently remove (hardscape) any Mariposa pussypaws occupied habitat over the 30-year term of the Permit. No effects will occur on the 0.807 acre of PG&E right-of-way currently occupied by Mariposa pussypaws (see *Species Baseline* above). PG&E also estimated that implementing the "minor construction" covered activities (outside the existing right-of-ways) would permanently remove 0.01 acres of occupied Mariposa pussypaws habitat over the 30-year term of the proposed permit.

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Mariposa pussypaws occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Mariposa pussypaws habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Mariposa pussypaws for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Mariposa pussypaws habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Mariposa pussypaws that is present in the disturbance site.

To minimize direct and indirect effects on Mariposa pussypaws, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Mariposa pussypaws take over the term of the proposed Permit.

AMM14 would not be effective on Mariposa pussypaws; therefore, this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Mariposa pussypaws extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Mariposa pussypaws plants in the next and subsequent growing seasons, possibly extirpating Mariposa pussypaws from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Mariposa pussypaws occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios*. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Mariposa pussypaws. Therefore, PG&E may provide 0.03 acres of Mariposa pussypaws compensation over the 30-year Permit term.

Compensation lands for effects to Mariposa pussypaws will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms*. The Service refers to this type of compensation as "in-kind compensation". Compensation for Mariposa pussypaws will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Mariposa pussypaws as described in the analysis above, including the permanent loss of up to 0.01 acres of occupied Mariposa pussypaws habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Mariposa pussypaws occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Mariposa pussypaws occupied-habitat.

PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Mariposa pussypaws occupied-habitat, preserving approximately 0.03 acres of Mariposa pussypaws occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Mariposa pussypaws. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures' long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Threatened Springville clarkia (*Clarkia springvillensis*)
Springville clarkia is an annual herb with simple or branched stems, narrow bright-green leaves, and can grow to 3 feet in height. It is in the evening primrose family (Onagraceae), and has brilliant lavender-pink flowers punctuated by dark purplish basal spots.

Status of the Species
Listing Status
Springville clarkia was federally listed as threatened in September 1998 (63 FR 49022). A detailed account of the taxonomy, ecology, and biology of Springville clarkia is presented in this final rule. No Critical Habitat has been designated. This species was listed as endangered by the California Department of Fish and Game in September 1979. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology
Springville clarkia blooms relatively late, between May and July. The aboveground (standing) population size in Springville clarkia can vary enormously from one year to the next due to interactions between the soil seed bank and seasonal weather conditions. The Springville clarkia forms a persistent seed bank (T. Holtsford pers. comm.). The numbers of plants per occurrence fluctuates greatly between years, and numbers were observed to correlate with the amount of "substantial rainfall" received by the month of December (Hansen, 1992).

Habitat Components
Springville clarkia is found on granitic soils mostly on the uphill slope of road cuts and in sunny openings from elevations between 1,220 and 3,000 feet, within the blue oak (*Quercus douglasii*) woodlands near the Tule River in the Sierra Nevada foothills of Tulare County. The most favorable sites for Springville clarkia appear to be steep slopes that face south or west, in openings where tree and grass cover are sparse (Stebbins and Clark 1992).

Historical and Current Range, Distribution
The distribution of Springville clarkia is narrow, and essentially the same as it was historically. All known populations are found in Tulare County.

The California Natural Diversity Database (2007) has recorded 17 extant occurrences for Springville clarkia: 16 near Springville and 1 near the town of Three Rivers. The type locality (Element Occurrence 1) near Springville was extirpated in 1983 by development of a mobile home park, and was not found at the described location in a 1987 search. All confirmed occurrences of Springville clarkia are in the watershed of the Tule River - on U.S. Forest Service land, California Department of Fish and Game land, Bureau of Land Management property, County land or private land (CNDDB 2006). A questionable population is located near Three Rivers is in the Kaweah River watershed (CNDDB 2006).

The primary area of concentration is the Rancheria/Bear Creek drainage in the watershed of the North Fork of the Tule River (Element Occurrences 5, 12, 13, 14). A secondary area of concentration is the Siphon Canyon-Coffee Canyon area in the watershed of the Middle Fork of

the Tule River (Element Occurrences 4, 6, and 18). The population at Coffee Camp (Element Occurrence 4) has not been seen since 1967 despite repeated searches (Stebbins and Clark 1992, CNDDB 2006). Ten occurrences are located on the Sequoia National Forest (in the Middle Tule, West Bear Creek, and Rancheria grazing allotments). Collectively, the occurrences are estimated to occupy a total of 150 acres. Biologists familiar with the species agree that additional, yet undiscovered populations of Springville clarkia likely occur along the Middle and North Forks of the Tule River (U.S. Forest Service 1998; EA Engineering and Stone 1999; C. Sanders and J. Stewart *in litt.* 2000; S. Carter, pers. comm. 2001; J. Stebbins, pers. comm. 2001), but this is not confirmed.

The HCP estimated that the potential geographic range of Springville clarkia inside the San Joaquin Valley totals 317,000 acres, all in Tulare County. The HCP calculated that 0.039 percent, or 123 acres, of this 317,000-acre potential range are presently occupied by the species.

Reasons for Decline and Threats to Survival
Springville clarkia apparently declined due to a complex combination of inappropriate livestock grazing (J. Shevock *in litt.* 1985; Stebbins 1991b; Hansen 1992, U.S. Forest Service 1996), competition from non-native plants (McCue *et al.* 1996), altered fire regimes (McCue *et al.* 1996; S. Carter, pers. comm. 2001; J. Stebbins *in litt.* 2002*a*), road maintenance, mowing, and urban development.

Springville clarkia blooms relatively late, between May and July. Because it is a late-blooming species, it may not develop mature seeds before its grassland habitat is mowed annually for fire protection, or grazing occurs.

Livestock do not specifically seek out Springville clarkia until late in the season when it is the only species still green and growing (J. Stebbins, pers. comm. 2001), but they may consume it incidentally earlier in the season while eating the associated plants (U.S. Forest Service 1998). Inappropriate grazing practices that apparently contributed to the decline of Springville clarkia are: (1) repeated consumption of the same plants in a single growing season; (2) grazing late in the season (May or later) so Springville clarkia plants did not have time to send up new shoots or set seed before dying back (McCue 1997; J. Stebbins, pers. comm. 2001); and (3) livestock spending long periods in one area, which caused direct trampling of plants, soil compaction, and surface disturbance (Hansen 1992). Concern over grazing peaked in the 1980s, and several populations were then fenced to exclude livestock (Stebbins 1991b).

Nonnative plants, especially *Bromus* species, may have contributed to the decline of Springville clarkia by competing directly for moisture and nutrients (J. Stebbins *in litt.* 2002*a*). Dead stems of non-native grasses create a build-up of thatch that may have prevented Springville clarkia from becoming established in openings, thereby isolating populations (McCue *et al.* 1996; J. Stebbins, pers. comm. 2001). Prolonged grazing may have exacerbated these problems because soil disturbance favors non-native plants over native species (Hansen 1992). However, in areas where livestock have been excluded completely, thatch build-up is more severe (J. Stebbins *in litt.* 2002*a*). A related problem is that the stems and thatch of non-native plants contribute to an increased fire frequency. Conversely, fire suppression activities may have inadvertently contributed to the decline of Springville clarkia by allowing encroachment of shrubs and trees

into the openings where it grows (McCue *et al.* 1996; S. Carter, pers. comm. 2001, J. Stebbins *in litt.* 2002*a*). Lack of fire also would contribute to thatch accumulation (J. Stebbins *in litt.* 2002*a*).

The plants growing on steep banks along roads generally have been safe from grazing animals because fences at the edge of the bank and the steep slopes prevented livestock from entering (J. Shevock *in litt.* 1985; J. Stebbins, pers. comm. 2001). However, road maintenance and improvements affected Springville clarkia on these banks to some extent (Stebbins 1991b, J. Stebbins *in litt.* 2002*a*, CNDDB 2006). Road maintenance includes activities such as mowing, grading, spraying herbicide, mechanically removing brush, and clearing culverts (U.S. Forest Service 1996), whereas road improvements are activities such as widening or straightening roads, or installing culverts. Mowing most likely reduced seed production because it took place when Springville clarkia was flowering - the timing was chosen to remove the annual grasses as soon they stopped growing (J. Shevock *in litt.* 1985). Mobile Home park road improvements apparently extirpated Element Occurrence 1 (J. Stebbins, pers. comm. 2001) and damaged, but did not eliminate, Element Occurrences 3 (Stebbins and Clark 1992) and 16 (S. Carter, pers. comm. 2001).

Road maintenance still is a threat at five occurrences in Springville clarkia habitat. The dirt roads along which it grows are maintained by either Tulare County, Pacific Gas and Electric, or Southern California Edison. Although this species occurs along some roads administered by the U.S. Forest Service, Springville clarkia is not threatened there because the roads require very little maintenance and the species occurs more than 100 meters (300 feet) from the roadside (S. Anderson *in litt.* 2002). Similarly, although C. springvillensis grows near State Highway 190, it is far enough from the roadway that it is not affected by California Department of Transportation maintenance activities (U.S. Forest Service 1996). Mechanical brush removal, which occurs along the Southern California Edison water flume and Pacific Gas and Electric transmission line, would not be detrimental if it is done from late summer through autumn when *C. springvillensis* is not actively growing (U.S. Forest Service 1996), and in fact appears to be beneficial to Springville clarkia if done in the autumn (J. Stebbins, pers. comm. 2001). A management plan prepared for Southern California Edison (EA Engineering and Stone 1999) suggests guidelines to avoid effects to Springville clarkia during routine maintenance activities.

Residential development affected Springville clarkia at two sites. Element Occurrence 5 was damaged, but not destroyed, when an access road, building pad, and well were constructed in the midst of the Springville clarkia population (Ashford 1989); however, the home was never built. Mobile home development apparently contributed to the extirpation of Element Occurrence 1. No mobile homes are currently located at that site, but road construction, maintenance and improvement associated with the former residences are believed to be responsible for its disappearance (J. Stebbins, pers. comm. 2001; J. Stebbins *in litt.* 2002*a*; CNDDB 2006).

Currently, the primary threat to the survival of Springville clarkia is competition and thatch build-up from non-native plants (Hansen 1992, McCue 1997, J. Stebbins *in litt.* 2002*a*). Aggressive, non-native plants such as *Bromus* species, *Brassica* species, *Torilis* species (hedge-parsley), and *Centaurea melitensis* are present at nine occurrences, although they have not been reported as threats at all nine sites. Trees and shrubs, although native, also may be competing

with Springville clarkia water (Martin 1990) or creating too much shade (McCue *et al.* 1996) at all of the extant sites.

Small population size increases the susceptibility of a population to extirpation from random demographic, environmental, and/or genetic events (Shaffer 1981, 1987; Lande 1988; Meffe and Carroll 1994). Populations of 200 growing plants or less are considered small, in keeping with Menges' (1992) calculation that populations of this size are especially vulnerable to even moderate levels of environmental uncertainty. The combination of few populations, small range, and restricted habitat still renders Springville clarkia susceptible to extinction or extirpation from a significant portion of its' range due to random events, such as flood, drought, disease, or other factors (Shaffer 1981, 1987; Meffe and Carroll 1994). McCue and Holtsford (1998) found that the presence of a soil seed bank greatly increased the effective population size of this species. The seed bank protects this species from the effects from small populations.

Status of the Species with Respect to Recovery
In 1987, the California Department of Fish and Game purchased a portion of land where the largest *Clarkia springvillensis* occurrence had been found and set it aside as the Springville Clarkia Ecological Reserve. Research plots were established and inventoried from 1987 to 1992. California Department of Fish and Game (2001) characterized the species as a whole as "declining" in 1999.

Springville clarkia Environmental Baseline within the Action Area
There is one extant occurrence for Springville clarkia in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This occurrence is located in the Madera County portion of the of the action area. This occurrence occupies approximately 12.05 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). This occurrence is approximately 6% of the remaining occurrences for the species, and the 12 acres of this occurrence that is within PG&E right-of ways is approximately 9% of the total area occupied by all Springville Clarkia populations.

The HCP land-cover types utilized by Springville clarkia are Grassland, Shrub, Blue-Oak Woodland, Blue Oak/Foothill Pine. The HCP classifies Springville clarkia as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
PG&E estimated the effects of the proposed action on Springville clarkia as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Springville clarkia occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Springville clarkia survey is not possible during an appropriate period May to July, and continuing until August, and 1) any CNDDB Springville clarkia occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 0.372 acre, and would permanently remove (hardscape) 0.001 acre of Springville clarkia occupied habitat over the 30-year term of the Permit. These effects would occur on the 12 acres of PG&E right-of-way currently occupied by Springville clarkia (see *Species Baseline* above). PG&E also estimated that implementing the "minor construction" covered activities (outside the existing right-of-ways) would directly disturb an additional 0.373 acre and would permanently remove an additional 0.001 acre of occupied Springville clarkia habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 0.744 acre and permanently remove (hardscape) 0.002 acre of Springville clarkia occupied habitat over the 30-year term of the permit (0.746 acre total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Springville clarkia occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Springville clarkia habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Springville clarkia for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate Springville clarkia from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Springville clarkia habitat likely to be impacted by these indirect effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Springville clarkia that is present in the disturbance site.

To minimize direct and indirect effects on Springville clarkia, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Springville clarkia take over the term of the proposed Permit.

PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Springville clarkia extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Springville clarkia plants in the next and subsequent growing seasons, possibly extirpating Springville clarkia from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Springville clarkia occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Springville clarkia. Therefore, PG&E may provide between 0.38 acre and 2.24 acres of Springville clarkia compensation over the 30-year Permit term.

Compensation lands for effects to Springville clarkia will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for Springville clarkia will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Springville clarkia as described in the analysis above, including the permanent loss of up to 0.746 acre of occupied Springville clarkia habitat over the 30-year Permit term.

Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Springville clarkia occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Springville clarkia occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Springville clarkia occupied-habitat, preserving between 0.38 acre and 2.24 acre of Springville clarkia occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Springville clarkia. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Merced clarkia (*Clarkia lingulata*)
Merced clarkia is an annual herb in the evening primrose family (Onagraceae) that produces bright pink flowers (California Native Plant Society 2001).

Status of the Species
Listing Status
Merced clarkia is not federally listed and is not listed by the California Department of Fish and Game. The California Native Plant Society has placed Merced clarkia on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology
Merced clarkia flowers May–June (California Native Plant Society 2001).

Habitat Affinities
Merced clarkia grows on steep north-facing slopes in chaparral and cismontane woodland plant communities with sandy loam soils of phyllite parent material at elevations of 1,312–1,493 feet (California Native Plant Society 2001).

Historical and Current Range, Distribution
Merced clarkia is endemic to California. It is known only from two locations in Mariposa County (California Native Plant Society 2001): one at the mouth of the South Fork Merced River, the other at the mouth of Ned Gulch about 3 kilometers (2 miles) west of the South Fork Merced River bridge. Both occurrences are located on National Forest System lands in the Sierra National Forest (California Natural Diversity Database 2002). According to the California Natural Diversity Database (2002), both are considered extant and recent.

Reasons for Decline and Threats to Survival
Primary threats to Merced clarkia are road maintenance, herbicide spraying, slumping of slope, fire, grazing, and (as of 1998) yellow star-thistle encroachment (*Centaurea solstitialis*) (California Natural Diversity Database 2002). The population trend for Merced clarkia in both occurrences is unknown. Both populations have been described to range from no individuals in dry years to tens of thousands in wet years (California Natural Diversity Database 2002).

The HCP estimated that the potential geographic range of Merced clarkia inside the HCP San Joaquin Valley planning area is 65,000 acres, all in Mariposa County. The HCP calculated that 0.1 percent, or 63 acres, of this 65,000-acre potential geographic range are presently occupied by the species.

In 1994, a multi-agency memorandum of understanding (MOU) for the conservation and protection of sensitive species in the Merced River Canyon was signed by the California Department of Fish and Game, the U.S. Forest Service, the Bureau of Land Management, Caltrans, and PG&E. The MOU specifies guidelines for highway and power line maintenance and repair, notification requirements, species monitoring, and annual reviews. The MOU emphasizes protection measures for Merced clarkia (*Clarkia lingulata*) (state-listed as

endangered), but it also improves protection for Congdon's lewisia and other species (CNDDB 2000b.)

Merced clarkia Environmental Baseline within the Action Area

The two known occurrences for Merced clarkia are located in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are located in the Mariposa County portion of the of the action area. This occurrence occupies approximately 18.1 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). The two occurrences are approximately 100% of the total occurrences for the species.

The HCP land-cover types utilized by Merced clarkia are Blue-Oak Woodland, Blue Oak/Foothill Pine, Upland Shrub, Conifer, and Montane Hardwood. The HCP classifies Merced clarkia as a "narrowly endemic plant covered-species.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to Merced clarkia occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Merced clarkia survey is not possible during an appropriate period May to June, and 1) any CNDDB Merced clarkia occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area and the "minor construction" covered activities (outside the existing right-of-ways) would permanently remove 0.01 acres of occupied Merced clarkia habitat over the 30-year term of the proposed permit.

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Merced clarkia occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Merced clarkia habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Merced clarkia for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate Merced clarkia from the disturbance site. Any construction dust generated from ground-disturbing

covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Merced clarkia habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Merced clarkia that is present in the disturbance site.

To minimize direct and indirect effects on Merced clarkia, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Merced clarkia take over the term of the proposed Permit.

AMM14 would not be effective on Merced clarkia; therefore, this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Merced clarkia extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Merced clarkia plants in the next and subsequent growing seasons, possibly extirpating Merced clarkia from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Merced clarkia occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Merced clarkia. Therefore, PG&E may provide 0.03 acres of Merced clarkia compensation over the 30-year Permit term.

Compensation lands for effects to Merced clarkia will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for Merced clarkia will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Merced clarkia as described in the analysis above, including the permanent loss of 0.01 acres of occupied Merced

clarkia habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Merced clarkia occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Merced clarkia occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Merced clarkia occupied-habitat, preserving 0.03 acres of Merced clarkia occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Merced clarkia. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Vasek's clarkia (*Clarkia temblorensis* ssp. *calientensis*)

Vasek's clarkia is an annual herb in the evening primrose family (Onagraceae) with flowers that have four lavender-pink petals. Vasek's clarkia can grow up to 30 inches tall and has alternate, grayish-green, lance-shaped leaves.

Status of the Species

Listing Status

Vasek's clarkia is not federally listed and is not listed by the California Department of Fish and Game. A detailed account of the taxonomy, ecology, and biology of Vasek's clarkia is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998). The California Native Plant Society has placed Vasek's clarkia on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Vasek's clarkia is an annual, flowering in April (Skinner and Pavlik 1994), and it is self-pollinating. The timing of seed germination in the wild is not known. The closely related Springville clarkia (*Clarkia springvillensis*) forms a persistent seed bank, and this taxon may as well (T. Holtsford pers. comm.).

Habitat Affinities

Vasek's clarkia grows in steep-sided canyons on grassy north- and west-facing slopes at elevations of 900 to 1,100 feet. Associated species include bladderpod, farewell-to-spring (*Clarkia cylindrica*), and gunsight clarkia (CDFG 1995).

Historical and Current Range

This taxon is endemic to the Caliente Hills of Kern County, which are southeast of Bakersfield (Skinner and Pavlik 1994). The historical distribution consisted of only the type locality, where the taxon was first collected in 1967 (Vasek 1977). Plants have not been observed at the type

locality since 1982, despite repeated searches. However, three other occurrences were discovered west of the type locality in the 1980's (CNDDB 2002). The CNDDB (2007) currently identifies three extant occurrences in Kern County. These occurrences represent a single metapopulation (CDFG 1995, T. Holtsford pers. comm.). The extant metapopulation comprises several thousand individuals in favorable years but has extremely low genetic variability (T. Holtsford pers. comm.).

The HCP estimated that the potential geographic range of Vasek's clarkia inside the San Joaquin Valley planning area totals 40,000 acres, all in Kern County. The HCP calculated that 0.002 percent, or approximately one acre of the 40,000-acre potential geographic range is presently occupied by the species.

Reasons for Decline and Threats to Survival
The reason for the disappearance of Vasek's clarkia from the type locality is unknown. The other occurrences have not declined. The primary threats to Vasek's clarkia are grazing and invasive grass encroachment (California Natural Diversity Database 2002). Vasek's clarkia is very narrowly endemic because of its extremely limited range, small population size, and lack of genetic variability. Thus, Vasek's clarkia is very vulnerable to extinction from random catastrophic events. All three of the reported occurrences were on private property, some of which is owned by the Tejon Ranch Company. Most of the occupied habitat is too steep to be developed or heavily grazed (T. Holtsford pers. comm.). Competition from exotic grasses is believed to be the primary threat to this taxon (T. Holtsford pers. comm.). The population trend of Vasek's clarkia is unknown. Two populations appear in good condition with individual numbers of 200 and 100, although one appears to be threatened by encroachment of invasive grasses. The third population was not located at last report, possibly due to a late survey date, but it may also have been extirpated (CNDDB 2002).

Vasek's clarkia Environmental Baseline within the action area
There are no occurrences for Vasek's clarkia in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). The HCP land-cover type utilized by Vasek's clarkia is Grassland. The HCP classifies Vasek's clarkia as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
PG&E estimated the effects of the proposed action on Vasek's clarkia as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Vasek's clarkia occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Vasek's clarkia survey is not possible during an appropriate period in April, and 1) any CNDDB Vasek's clarkia occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would not directly disturb or permanently remove (hardscape) any

Vasek's clarkia occupied habitat over the 30-year term of the Permit. No species effects would occur in the existing PG&E right-of-ways in the 276,350-acre action area (see *Species Baseline* above). PG&E estimated that implementing the "minor construction" covered activities (outside the existing right-of-ways) would directly disturb 0.005 acre and would permanently remove (hardscape) 0.005 acre of occupied Vasek's clarkia habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 0.005 acre and permanently remove (hardscape) 0.005 acre of Vasek's clarkia occupied habitat over the 30-year term of the permit (0.01 acre total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Vasek's clarkia occupied-habitat is not available to the Service.

If soil excavations or other ground disturbances does occur in or near occupied Vasek's clarkia habitat, the occupied habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Vasek's clarkia for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate Vasek's clarkia from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Vasek's clarkia habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Vasek's clarkia that is present in the disturbance site.

To minimize direct and indirect effects on Vasek's clarkia, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Vasek's clarkia take over the term of the proposed Permit.

AMM 14 would not be effective on this species, and this topsoil stockpiling process should not be viewed as an avoidance or minimization measure for Vasek's clarkia. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre

with a non-native commercial seed-mix) within the polygon-boundaries of a Vasek's clarkia extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Vasek's clarkia plants in the next and subsequent growing seasons, possibly extirpating Vasek's clarkia from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Vasek's clarkia occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from the minor-construction covered-activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios*. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Vasek's clarkia. Therefore, PG&E may provide between 0.018 acre and 0.03 acre of Vasek's clarkia compensation over the 30-year Permit term.

Compensation lands for effects to Vasek's clarkia will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms*. The Service refers to this type of compensation as "in-kind compensation". Compensation for Vasek's clarkia will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Vasek's clarkia as described in the analysis above, including the permanent loss of up to 0.01 acre of occupied Vasek's clarkia habitat over the 30-year Permit term.

Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Vasek's clarkia occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Vasek's clarkia occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Vasek's clarkia occupied-habitat, preserving between 0.018 acre and 0.03 acre of Vasek's clarkia occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Vasek's clarkia. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Mariposa clarkia (*Clarkia biloba* ssp. *australis*)

Mariposa clarkia is an erect, annual herb in the evening primrose family (Onagraceae). It grows to less than 1 meter (3 feet) and has showy, bright pink to magenta flowers (Hickman 1993).

Status of the Species

Listing Status

Mariposa clarkia is not federally listed and is not listed by the California Department of Fish and Game. The California Native Plant Society has placed Mariposa clarkia on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal

Mariposa clarkia blooms May–July (California Native Plant Society 2001).

Habitat Affinities

Mariposa clarkia grows in chaparral and woodlands in Mariposa County. Several populations occur in transition areas between foothill woodland and riparian habitat. Populations are generally located at elevations of 984–3,100 feet. Soil substrates for this species include soil derived from phyllite parent material; dry, metamorphic rock; and loose soil (California Native Plant Society 2001; CNDDB 2001).

Historical and Current Range, Distribution

Mariposa clarkia is a California endemic known from 14 occurrences in the west foothills of Mariposa County, and may occur in Tuolumne County (CNDDB 2007, California Native Plant Society 2001). Recorded occurrences of this species are along or near the South Fork Merced River and along State Routes 140 and 49. Populations are located on privately owned property, National Forest System lands in the Sierra National Forest, and property of unknown ownership (CNDDB 2002). The Bureau of Land Management manages one extensive population on the Sierra National Forest in the Merced River canyon. The populations of Mariposa clarkia on Federal land are protected from development; these populations appear to be stable (California Natural Diversity Database 2002). Population sizes vary from hundreds to thousands of individuals.

The HCP estimated that the potential geographic range of Mariposa clarkia inside the San Joaquin Valley planning area is 65,000 acres, all in Mariposa County. The HCP calculated that 0.762-percent, or 494 acres, of this 65,000-acre potential geographic range is presently occupied by the species.

Reasons for Decline and Threats to Survival

Primary threats to Mariposa clarkia include road maintenance and roadside spraying, power line maintenance, slope failure, mining, public recreation, fire control activities, and competitive non-native plants (California Native Plant Society 2001; CNDDB 2002). In all 14 extant occurrences, the population trend of Mariposa clarkia is unknown due to lack of research (CNDDB 2002).

Environmental Baseline within the Action Area

There are seven extant occurrences for Mariposa clarkia in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are located in the Mariposa County portion of the of the action area. These occurrences occupy approximately 84.2 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). The seven occurrences are approximately 50% of the total occurrences for the species.

The HCP land-cover types utilized by Mariposa clarkia are Blue-Oak Woodland, Blue Oak/Foothill Pine, Upland Shrub, Conifer, and Montane Hardwood. The HCP classifies Mariposa clarkia as an "other" plant covered-species (a plant covered-species that is not a "narrowly endemic" species.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on Mariposa clarkia as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Mariposa clarkia occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Mariposa clarkia survey is not possible during an appropriate period May through July, and 1) any CNDDB Mariposa clarkia occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 2.867 acres of occupied Mariposa clarkia habitat, and would permanently remove (hardscape) 0.014 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur on the 84.2 acres of PG&E right-of-way currently occupied by Mariposa clarkia (see *Species Baseline* above). PG&E estimates that implementing the "minor construction" covered activities (outside the existing right-of-ways) would not directly disturb or permanently remove (hardscape) any additional Mariposa clarkia occupied habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 2.867 acres and permanently remove (hardscape) 0.014 acre of Mariposa clarkia occupied habitat over the 30-year term of the permit (2.88 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Mariposa clarkia occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Mariposa clarkia habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded

by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Mariposa clarkia for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, transpiration, respiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Mariposa clarkia habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Mariposa clarkia that is present in the disturbance site.

Because the HCP does not classify Mariposa clarkia as a "narrowly endemic" species, ground-disturbance in or near Mariposa clarkia occupied habitat would not trigger the "Confer Process". To minimize direct and indirect effects on Mariposa clarkia, PG&E will apply one or more of the plant AMMs. Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Mariposa clarkia take over the 30-year term of the proposed Permit.

AMM14 would not be effective on Mariposa clarkia, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Mariposa clarkia extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Mariposa clarkia plants in the next and subsequent growing seasons, possibly extirpating Mariposa clarkia from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Mariposa clarkia occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Mariposa clarkia. Therefore, PG&E may provide between 1.48 acres and 8.64 acres of Mariposa clarkia compensation over the 30-year Permit term.

Compensation lands for effects to Mariposa clarkia will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for Mariposa clarkia will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Mariposa clarkia as described in the analysis above, including the permanent loss of up to 2.9 acres of occupied Mariposa clarkia habitat over the 30-year Permit term.

Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Mariposa clarkia occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Mariposa clarkia occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Mariposa clarkia occupied-habitat, preserving between 1.48 acres and 8.64 acres of Mariposa clarkia occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Mariposa clarkia.

We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Lesser saltscale (*Atriplex minuscula*)
Lesser saltscale is a member of the goosefoot family (Chenopodiaceae). It has many upright, reddish stems (up to 16 inches tall) and egg-shaped leaves with untoothed margins. As with all *Atriplex* species, the flowers are tiny and are inconspicuous because they have no petals (Munz and Keck 1959).

Status of the Species
Listing Status
Lesser saltscale is not federally listed A detailed account of the taxonomy, ecology, and biology of the Lesser saltscale is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998). This species has not been listed by the California Department of Fish and Game under the CESA. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal
The life history of lesser saltscale is poorly known, except that it is an annual and flowers from May to October (Skinner and Pavlik 1994).

Lesser salt-scale is associated with a cryptogamic or biological soil-crust (Ellen Cypher *in litt* 2007b, Betty Warene pers. comm. 2007). Terrestrial-type biological soil-crusts are a complex

mosaic of cyanobacteria, green algae, lichens, mosses, microfungi and other bacteria (Belnap et.al. 2001). Biological soil-crusts fix nitrogen, prevent soil erosion, and inhibit invasion of weeds, benefiting some native plant species. Fungal action has been shown to break down seed coats of certain species and facilitate seed germination. Once a terrestrial-type biological-crust is disturbed, the complex composition of the crust community can begin changing, eliminating the lichen, bacteria, moss and fungal components, and perhaps cryptic algal filaments in the soil (Ellen Cypher *in litt* 2007b). Simple blue-green or green algal crusts can return relatively quickly after disturbance, but without the entire crust community. Belnap and Rosentreter recommend that cattle grazing and other disturbance to plant-species associated with biological-crusts stop several weeks before the end of the rainy season so the biological-crusts can recover from any damage (Ellen Cypher *in litt* 2007b).

Habitat Affinities
Lesser saltscale grows on sandy soils in alkaline areas at elevations of less than 330 feet, often in association with slough systems and river floodplains. However, it is found only in microhabitats that are not inundated year-round. The species has been found in the Valley Sink Scrub, Valley Sacaton Grassland, and Non-native Grassland natural communities. Lesser saltscale grows with other halophytes, including alkali sacaton, brittlescale, heartscale (*Atriplex cordulata*), and seepweed (USFWS 1998)

Historical and Current Range, Distribution
Historical records are known from the Goshen area (Tulare County) and El Nido area (Merced County). Most historical occurrences are in the San Joaquin Valley, with one population in the Sacramento Valley. The northern most record is at Gray Lodge State Wildlife Area in Butte County, and the southernmost report is from Kern County, near the intersection of Interstate 5 and state Highway 58 near Buttonwillow. Lesser saltscale also was reported from the Kerman Ecological Reserve in Fresno County, Arena Plains National Wildlife Refuge in Merced County and along the Fresno River in Madera County (USFWS 1998).

There are currently collections representing 27 extant occurrences in Butte (2), Stanislaus (2), Fresno (5), Kern (1), Madera (9), Merced (2), and Tulare (6) Counties, with population sizes ranging from 20 to more than 5,000 plants (Jones & Stokes project files, CNDDB 2007). Existing populations are located on private property and California Department of Fish and Game lands, including Kerman Ecological Reserve (CNDDB 2002)

The HCP estimated that the potential geographic range of lesser saltscale inside the San Joaquin Valley totals 379,000 acres in Merced, Madera, Fresno, and Kern counties. The HCP calculated that 0.41 percent, or 155 acres, of this 379,000-acre potential range are presently occupied by the species. The HCP document states that 17 extant occurrences of lesser saltscale are within the San Joaquin Valley (Jones & Stokes project files).

Reasons for Decline and Threats to Survival
The lack of historical information about lesser saltscale prohibits a determination of whether or not it has declined. However, the conversion of alkali sinks to agriculture undoubtedly has reduced its habitat (Skinner and Pavlik 1994). The extant population in Kern County is on land that is zoned for commercial development and which is for sale. The site in Madera County is

threatened by installation of a pipeline (CNDDB 1998). Sites on state wildlife-management areas are threatened by flooding for waterfowl management (D. Taylor pers. comm.).

Lesser Saltscale Environmental Baseline within the Action Area

There are seven extant occurrences for lesser saltscale in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are in Stanislaus County (2), Madera County (2), Fresno County (2), and Tulare County (1) portions of the 276-350-acre action area. The seven occurrences occupy approximately 55.34 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). The seven occurrences are 26% of all remaining occurrences for the species.

The HCP land-cover types utilized by lesser saltscale are Grassland, Seasonal Wetland, and Upland Scrub. The HCP classifies lesser saltscale as an "other" plant covered-species (a plant covered-species that is not a "narrowly endemic" species.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on lesser saltscale as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to lesser saltscale occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a lesser saltscale survey is not possible during an appropriate period May through October, and 1) any CNDDB lesser saltscale occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 3.645 acres of occupied lesser saltscale habitat, and would permanently remove (hardscape) 0.039 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur on the 55.34 acres of PG&E right-of-way currently occupied by lesser saltscale (see *Species Baseline* above). PG&E estimates that implementing the "minor construction" covered activities (outside the existing right-of-ways) would not directly disturb or permanently remove any lesser saltscale occupied-habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 3.645 acres and permanently remove (hardscape) 0.039 acre of lesser saltscale occupied habitat over the 30-year term of the permit (3.685 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in lesser saltscale occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied lesser saltscale habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of cryptogamic biological soil-crusts and other microhabitat-features essential to this species. Soil excavations or other ground disturbances in

occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with lesser saltscale for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied lesser saltscale habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for lesser saltscale that is present in the disturbance site.

Because the HCP does not classify lesser saltscale as a "narrowly endemic" species, ground-disturbance in or near lesser saltscale occupied habitat would not trigger the "Confer Process". To minimize direct and indirect effects on lesser saltscale, PG&E will apply one or more of the plant AMMs. Plant AMMs include staking and flagging work-exclusion zones of 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of lesser saltscale take over the term of the proposed Permit.

AMM14 would not be effective on lesser saltscale, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. AMM13 also would not be effective on palmate-bracted birds-beak because it would allow soil-disturbance after the plant senescences and prior to the first significant rainfall, which could destroy the biological soil-crust and other microhabitat features essential to this species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a lesser saltscale extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals lesser saltscale plants in the next and subsequent growing seasons, possibly extirpating lesser saltscale from the disturbance site.

Effects of Compensation Measures

Although PG&E will avoid lesser saltscale occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for lesser saltscale. Therefore, PG&E may provide between 1.92 acres and 11.1 acres of lesser saltscale compensation over the 30-year Permit term.

Compensation lands for effects to lesser saltscale will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for lesser saltscale will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion

We anticipate that the proposed action will directly and indirectly affect lesser saltscale as described in the analysis above, including the permanent loss of up to 3.69 acres of occupied lesser saltscale habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to lesser saltscale occupied-habitat. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable. PG&E will provide compensation if ground-disturbance occur in lesser saltscale occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to lesser saltscale occupied-habitat, preserving between 1.94 acres and 11.1 acres of lesser saltscale occupied habitat over 30 years.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of lesser saltscale.

We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Bakersfield smallscale (*Atriplex tularensis*)

Bakersfield smallscale is a member of the goosefoot family (Chenopodiaceae). It is an erect, few-branched summer annual with a scaly surface on the stems, smooth ovate leaves, and small dense clusters of greenish flowers (CNDDB 2000; California Native Plant Society 2001). As with all *Atriplex* species, the flowers are tiny and are inconspicuous because they have no petals (Munz and Keck 1959).

Status of the Species and the Critical Habitat

Listing Status

Bakersfield smallscale is not federally listed A detailed account of the taxonomy, ecology, and biology of the Bakersfield smallscale is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998). This species was listed as endangered by the California Department of Fish and Game in January 1987. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology Dispersal

Bakersfield smallscale is a summer annual, germinating from May to June and flowering from June to October (Freas and Murphy 1991, Skinner and Pavlik 1994). Surface soil moisture is

required during the summer and fall months for seed germination and seedling survival (Freas and Murphy 1988). Other aspects of the life history and reproductive biology are unknown.

Bakersfield smallscale is associated with a cryptogamic or biological soil-crust (Ellen Cypher *in litt* 2007b, Betty Warene pers. comm. 2007). Terrestrial-type biological soil-crusts are a complex mosaic of cyanobacteria, green algae, lichens, mosses, microfungi and other bacteria (Belnap et.al. 2001). Biological soil-crusts fix nitrogen, prevent soil erosion, and inhibit invasion of weeds, benefiting some native plant species. Fungal action has been shown to break down seed coats of certain species and facilitate seed germination. Once a terrestrial-type biological-crust is disturbed, the complex composition of the crust community can begin changing, eliminating the lichen, bacteria, moss and fungal components, and perhaps cryptic algal filaments in the soil (Ellen Cypher *in litt* 2007b). Simple blue-green or green algal crusts can return relatively quickly after disturbance, but without the entire crust community. Belnap and Rosentreter recommend that cattle grazing and other disturbance to plant-species associated with biological-crusts stop several weeks before the end of the rainy season so the biological-crusts can recover from any damage (Ellen Cypher *in litt* 2007b).

Habitat Affinities
All the populations of Bakersfield smallscale have been found on the subalkaline margins of alkali sinks at elevations of 300 to 315 feet. Associated species included alkali heath, glasswort, scratchgrass (*Muhlenbergia asperifolia*), and saltgrass (Twisselmann 1969, CDFG 1995, Bowen 1986).

Historical and Current Range, Distribution
Bakersfield smallscale was restricted historically to a small area of south-central Kern County between Greenfield and Mettler (Twisselmann 1969, Skinner and Pavlik 1994, CNDDB 2002).

The only remaining population believed to represent Bakersfield smallscale is at Gator Pond, which is a remnant of Kern Lake, and formerly part of the Kern Lake Preserve in Kern County. The CNDDB (2007) identifies no presumed extant occurrences for this species. The number of individuals at the Gator Pond occurrence decreased from a high of 721 in 1998 down to 5 in 1991, and 0 individuals in 1992. The site has not been visited since 1992, and is no longer protected (CNDDB 2007).

The HCP estimated that the potential geographic range of Bakersfield smallscale inside the HCP San Joaquin Valley planning area totals 40,000 acres in Kern County. The HCP calculated that 0.003-percent, or 45 acres, of this 140,000-acre potential geographic range are presently occupied by the species (HCP Table F-3).

Reasons for Decline and Threats to Survival
The decline of Bakersfield smallscale was due primarily to agricultural activities (Skinner and Pavlik 1994, CDFG 1995). At most historical locations of Bakersfield smallscale, the habitat is completely destroyed by cultivation.

The Gator Pond occurrence is threatened by a lowering water table and changes in the soil moisture regime, changes in land management, predation by rabbits, and hybridization with *A. serenana.*

Status with respect to Recovery
The population at Gator Pond declined from 721 plants in 1985 to 13 in 1987 and 0 in 1992. At Gator Pond, the soil surface was not disturbed but the hydrology was altered by lowering the water table in the vicinity, leading to conditions too dry for germination and survival of Bakersfield smallscale in all but the wettest years (Bowen 1986, Tollefson 1992). The Atriplex that now occurs at Gator Pond exhibits characteristics intermediate between Bakersfield smallscale and bractscale. Freas and Murphy (1988) speculated that under the drier conditions, bractscale increased and the two species hybridized. Thus, pure Bakersfield smallscale may be extinct. Even if the two species did not hybridize, the plants at Gator Pond may represent an un-described form of bractscale (Skinner and Pavlik 1994, Skinner et al. 1995). Another possibility is that Bakersfield smallscale never was a distinct species, but instead was an environmental variant of bractscale that appeared only in years of high rainfall, when soil salinity decreased (Freas and Murphy 1988).

Environmental Baseline within the Action Area
There are no extant occurrences of Bakersfield smallscale within the in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). The Gator Pond occurrence is not identified in the HCP document as being within 200 meters of the PG&E facilities presently in the 276,350-acre action area (CNDDB 2002).

The HCP identifies Grassland, Seasonal Wetland, and Upland Scrub land cover types as those utilized by Bakersfield smallscale. The HCP classifies Bakersfield smallscale as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
The actual acres of impact to Bakersfield smallscale occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Bakersfield smallscale survey is not possible during an appropriate period May through June, and 1) any CNDDB Bakersfield smallscale occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb no occupied Bakersfield smallscale habitat, and would permanently remove (hardscape) no occupied habitat over the 30-year term of the proposed permit. PG&E estimates that implementing the "minor construction" covered activities (outside the existing right-of-ways) would directly disturb no occupied Bakersfield smallscale habitat, and permanently remove no occupied habitat.

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Bakersfield smallscale occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Bakersfield smallscale habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of cryptogamic biological soil-crusts and other microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Bakersfield smallscale for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Bakersfield smallscale habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Bakersfield smallscale that is present in the disturbance site.

To minimize direct and indirect effects on Bakersfield smallscale, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (including occupied seed-bank) (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of the 100 feet, around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Bakersfield smallscale take over the term of the proposed Permit.

AMM14 would not be effective on Bakersfield smallscale, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. AMM13 also would not be effective on Bakersfield smallscale because it would allow soil-disturbance after the plant senescences and prior to the first significant rainfall, which could destroy the biological soil-crust and other microhabitat features essential to this species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Bakersfield smallscale extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Bakersfield smallscale plants in the next and subsequent growing seasons, possibly extirpating Bakersfield smallscale from the disturbance site.

Effects of Compensation Measures
If ground disturbance occurs in a CNDDB "presumed extant" or "possibly extirpated" occurrence of Bakersfield smallscale (i.e. the Gator Pond occurrence), adverse effects to occupied habitat of viable seeds within the soil seed-bank may occur. In-kind compensation lands are not available for this species. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities if they occur at the Gator Pond occurrence would result in a permanent loss of occupied habitat for Bakersfield smallscale. If effects occur and compensation is necessary, the type and quantity of compensation would be determined during the Confer Process. If compensation is necessary for Bakersfield smallscale, it will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will not directly disturb soil at the Gator Pond occurrence, or indirectly or cumulatively affect Bakersfield smallscale at the Gator Pond occurrence. If covered-activity soil-disturbing impacts should occur within the boundaries of the Gator Pond occurrence of Bakersfield smallscale, the direct and indirect affects described in the analysis above could jeopardize the continued existence of the species. With implementation of the Confer Process, the Service anticipates that the minor-construction covered-activities occurring outside the existing rights-of-way would avoid all direct, indirect, and cumulative effects to the Gator Pond occurrence of Bakersfield smallscale and would not result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its very limited range. After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed and including the Confer Process, is not likely to jeopardize the continued existence of Bakersfield smallscale.

Big tarplant (*Blepharizonia plumose* ssp. *plumosa*)
Big tarplant is an annual herb in the sunflower family (Asteraceae) that grows 12–71 inches (California Native Plant Society 2001).

Status of the Species
Listing Status
Big tarplant is not federally listed, and is not listed by California Department of Fish and Game. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology Dispersal
Big tarplant blooms July–October (California Native Plant Society 2001). Its population size fluctuates from year to year. Environmental factors affect all stages in the plant's life: seed germination and seedling growth; pollination; seed production; and growth of competing plants, particularly non-native grasses (CNDDB 2002).

Habitat Affinities
Big tarplant grows in valley and foothill grasslands in clay- to clay-loam soils at elevations of 98–1,657 feet (California Native Plant Society 2001). This species may benefit from removal of non-native grasses; populations do well in controlled burn areas on the Lawrence Livermore National Laboratory property (CNDDB 2002).

Historical and Current Range, Distribution
Big tarplant is endemic to California. Historically it was known from 50 occurrences in Alameda, Solano, Contra Costa, San Joaquin, and Stanislaus counties. Big tar plant may be extirpated from Solano County.

CNDDB presently identifies 46 extant occurrences in four counties: Alameda (7), Contra Costa (21), San Joaquin (14), and Stanislaus (5) (CNDDB 2007). Twelve of these occurrences are on Lawrence Livermore National Laboratory property in San Joaquin County.

The HCP estimated that the potential geographic range of big tarplant inside the San Joaquin Valley totals 119,000 acres in San Joaquin and Stanislaus counties. The HCP calculated that 0.056 percent, or 67 acres, of this 119,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
Big tarplant is currently threatened by competition from non-native plants, fire suppression activities, proposed drainage construction, cattle grazing, erosion, road maintenance, and residential development (California Native Plant Society 2001, CNDDB 2002).

Big Tarplant Environmental Baseline within the Action Area
There are four extant occurrences for big tarplant in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are located in the San Joaquin (3) and Stanislaus (1) county portion of the of the action area. This occurrence occupies approximately 29.5 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). These occurrences are approximately 9% of the remaining occurrences for the species.

The HCP land-cover type utilized by big tarplant is Grassland. The HCP classifies big tarplant as an "other" plant covered-species (a plant covered-species that is not a "narrowly endemic" species.

Effects of the Action
Direct and Indirect Effects
PG&E estimated the effects of the proposed action on big tarplant as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to big tarplant occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a big tarplant survey is not possible during an appropriate period July through October, and 1) any CNDDB big tarplant occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover

and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 1.663 acres of occupied big tarplant habitat, and would permanently remove (hardscape) 0.018 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur on the 29.5 acres of PG&E right-of-way currently occupied by big tarplant (see *Species Baseline* above). PG&E estimates that implementing the "minor construction" covered activities (outside the existing right-of-ways) would directly disturb an additional 0.166 acre of occupied big tarplant habitat, and permanently remove an additional 0.002 acre of occupied habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 1.83 acres and permanently remove (hardscape) 0.02 acre of big tarplant occupied habitat over the 30-year term of the permit (1.85 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in big tarplant occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied big tarplant habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of cryptogamic biological soil-crusts and other microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with big tarplant for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, transpiration, respiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied big tarplant habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for big tarplant that is present in the disturbance site.

Because the HCP does not classify big tarplant as a "narrowly endemic" species, ground-disturbance in or near big tarplant occupied habitat would not trigger the "Confer Process". To minimize direct and indirect effects on big tarplant, PG&E will apply one or more of the plant AMMs. Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of big tarplant take over the term of the proposed Permit.

AMM14 would not be effective on big tarplant, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. AMM13 also would not be effective on palmate-bracted birds-beak because it would allow soil-disturbance after the plant senescences and prior to the first significant rainfall, which could destroy the biological soil-crust and other microhabitat features essential to this species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a big tarplant extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual big tarplant plants in the next and subsequent growing seasons, possibly extirpating big tarplant from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid big tarplant occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for big tarplant. Therefore, PG&E may provide between 1.0 acre and 5.6 acres of big tarplant compensation over the 30-year Permit term.

Compensation lands for effects to big tarplant will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for big tarplant will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect big tarplant as described in the analysis above, including the permanent loss of up to 1.85 acres of occupied big tarplant habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to big tarplant occupied-habitat. PG&E will provide compensation if ground-disturbance occur in big tarplant occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to big tarplant occupied-habitat, preserving between 1.0 acre and 5.55 acres of big tarplant occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of big tarplant.

We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Tree-anemone (*Carpenteria californica*)

Tree-anemone is an erect to spreading evergreen shrub in the mock orange family (Philadelphaceae). It can reach 10 feet in height. Tree anemone has glossy leathery green leaves, pale bark that peels in large sheets in the fall, and large showy flowers with white petals and yellow centers. The spherical fruits are up to 1.5 centimeters (0.6 inches) wide (California Department of Fish and Game 2000; California Native Plant Society 2001 Hickman 1993.)

Status of the Species

Listing Status

Tree-anemone is not federally listed and is not listed by the California Department of Fish and Game. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal

Tree-anemone blooms May–July. Their seeds appear to be fire-dependent; no seedling establishment had been observed in nature until the spring after the 1989 Powerhouse fire. Tree-anemone plants appear to be fire-resistant stump sprouters (Hickman 1993; California Department of Fish and Game 2000.)

Essential Habitat Components

Tree-anemone is restricted to elevations of 1,115-4,396 feet (Hickman 1993; California Natural Diversity Database 2002). Tree-anemone grows on well-drained granitic soils and is most abundant on north-facing ravines and drainages in chaparral and cismontane woodland communities at 1,476–3,281 feet (Hickman 1993; California Department of Fish and Game 2000.)

Historical and Current Range, Distribution

Tree-anemone is endemic to the central and southern Sierra Nevada foothills between the Kings and San Joaquin Rivers in Fresno County. Since tree-anemone was discovered in the 1840s, at least one-third of its populations have been destroyed (California Department of Fish and Game 2000).

There are 11 extant occurrences in two California counties: Madera (2) and Fresno (9). As of March 2002, the population trend of tree-anemone is unknown (California Natural Diversity Database 2002). The species' total range now encompasses approximately 225 square miles (144,000 acres) in Madera and Fresno counties (CNDDB 2000). An occurrence of 40 plants is on the Sierra National Forest in Madera County (CNDDB 2002). One occurrence on the north slope of Davis Mountain in Fresno County appears stable with about 150 plants (CNDDB 2002). In addition, four to five plants were seen in 1987 just south of Kerckhoff Lake on the San Joaquin River in Fresno County.

Reasons for Decline and Threats to Survival
Populations have been lost due to landfill and road construction activities (CNDDB 2002). Existing tree-anemone populations are threatened by proposed road construction, off-highway vehicle use, logging, hydroelectric operations, residential development, and fire suppression (California Department of Fish and Game 2000).

Tree-anemone Environmental Baseline within the Action Area
There are three extant occurrences for tree-anemone in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are located in the Fresno County portion of the of the action area. These three occurrences occupy approximately 55.3 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). These occurrences are approximately 27% of the remaining occurrences for tree-anemone.

The HCP land-cover types utilized by tree anemone are Blue Oak/Foothill Pine, Upland Scrub, and Montane Hardwood. The HCP classifies tree-anemone as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
The actual acres of impact to tree-anemone occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a tree-anemone survey is not possible during an appropriate period May to July, and 1) any CNDDB tree-anemone occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would permanently remove 0.01 acre of tree-anemone occupied habitat over the 30-year term of the Permit. These effects would occur on the 55.3- acres of PG&E right-of-way currently occupied by tree-anemone (see *Species Baseline* above). PG&E also estimated that implementing the "minor new construction" covered activities (outside the existing right-of-ways) would not directly disturb or permanently remove (hardscape) any additional area of occupied tree-anemone habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will permanently remove 0.01acre of tree-anemone occupied habitat over the 30-year term of the permit...

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in tree-anemone occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied tree-anemone habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil

excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with tree-anemone for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate tree-anemone from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied tree-anemone habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for tree-anemone that is present in the disturbance site.

To minimize direct and indirect effects on tree-anemone, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of tree-anemone take over the term of the proposed Permit.

AMM14 would not be effective on tree-anemone, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a tree-anemone extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual tree-anemone plants in the next and subsequent growing seasons, possibly extirpating tree-anemone from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid tree anemone occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for tree-anemone. Therefore, PG&E may provide between 2.45 acres and 13.6 acres of tree-anemone compensation over the 30-year Permit term.

Compensation lands for effects to tree-anemone will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms*. The Service refers to this type of compensation as "in-kind compensation". Compensation for tree-anemone will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion

We anticipate that the proposed action will directly and indirectly affect tree-anemone as described in the analysis above, including the permanent loss of up to 4.54 acres of occupied tree-anemone habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to tree-anemone occupied-habitat. PG&E will provide compensation if ground-disturbance occur in tree-anemone occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to tree-anemone occupied-habitat, preserving between 2.25 acres and 13.6 acres of tree-anemone occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of tree-anemone. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Hispid bird's-beak (*Cordylanthus mollis* ssp. *hispidus*)

Hispid bird's-beak is an annual herb in the figwort family (*Scrophulariaceae*). It grows 4-16 inches tall (Hickman 1993)

Status of the Species

Listing Status

Hispid bird's beak is not federally listed and is not listed by the California Department of Fish and Game. The California Native Plant Society has placed hispid bird's beak on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Hispid bird's-beak is a hemiparasitic. It blooms June-September (California Native Plant Society 2001).

Habitat Affinities

Hispid bird's-beak grows in playas, alkaline meadows, saline marshes, and flats.

Historical and Current Range
Hispid bird's-beak historically occurred in California's central and southern Central Valley, including Alameda, Merced, Placer, Kern, and Solano Counties (Hickman 1993; California Native Plant Society 2001). Although the taxon has been extirpated from most of the San Joaquin Valley, it is still extant in approximately 28 occurrences six counties: Alameda (1), Fresno (1), Kern (1), Merced (23), Placer (1), and Solano (1) (CNDDB 2007). Populations are located on private property as well as property owned by the California Department of Fish and Game, the U.S. Fish and Wildlife Service, The Nature Conservancy, the Federal Communications Commission, and the Cities of Livermore and Los Banos (CNDDB 2002).

The HCP estimated that the potential geographic range of hispid bird's-beak inside the HCP's 12.1 million-acre San Joaquin Valley planning area totals 2,086 acres, all in Merced County. The HCP calculated that 1.61-percent, or 53 acres, of this 2,086-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
Current populations of hispid bird's-beak are threatened by conversion of habitat to agricultural use, residential development, hydraulic modifications, off-highway vehicle use, erosion, and grazing (California Native Plant Society 2001; CNDDB 2002).

The population trend of hispid bird's-beak is unknown for all populations except two, in which the populations are reported as decreasing. Populations can range from 50 to 4,000 plants; these numbers fluctuate from year to year in response to site and weather conditions (CNDDB 2002).

Environmental Baseline within the Action Area
There are 3 extant occurrences for hispid bird's beak in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are located in the Merced County portion of the of the action area. These occurrences occupy approximately 4.0 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). The 3 occurrences are approximately 11% of the total occurrences for the species.

The HCP land-cover types utilized by hispid bird's-beak are Grassland and Seasonal Wetland. The HCP classifies hispid bird's beak as an "other" plant covered-species (a plant covered-species that is not a "narrowly endemic" species.

Effects of the Action
Direct and Indirect Effects
PG&E estimated the effects of the proposed action on hispid bird's beak as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to hispid bird's beak occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a hispid bird's beak survey is not possible during an appropriate period June through September, and 1) any CNDDB hispid bird's beak occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist

determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 0.43 acre of occupied hispid bird's beak habitat, and would permanently remove (hardscape) 0.009 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur on the 4 acres of PG&E right-of-way currently occupied by hispid bird's beak (see *Species Baseline* above). PG&E estimates that implementing the "minor construction" covered activities (outside the existing right-of-ways) would directly disturb an additional 0.43 acre and permanently remove (hardscape) an additional 0.009 acre of hispid bird's beak occupied habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 0.86 acre and permanently remove (hardscape) 0.018 acre of hispid bird's beak occupied habitat over the 30-year term of the permit (0.856 acre total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in hispid bird's beak occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied hispid bird's beak habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features and hemiparasitic features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with hispid bird's beak for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, transpiration, respiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied hispid bird's beak habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for hispid bird's beak that is present in the disturbance site.

Because the HCP does not classify hispid bird's beak as a "narrowly endemic" species, any covered-activity ground-disturbance in or near hispid bird's beak occupied habitat would not trigger the "Confer Process". To minimize direct and indirect effects on hispid bird's beak, PG&E will apply one or more of the plant AMMs. Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of hispid bird's beak take over the 30-year term of the proposed Permit.

AMM14 would not be effective on hispid bird's beak, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a hispid bird's beak extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals hispid bird's beak plants in the next and subsequent growing seasons, possibly extirpating hispid bird's beak from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid hispid bird's beak occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for hispid bird's beak. Therefore, PG&E may provide between 0.05 acre and 2.6 acres of hispid bird's beak compensation over the 30-year Permit term.

Compensation lands for effects to hispid bird's beak will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for hispid bird's beak will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect hispid bird's beak as described in the analysis above, including the permanent loss of up to 0.86 acres of occupied hispid bird's beak habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to hispid bird's beak occupied-habitat. PG&E will provide compensation if covered-activity ground-disturbance occurs in hispid bird's beak occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to hispid bird's beak occupied-habitat, preserving between 0.05 acre and 2.6 acres of hispid bird's beak occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of hispid bird's beak.

We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not

anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Congdon's wooly sunflower (*Eriophyllum congdonii*)

Congdon's wooly sunflower is a yellow-flowered annual herb in the sunflower family (Asteraceae).

Status of the Species

Listing Status

Condon's wooly sunflower is not federally listed. It is listed as "Rare" by the California Department of Fish and Game. The California Native Plant Society has placed Condon's wooly sunflower on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Congdon's wooly sunflower is an annual that blooms May–June (California Native Plant Society 2001).

Habitat Affinities

Congdon's wooly sunflower occurs in chaparral, cismontane woodland, and lower montane conifer Forest on dry ridges of metamorphic rock, scree, and talus at elevations of 500–1900 meters (1,640–6,234 feet) (California Native Plant Society 2001).

Historical and Current Range, Distribution

Congdon's wooly sunflower is endemic to California. It is restricted to the Merced River Canyon in Mariposa County (California Department of Fish and Game 2000). The California Natural Diversity Database (2007) lists 14 extant occurrences, all in Mariposa County on the Sierra or Stanislaus National Forests or near the western boundary of Yosemite National Park. All occurrences are reported to exceed 600 individual plants

The HCP estimated that the potential geographic range of Condon's wooly sunflower inside the HCP San Joaquin Valley planning area totals 52,000 acres, all in Mariposa County. The HCP calculated that 0.92-percent, or 475 acres, of this 52,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival

The primary threats to Congdon's wooly sunflower are competition from weedy non-native plants, trail restoration, mining, timber harvest, and road maintenance (California Native Plant Society 2001; California Natural Diversity Database 2002). In 1999, the California Department of Fish and Game described the population trend of Congdon's wooly sunflower as stable.

Environmental Baseline within the Action Area

There are two extant occurrences for Congdon's wooly sunflower in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are located in the

Mariposa County portion of the of the action area. These three occurrences occupy approximately 8.6 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). These occurrences are approximately 21% of the remaining occurrences for Congdon's wooly sunflower.

The HCP land-cover types utilized by Condon's wooly sunflower are Blue Oak Woodland, Blue Oak/Foothill Pine, Conifer, Montane Hardwood, and Upland Scrub. The HCP classifies Congdon's wooly sunflower as a "narrowly endemic plant covered-species.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on Congdon's wooly sunflower as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Congdon's wooly sunflower occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Congdon's wooly sunflower survey is not possible during an appropriate period May to June, and 1) any CNDDB Congdon's wooly sunflower occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 0.385 acre, and would permanently remove (hardscape) 0.004 acre of Congdon's wooly sunflower occupied habitat over the 30-year term of the Permit. These effects would occur on the 8.6- acres of PG&E right-of-way currently occupied by Congdon's wooly sunflower (see *Species Baseline* above). PG&E also estimated that implementing the "minor construction" covered activities (outside the existing right-of-ways) would directly disturb an additional 0.385 acre and permanently remove (hardscape) an additional 0.004 acre of occupied Congdon's wooly sunflower habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 0.778 acre and permanently remove (hardscape) 0.008 acre of Congdon's wooly sunflower occupied habitat over the 30-year term of the permit (0.8 acre total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Congdon's wooly sunflower occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Congdon's wooly sunflower habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Congdon's wooly sunflower for space, soil moisture, and nutrients,

and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate Congdon's wooly sunflower from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Congdon's wooly sunflower habitat likely to impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Congdon's wooly sunflower that is present in the disturbance site.

To minimize direct and indirect effects on Congdon's wooly sunflower, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Congdon's wooly sunflower take over the term of the proposed Permit.

AMM14 would not be effective on Congdon's wooly sunflower, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25acre with a non-native commercial seed-mix) within the polygon-boundaries of a Congdon's wooly sunflower extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals Congdon's wooly sunflower plants in the next and subsequent growing seasons, possibly extirpating Congdon's wooly sunflower from the disturbance site.

Effects of Compensation Measures

Although PG&E will avoid Congdon's wooly sunflower occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios*. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Congdon's wooly sunflower. Therefore, PG&E may provide between 0.4 acre and 2.4 acres of Congdon's wooly sunflower compensation over the 30-year Permit term.

Compensation lands for effects to Congdon's wooly sunflower will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms*. The Service refers to this type of

compensation as "in-kind compensation". Compensation for Congdon's wooly sunflower will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion

We anticipate that the proposed action will directly and indirectly affect Congdon's wooly sunflower as described in the analysis above, including the permanent loss of up to 0.8 acre of occupied Congdon's wooly sunflower habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Congdon's wooly sunflower occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Congdon's wooly sunflower occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Congdon's woolly sunflower occupied-habitat, preserving between 0.4 acre and 2.4 acres of Congdon's wooly sunflower occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Congdon's wooly sunflower. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Striped adobe-lily (*Fritillaria striata*)

Striped adobe-lily, a member of the lily family (Liliaceae), is a slender, bulbous perennial with fragrant, white to pink bell-shaped flowers with burgundy stripes

Status of the Species

Listing Status

Striped adobe-lily was proposed for Federal listing in 1994, but currently has no federally status. It was listed as Threatened by the California Department of Fish and Game in 1987. The California Native Plant Society has placed slough thistle on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Striped adobe-lily is a perennial, which grows from a bulb. It blooms February–April (California Native Plant Society 2001).

Essential Habitat Components

Striped adobe-lily grows in Cismontane Woodland and Valley and Foothill Grassland habitats on heavy clay soils in open annual grasslands and blue oak woodlands at elevations of 443–4,774 feet (California Native Plant Society 2001).

Historical and Current range, Dispersal
Striped adobe-lily is endemic to California. Its known distribution is in the southern Sierra Nevada foothills of eastern Tulare and Kern Counties (California Native Plant Society 2001).

CNDDB identifies 18 extant occurrences are scattered throughout the species' known range in Kern (14 occurrences) and Tulare (4 occurrences). All populations occur on private land and land of unknown ownership (California Department of Fish and Game 2000; California Natural Diversity Database 2002).

The HCP estimated that the potential geographic range of striped adobe-lily inside the HCP San Joaquin Valley planning area totals 96,000 acres in Tulare and Kern counties. The HCP calculated that 0.014-percent, or 138 acres, of this 96,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
Striped adobe-lily is threatened by agriculture, competition from non-native plants, and urbanization (California Native Plant Society 2001). Conversion of habitat for agricultural uses has eliminated at least four populations of striped adobe-lily. Expansion of citrus orchards threatens three populations at lower elevations on the slopes of Lewis Hill near Frazier Valley. Road maintenance activities and urbanization threaten other populations. Although heavy grazing has adversely affected some populations, light grazing during the flowering period appears to benefit the species by reducing competition from non-native plants (California Department of Fish and Game 2000). In 1999, the CDFG classified the status of striped adobe-lily as Unknown.

Environmental Baseline within the Action Area
There are 3 extant occurrences for striped adobe-lily in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are located in the Kern County portion of the of the action area. These three occurrences occupy approximately 6.8 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). These occurrences are approximately 17% of the remaining occurrences for striped adobe-lily.

The HCP land-cover types utilized by stripped adobe-lily are Blue Oak Woodland, Blue Oak/Foothill Pine, and Upland Shrub. The HCP classifies striped adobe-lily as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
PG&E estimated the effects of the proposed action on striped adobe-lily as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to striped adobe-lily occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a striped adobe-lily survey is not possible during an appropriate period February to April, and 1) any CNDDB striped adobe-lily occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines

that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 0.291 acre, and would permanently remove (hardscape) 0.003 acre of striped adobe-lily occupied habitat over the 30-year term of the Permit. These effects would occur on the 6.8 acres of PG&E right-of-way currently occupied by striped adobe-lily (see *Species Baseline* above). PG&E also estimated that implementing the "minor construction" covered activities (outside the existing right-of-ways) would directly disturb an additional 0.291 acre and permanently remove (hardscape) an additional 0.0034 acre of striped adobe-lily occupied-habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 0.582 acre and permanently remove (hardscape) 0.006 acre of striped adobe-lily occupied habitat over the 30-year term of the permit (0.588 acre total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in striped adobe-lily occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied striped adobe-lily habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with striped adobe-lily for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate striped adobe-lily from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied striped adobe-lily habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for striped adobe-lily that is present in the disturbance site.

To minimize direct and indirect effects on striped adobe-lily, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will

minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of striped adobe-lily take over the term of the proposed Permit.

AMM14 would not be effective on striped adobe-lily, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a striped adobe-lily extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual striped adobe-lily plants in the next and subsequent growing seasons, possibly extirpating striped adobe-lily from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid striped adobe-lily occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for striped adobe-lily. Therefore, PG&E may provide between 0.6 acre and 1.8 acres of striped adobe-lily compensation over the 30-year Permit term.

Compensation lands for effects to striped adobe-lily will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for striped adobe-lily will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect striped adobe-lily as described in the analysis above, including the permanent loss of up to 0.59 acres of occupied striped adobe-lily habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to striped adobe-lily occupied-habitat. PG&E will provide compensation if covered-activity ground-disturbance occurs in striped adobe-lily occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to striped adobe-lily occupied-habitat, preserving between 0.6 acre and 1.76 acres of striped adobe-lily occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of striped adobe-lily. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and

management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Pale-yellow layia (*Layia heterotricha*)

Pale-yellow layia is an annual herb in the sunflower family (Asteraceae) that grows 5 to 354 inches.

Status of the Species

Listing Status

Pale-yellow layia is not federally listed and is not listed by the California Department of Fish and Game. The California Native Plant Society has placed pale-yellow layia on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Pale-yellow layia is an annual which blooms March–June (Hickman 1993; California Native Plant Society 2001).

Habitat Affinities

Pale-yellow layia occurs in dry cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland communities on alkaline or clay soils at elevations of (984–5,249 feet) (California Native Plant Society 2001).

Historical and Current Range, Distribution

Pale-yellow layia is endemic to California, having a historical distribution throughout the southern Tehachapi Mountains, western San Joaquin Valley, southern Coast Ranges, and northern Western Transverse Ranges (Hickman 1993). The historical range includes portions of Fresno, Kings, Kern, San Benito, Monterey, San Luis Obispo, Santa Barbara, and Ventura Counties (California Native Plant Society 2001).

The CNDDB identifies 67 extant occurrences of pale-yellow layia in nine California counties: Fresno (6), Kern (10), Kings (1), Los Angeles (1), Monterey (8), San Benito (2), San Luis Obispo (10), Santa Barbara (10), and Ventura (22). Of the nine populations recently surveyed, population size ranged from five to more than 1,000 plants. These occurrences are located in Fresno, Kern, Santa Barbara, and Ventura Counties on privately owned land, land managed by the U.S. Bureau of Land Management (BLM), the U.S. Forest Service, and the California Department of Parks and Recreation.

The HCP estimated that the potential geographic range of pale-yellow layia inside the San Joaquin Valley planning area totals 52,000 acres in Fresno, Kings, and Kern counties. The HCP calculated that 0.12 percent, or 642 acres, of this 52,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
The reasons for decline and primary threats to pale-yellow layia are agricultural conversion, previous construction on San Antonio Reservoir, and overgrazing (California Native Plant Society 2001; California Natural Diversity Database 2002).

Pale-yellow layia Environmental Baseline within the Action Area
There are six extant occurrences for pale-yellow layia in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are located in the Fresno County (5) and Kings County (1) portions of the of the action area. These three occurrences occupy approximately 44.2 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). These occurrences are approximately 9% of the remaining occurrences for pale-yellow layia. The HCP land-cover types utilized by pale-yellow layia are Blue Oak Woodland, Blue Oak/Foothill Pine, and Grassland. The HCP classifies pale-yellow layia as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
The actual acres of impact to pale-yellow layia occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a pale-yellow layia survey is not possible during an appropriate period March to June, and 1) any CNDDB pale-yellow layia occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would permanently remove 0.01 acre of pale-yellow layia occupied habitat over the 30-year term of the Permit. These effects would occur on the 44.2-acres of PG&E right-of-way currently occupied by pale-yellow layia (see *Species Baseline* above). PG&E also estimated that implementing the "minor new construction" covered activities (outside the existing right-of-ways) would not directly disturb or permanently remove (hardscape) any additional acres of occupied pale-yellow layia habitat over the 30-year term of the proposed permit.
Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in pale-yellow layia occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied pale-yellow layia habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with pale-yellow layia for space, soil moisture, and nutrients, and could

extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate pale-yellow layia from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied pale-yellow layia habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for pale-yellow layia that is present in the disturbance site.

To minimize direct and indirect effects on pale-yellow layia, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of pale-yellow layia take over the term of the proposed Permit.

AMM14 would likely not be effective on pale-yellow layia, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a pale-yellow layia extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual pale-yellow layia plants in the next and subsequent growing seasons, possibly extirpating pale-yellow layia from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid pale-yellow layia occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for pale-yellow layia. Therefore, PG&E may provide 0.03 acres of pale-yellow layia compensation over the 30-year Permit term.

Compensation lands for effects to pale-yellow layia will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for pale-yellow layia will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion

We anticipate that the proposed action will directly and indirectly affect pale-yellow layia as described in the analysis above, including the permanent loss of up to 3.3 acres of occupied pale-yellow layia habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to pale-yellow layia occupied-habitat. PG&E will provide compensation if ground-disturbance occur in pale-yellow layia occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to pale-yellow layia occupied-habitat, preserving between 1.7 acres and 9.8 acres of pale-yellow layia occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of pale-yellow layia. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Comanche Point layia (*Layia leucopappa*)

Comanche Point layia is an annual herb in the sunflower family (Asteraceae) with yellow and white daisy-like flowers. The stem is glandular and grows up to 24 inches tall. The leaves are oblong, fleshy, and entire to lobed (Munz and Keck 1959, Abrams and Ferris 1960, Hickman 1993).

Status of the Species

Listing Status

Comanche Point layia is not federally listed and is not listed by the California Department of Fish and Game. A detailed account of the taxonomy, ecology, and biology of the Comanche Point layia is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998). The California Native Plant Society has placed Comanche Point layia on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Comanche Point layia is an annual and blooms March–April, (Hickman 1993; California Native Plant Society 2001). It is found only in years of higher that average rainfall. Cross-pollination is necessary for seed set (Munz and Keck 1959).

Habitat Affinities

Comanche Point layia occurs in chenopod scrub, valley, and foothill grassland communities on open slopes with heavy clay soils at elevations of 328-1,148 feet (Hickman 1993; California Native Plant Society 2001). It grows on sparsely vegetated microhabitats in non-native grassland.

Historical and Current Range, Distribution
Comanche Point layia is endemic to Kern County. The formerly extensive occurrences of Comanche Point layia on the Valley floor apparently have been eliminated by conversion to agriculture. It occurred historically in three general areas: (1) Comanche Point and the Tejon Hills (including the type locality), (2) between Edison and Bena, east of Bakersfield and, (3) on the Valley floor south of Bakersfield near the southern end of Kern Lake (Twisselmann 1967, 1969, CNDDB 2002).

It remains at the Comanche Point and Tejon Hills but has not been observed in the Edison-Bena area or on the Valley floor since 1935 (CNDDB 2002 Hickman 1993). Comanche Point layia is now known from only eight occurrences in Kern County, most of which have not been revisited recently (CNDDB 2007). Five of the eight populations are located on Tejon Ranch Company property; the other three are on property of unknown and private ownership.

The HCP estimated that the potential geographic range of Comanche Point layia inside the HCP San Joaquin Valley planning area is 45,000 acres, all in Kern County. The HCP calculated that 0.68 percent, or 304 acres, of this 45,000-acre potential geographic range are presently occupied by the species.

Reasons for Decline and Threats to Survival
The primary factors causing the decline of Comanche Point layia are agricultural conversion, urban development, and overgrazing (California Native Plant Society 2001, CNDDB 2002). According to the CNDDB (2002), the population trend of Comanche Point layia is unknown in all occurrences except one, in which it is reported as decreasing. The populations are sufficiently small that they are in danger of extirpation from chance events (Menges 1991).

Environmental Baseline within the Action Area
There is one extant occurrence for Comanche Point layia in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This occurrence is in the Kern County portion of the of the action area. This occurrence occupies approximately 0.05 acre of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). This occurrence is approximately 13% of the remaining occurrences for Comanche Point layia. The HCP land-cover types utilized by Comanche Point layia are Upland Scrub and Grassland. The HCP classifies Comanche Point layia as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
The actual acres of impact to Comanche Point layia occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Comanche Point layia survey is not possible during an appropriate period March to April, and 1) any CNDDB Comanche Point layia occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area and the "minor construction" covered activities (outside the existing right-of-ways) would permanently remove 0.01 acre of occupied Comanche Point layia habitat over the 30-year term of the proposed permit.
Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Comanche Point layia occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Comanche Point layia habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Comanche Point layia for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate Comanche Point layia from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Comanche Point layia habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Comanche Point layia that is present in the disturbance site.

To minimize direct and indirect effects on Comanche Point layia, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Comanche Point layia take over the term of the proposed Permit.

AMM14 would likely not be effective on Comanche Point layia, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Comanche Point layia extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual Comanche Point layia plants in the next and

subsequent growing seasons, possibly extirpating Comanche Point layia from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Comanche Point layia occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Comanche Point layia. Therefore, PG&E may provide 0.03 acres of Comanche Point layia compensation over the 30-year Permit term.

Compensation lands for effects to Comanche Point layia will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for Comanche Point layia will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Comanche Point layia as described in the analysis above, including the permanent loss of up to 0.53 acre of occupied Comanche Point layia habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Comanche Point layia occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Comanche Point layia occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Comanche Point layia occupied-habitat, preserving between 0.3 acre and 1.6 acres of Comanche Point layia occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Comanche Point layia. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Panoche peppergrass (*Lepidium jaredii* ssp. *album*)
Panoche peppergrass is a tall annual herb in the mustard family (Brassicaceae) with white flowers and numerous branches.

Status of the Species

Listing Status

Panoche peppergrass is not federally listed and is not listed by the California Department of Fish and Game. The California Native Plant Society has placed Panoche peppergrass on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Panoche peppergrass is an annual which blooms February–June (California Native Plant Society 2001).

Essential Habitat Components

Panoche peppergrass grows on alkali bottoms, slopes, washes, and alluvial fans with clay and gypsum-rich soils in valley and foothill grasslands at elevations of 185–275 meters (607–902 feet) (California Native Plant Society 2001; California Natural Diversity Database 2001). Panoche peppergrass can grow in heavy clay or sandy soils.

Historical and Current Range, Distribution

Panoche peppergrass is endemic to California. It occurs in Fresno, San Luis Obispo, and San Benito counties (California Native Plant Society 2001). The California Natural Diversity Database (2007) lists 13 extant occurrences in Fresno (8), San Benito (4), and San Luis Obispo (1) and counties. The majority of the sites are in the Ciervo-Panoche region of Fresno and San Benito counties. One or two sites may remain in southern Fresno County and another in the Orchard Peak area of San Luis Obispo County

The HCP estimated that the potential geographic range of Panoche peppergrass inside the HCP San Joaquin Valley planning area totals 112,000 acres, all in Fresno County. The HCP calculated that 0.004 percent, or 5 acres, of this 112,000-acre potential range are presently occupied by the species.

Reasons for Decline and Threats to Survival

Populations of Panoche peppergrass have been subject to disturbance from sand and gravel quarrying. Five occurrences in Fresno County and one in San Benito County have been extirpated. Currently, Panoche peppergrass is presumed to be extant at approximately 13 occurrences. In all extant occurrences, the population trend of Panoche peppergrass is unknown due to lack of research. Extant occurrences are located on private property and on property of unknown ownership (CNDDB 2007).

Panoche peppergrass Environmental Baseline within the Action Area

There are two extant occurrences for Panoche peppergrass in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are in the Panoche Hills (western Fresno County) portion of the of the action area. These two occurrences occupy approximately 4.2 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). These occurrences are approximately 16% of the remaining occurrences for Panoche peppergrass. The HCP land-cover type utilized by Panoche peppergrass is Grassland. The HCP classifies Panoche peppergrass as a "narrowly endemic plant covered-species.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on Panoche peppergrass as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Panoche peppergrass occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Panoche peppergrass survey is not possible during an appropriate period February to June, and 1) any CNDDB Panoche peppergrass occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would not directly disturb or permanently remove (hardscape) any Panoche peppergrass occupied habitat over the 30-year term of the Permit. No effects will occur on the 4.2 acres of PG&E right-of-way currently occupied by Panoche peppergrass (see *Species Baseline* above). PG&E estimated that implementing the "minor construction" covered activities (outside the existing right-of-ways) would directly disturb 0.005 acre and would permanently remove (hardscape) 0.005 acre of occupied Panoche peppergrass habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 0.005 acre and permanently remove (hardscape) 0.005 acre of Panoche peppergrass occupied habitat over the 30-year term of the permit (0.01 acre total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Panoche peppergrass occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Panoche peppergrass habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Panoche peppergrass for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate Panoche peppergrass from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Panoche peppergrass habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that

the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Panoche peppergrass that is present in the disturbance site.

To minimize direct and indirect effects on Panoche peppergrass, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Panoche peppergrass take over the term of the proposed Permit.

AMM14 would likely not be effective on Panoche peppergrass, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Panoche peppergrass extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual Panoche peppergrass plants in the next and subsequent growing seasons, possibly extirpating Panoche peppergrass from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Panoche peppergrass occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios*. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Panoche peppergrass. Therefore, PG&E may provide between 0.02 acre and 0.03 acre of Panoche peppergrass compensation over the 30-year Permit term.

Compensation lands for effects to Panoche peppergrass will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms*. The Service refers to this type of compensation as "in-kind compensation". Compensation for Panoche peppergrass will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Panoche peppergrass as described in the analysis above, including the permanent loss of up to 0.01 acres of occupied Panoche peppergrass habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Panoche peppergrass occupied-habitat.

PG&E will provide compensation if ground-disturbance occur in Panoche peppergrass occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Panoche peppergrass occupied-habitat, preserving between 0.02 acre and 0.03 acre of Panoche peppergrass occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Panoche peppergrass. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Congdon's lewisia (*Lewisia congdonii*)

Congdon's lewisia is a perennial herb in the purslane family (Portulaceae) that has a basal rosette of semi-succulent leaves and produces rose-colored flowers (California Department of Fish and Game 2000; California Native Plant Society 2001).

Status of the Species

Listing Status

Congdon's lewisia is not federally listed. The California Department of Fish and Game listed Congdon's lewisia as Rare in 1982. The California Native Plant Society has placed Congdon's lewisia on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Congdon's lewisia produces flowers April–June (California Department of Fish and Game 2000b, California Native Plant Society 2001).

Habitat Affinities

Congdon's lewisia grows in chaparral, cismontane woodland, lower montane coniferous forest, and upper montane coniferous forest communities on dry talus slopes and in rock crevices at elevations of 1,640-9,186 feet (California Department of Fish and Game 2000b; California Native Plant Society 2001).

Historical and Current Range, Distribution

Congdon's lewisia is endemic to California, known only from the Merced River Canyon in Mariposa County and along the Kings River Canyon in Fresno County (California Natural Diversity Database 2002). The CNDDB (2007) identifies 9 extant occurrences for Congdon's lewisia in Mariposa County (7) and Fresno County (2).

The HCP estimated that the potential geographic range of Congdon's lewisia inside the San Joaquin Valley planning area totals 244,000 acres in Mariposa and Fresno counties. The HCP calculated that 0.015 percent, or 36 acres, of this 244,000-acre potential range are presently

occupied by the species. The HCP identifies 2 extant occurrences of Congdon's lewisia in the San Joaquin Valley planning area, and these are on National Forest System lands. None of the extant occurrences of Congdon's lewisia is located within 200 meters of existing PG&E facilities.

Reasons for Decline and Threats to Survival
The threats to Congdon's lewisia are herbicide spraying, road widening, collecting, and landslides (CNDDB 2007). Fewer than ten occurrences of Congdon's lewisia are known, and several of these are along roads where herbicide spraying, road improvement and maintenance, and trash dumping are threats. Most of the occurrences are on U.S. Forest Service land.

In 1994, a multi-agency memorandum of understanding (MOU) for the conservation and protection of sensitive species in the Merced River Canyon was signed by the California Department of Fish and Game, the U.S. Forest Service, the Bureau of Land Management, Caltrans, and PG&E. The MOU specifies guidelines for highway and power line maintenance and repair, notification requirements, species monitoring, and annual reviews. The MOU emphasizes protection measures for Merced clarkia (*Clarkia lingulata*) (state-listed as endangered), but it also improves protection for Congdon's lewisia and other species (California Department of Fish and Game 2000b.).

Environmental Baseline within the Action Area
PG&E identifies no extant occurrences for Congdon's lewisia in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007).

The HCP land-cover types utilized by Congdon's lewisia are Conifer, Upland Shrub, and Blue Oak Woodland. The HCP classifies Congdon's lewisia as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
PG&E estimated the effects of the proposed action on Congdon's lewisia as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Congdon's lewisia occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Congdon's lewisia survey is not possible during an appropriate period April to June, and 1) any CNDDB Congdon's lewisia occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would not directly disturb or permanently remove (hardscape) any Congdon's lewisia occupied habitat over the 30-year term of the Permit (see *Species Baseline* above). PG&E estimated that implementing the "minor construction" covered activities (outside the existing right-of-ways) would directly disturb 0.005 acre and would permanently remove (hardscape) 0.005 acre of occupied Congdon's lewisia habitat over the 30-year term of the

proposed permit. In total, PG&E estimates that covered activities will impact 0.01 acre of Congdon's lewisia over the 30-year permit term.

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Congdon's lewisia occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Congdon's lewisia habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Congdon's lewisia for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate Congdon's lewisia from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Congdon's lewisia habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Congdon's lewisia that is present in the disturbance site.

To minimize direct and indirect effects on Congdon's lewisia, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Congdon's lewisia take over the term of the proposed Permit.

AMM14 would likely not be effective on Congdon's lewisia, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Congdon's lewisia extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual Congdon's lewisia plants in the next and subsequent growing seasons, possibly extirpating Congdon's lewisia from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Congdon's lewisia occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios*. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Congdon's lewisia. Therefore, PG&E may provide between 0.02 acre and 0.03 acre of Congdon's lewisia compensation over the 30-year Permit term.

Compensation lands for effects to Congdon's lewisia will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms*. The Service refers to this type of compensation as "in-kind compensation". Compensation for Congdon's lewisia will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Congdon's lewisia as described in the analysis above, including the permanent loss of up to 0.01 acre of occupied Congdon's lewisia habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Congdon's lewisia occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Congdon's lewisia occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Congdon's lewisia occupied-habitat, preserving between 0.02 acre and 0.03 acre of Congdon's lewisia occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Congdon's lewisia. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Mariposa lupine (*Lupinus citrinus* var. *deflexus*)
Mariposa lupine is an annual herb in the pea family (Fabaceae) with long spikes of white to pinkish flowers (California Department of Fish and Game 2000; California Native Plant Society 2001).

Status of the Species

Listing Status

Mariposa lupine is not federally listed. It was listed as Threatened by the California Department of Fish and Game in 1990. The California Native Plant Society has placed Mariposa lupine on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Mariposa lupine is an annual herb that blooms April-May (California Department of Fish and Game 2000; California Native Plant Society 2001).

Habitat Affinities

Mariposa lupine grows in chaparral and cismontane woodland communities on granitic domes with sandy soil at elevations of 1,312–2,001 feet (California Native Plant Society 2001).

Historical and Current Range, Distribution l

Mariposa lupine is endemic to California. It is known from only six occurrences on the western slope of the Sierra Nevada in southwestern Mariposa County, south of the town of Mariposa (CNDDB 2007). All six occurrences are presumed extant. There are no historical records of Mariposa lupine outside this area, indicating that the species has always been rare (California Department of Fish and Game 2000). The total area occupied by this species is less than 125 acres (CNDDB 2002).

The HCP estimated that the potential geographic range of Mariposa lupine inside the San Joaquin Valley planning area totals 51,000 acres, all in Mariposa County. The HCP calculated that 0.239 percent, or 123 acres, of this 51,000-acre potential geographic range are presently occupied by the species. All six extant occurrences of Mariposa lupine are located inside the San Joaquin Valley planning area. None of the extant occurrences is located within 200 meters of existing PG&E facilities.

Reasons for Decline and Threats to Survival

The primary threats to Mariposa lupine are grazing and factors associated with development, such as irrigation runoff and herbicides (California Native Plant Society 2001; CNDDB 2002). All known populations occur on private land (CNDDB 2002.). The only conservation efforts for Mariposa lupine are voluntary registration of the landowners with The Nature Conservancy. This agreement involved four of the six known occurrences, although one was on property that in 1992 was reported to be for sale (CNDDB 2002).

According to the CNDDB, the population trend of Mariposa lupine is unknown. All surveys reported to the CNDDB except one counted thousands of individual plants in populations in the early 1990s; the exception was described has having hundreds of individuals (CNDDB 2002).

Environmental Baseline within the Action Area

PG&E identifies no extant occurrences for Mariposa lupine in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007).

The HCP land-cover types utilized by Mariposa lupine are Blue Oak Woodland, Blue Oak/Foothill Pine, Montane Hardwood, and Upland Shrub. The HCP classifies Mariposa lupine as a "narrowly endemic plant covered-species.

Effects of the Action

Direct and Indirect Effects

The actual acres of impact to Mariposa lupine occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Mariposa lupine survey is not possible during an appropriate period in April or May, and 1) any CNDDB Mariposa lupine occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area and the "minor construction" covered activities (outside the existing right-of-ways) would permanently remove 0.01 acres of occupied Mariposa lupine habitat over the 30-year term of the proposed permit.
Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Mariposa lupine occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Mariposa lupine habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Mariposa lupine for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate Mariposa lupine from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Mariposa lupine habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Mariposa lupine that is present in the disturbance site.

To minimize direct and indirect effects on Mariposa lupine, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant

occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Mariposa lupine take over the term of the proposed Permit.

AMM14 would likely not be effective on Mariposa lupine, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Mariposa lupine extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual Mariposa lupine plants in the next and subsequent growing seasons, possibly extirpating Mariposa lupine from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Mariposa lupine occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios*. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Mariposa lupine. Therefore, PG&E may provide 0.03 acres of Mariposa lupine compensation over the 30-year Permit term.

Compensation lands for effects to Mariposa lupine will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms*. The Service refers to this type of compensation as "in-kind compensation". Compensation for Mariposa lupine will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Mariposa lupine as described in the analysis above, including the permanent loss of up to 0.01 acre of occupied Mariposa lupine habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Mariposa lupine occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Mariposa lupine occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Mariposa lupine occupied-habitat, preserving 0.03 acres of Mariposa lupine occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the

Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Mariposa lupine. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Showy madia (*Madia radiata*)

Showy madia is an annual herb in the sunflower family (Asteraceae) (Hickman 1993). The species is glandular and grows from 4-35-inches tall, and has singular flower heads with golden yellow petals.

Status of the Species

Listing Status

Showy madia is not federally listed and is not listed by the California Department of Fish and Game. The California Native Plant Society has placed Showy madia on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology, Dispersal

The showy madia blooming period is March-May (California Native Plant Society 2001).

Habitat Affinities

Showy madia grows on grassy slopes of cismontane woodlands and valley grasslands with mostly adobe clay soils at elevations of 82–3,691 feet (California Native Plant Society 2001; California Natural Diversity Database 2001).

Historical and Current Range, Distribution

Showy madia is endemic to California. Occurrences are scattered in the eastern San Francisco Bay, and the South Coast Ranges, and in the western San Joaquin Valley (Hickman 1993). The CNDDB (2007) identifies 41 extant occurrences in ten California counties: Contra Costa (3), Fresno (9), Kern (5), Kings (1), Monterey (2), San Benito (8), San Joaquin (2), San Luis Obispo (13), Santa Barbara (1), and Stanislaus (1).

The HCP estimated that the potential geographic range of showy madia inside the HCP San Joaquin Valley planning area totals 475,000 acres in the foothills along the westside of the San Joaquin Valley in San Joaquin, Fresno, Kings, and Kern counties. The HCP calculated that 0.29-percent or 1,371 acres, of this 475,000-acre potential range are presently occupied by the species (HCP Table 4-3). There are 12 extant occurrences of showy madia in the HCP San Joaquin Valley planning area (HCP Table 4-2). These populations are located on private property, property of the California Department of Water Resources, and property of unknown ownership (CNDDB 2002). The HCP identifies no extant occurrences within 200 meters of existing PG&E facilities.

Reasons for Decline and Threats to Survival
Showy madia is threatened by grazing and competition with invasive non-native plants (California Native Plant Society 2001). The species could also be threatened by road maintenance activities and conversion of habitat to off-highway vehicle use (CNDDB 2002). The population trend of showy madia is unknown due to lack of research (CNDDB 2002).

Showy madia Environmental Baseline within the Action Area
There are four extant occurrences for showy madia in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are in the San Joaquin County (2), Fresno County (1), and Kings County (1) portions of the of the action area. These four occurrences occupy approximately 48.5 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). These occurrences are approximately 10% of the remaining occurrences for showy madia.

The HCP land-cover types utilized by showy madia are Grassland, shrub, Blue Oak/Foothill Pine, Blue Oak Woodland. The HCP classifies showy madia as a "narrowly endemic" plant covered-species.

Effects of the Action
Direct and Indirect Effects
PG&E estimated the effects of the proposed action on showy madia as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to showy madia occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a showy madia survey is not possible during an appropriate period March to May, and 1) any CNDDB showy madia occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 3.45 acres, would permanently remove (hardscape) 0.04 acre of showy madia occupied habitat over the 30-year term of the Permit. These effects would occur on the 48.5 acres of PG&E right-of-way currently occupied by showy madia (see *Species Baseline* above). PG&E also estimated that implementing the "minor construction" covered activities (outside the existing right-of-ways) would not directly disturb or permanently remove (hardscape) any showy madia occupied-habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 3.45 acres and permanently remove (hardscape) 0.04 acre of showy madia occupied habitat over the 30-year term of the permit (3.49 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in showy madia occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied showy madia habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with showy madia for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate showy madia from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied showy madia habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for showy madia that is present in the disturbance site.

To minimize direct and indirect effects on showy madia, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of showy madia take over the term of the proposed Permit.

AMM14 would not be effective on showy madia, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a showy madia extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual showy madia plants in the next and subsequent growing seasons, possibly extirpating showy madia from the disturbance site.

Effects of Compensation Measures

Although PG&E will avoid showy madia occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for showy madia. Therefore,

PG&E may provide between 1.85 acres and 10.47 acres of showy madia compensation over the 30-year Permit term.

Compensation lands for effects to showy madia will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms*. The Service refers to this type of compensation as "in-kind compensation". Compensation for showy madia will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion

We anticipate that the proposed action will directly and indirectly affect showy madia as described in the analysis above, including the permanent loss of up to 3.49 acres of occupied showy madia habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to showy madia occupied-habitat. PG&E will provide compensation if ground-disturbance occur in showy madia occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to showy madia occupied-habitat, preserving between 1.85 acres and 10.47 acres of showy madia occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of showy madia. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Hall's bush mallow (*Malacothamnus hallii*)

Hall's bush mallow is an evergreen sub-shrub in the mallow family (Malvaceae) that grows 39–197 inches tall (3.25-16.5 feet) (California Native Plant Society 2001). It has spikes of pink-purple cup-shaped flowers.

Status of the Species

Listing Status

Hall's brush mallow is not federally listed and is not listed by the California Department of Fish and Game. The California Native Plant Society has placed Hall's bush-mallow on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

Hall's brush mallow blooms May–September (California Native Plant Society 2001).

Habitat Affinities
Hall's bush mallow is found in chaparral and scrub plant communities at elevations of 33-1,804 feet. Some populations grow on serpentine soils (California Natural Diversity Database 2001).

Historical and Current Range, Distribution
Hall's bush mallow is endemic to California. The CNDDB (2007 identifies 31 extant occurrences in six counties: Mendocino (1), San Mateo (2), Contra Costa (6), Santa Clara (19), Stanislaus (2), and Merced (2). Population sizes range from 2 to 100,000 individuals (CNDDB2002).

The HCP estimated that the potential geographic range of Hall's bush mallow inside the HCP San Joaquin Valley planning area totals 152,000 acres, all in the foothills of western Stanislaus and Merced counties. The HCP calculated that 0.056-percent, or 85 acres, of this 152,000-acre potential range are presently occupied by the species. The HCP identified four extant occurrences of Hall's bush-mallow in the San Joaquin Valley planning area. Two populations in Merced County are on land of unknown ownership. All the Stanislaus County populations are on privately owned land, and they range from 30 to 100,000 plants (CNDDB 2002).

Reasons for Decline and Threats to Survival
Hall's bush mallow is threatened by grazing, rooting by feral pigs, and a proposed reservoir at Los Banos Creek in Merced County (CNDDB 2002).

Environmental Baseline within the Action Area
There is one extant occurrence for Hall's bush mallow in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). This occurrences is in the Merced County portion of the of the action area. This occurrence occupies approximately 9.6 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). This occurrence is approximately 3% of the remaining occurrences for Hall's bush mallow.

The HCP land-cover type utilized by Hall's bush mallow is Upland Scrub. The HCP classifies Hall's bush mallow as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
PG&E estimated the effects of the proposed action on Hall's bush mallow as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to Hall's bush mallow occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a Hall's bush mallow survey is not possible during an appropriate period February to June, and 1) any CNDDB Hall's bush mallow occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimated that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 0.141 acre, would permanently remove

(hardscape) 0.001 acre of Hall's bush mallow occupied habitat over the 30-year term of the Permit. These effects would occur on the 9.6 acres of PG&E right-of-way currently occupied by Hall's bush mallow (see *Species Baseline* above). PG&E also estimated that implementing the "minor construction" covered activities (outside the existing right-of-ways) would directly disturb an additional 0.141 acre and permanently remove (hardscape) an additional 0.001 acre of Hall's bush mallow occupied-habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 0.282 acre and permanently remove (hardscape) 0.002 acre of Hall's bush mallow occupied habitat over the 30-year term of the permit (0.284 acre total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in Hall's bush mallow occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied Hall's bush mallow habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with Hall's bush mallow for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate Hall's bush mallow from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied Hall's bush mallow habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for Hall's bush mallow that is present in the disturbance site.

To minimize direct and indirect effects on Hall's bush mallow, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals)(AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of Hall's bush mallow take over the term of the proposed Permit.

AMM14 would not be effective on Hall's bush mallow, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E

shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a Hall's bush mallow extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual Hall's bush mallow plants in the next and subsequent growing seasons, possibly extirpating Hall's bush mallow from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid Hall's bush mallow occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for Hall's bush mallow. Therefore, PG&E may provide between 0.15 acre and 0.86 acre of Hall's bush mallow compensation over the 30-year Permit term.

Compensation lands for effects to Hall's bush mallow will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for Hall's bush mallow will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion
We anticipate that the proposed action will directly and indirectly affect Hall's bush mallow as described in the analysis above, including the permanent loss of up to 0.30 acre of occupied Hall's bush mallow habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to Hall's bush mallow occupied-habitat. PG&E will provide compensation if ground-disturbance occur in Hall's bush mallow occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to Hall's bush mallow occupied-habitat, preserving between 0.15 acre and 0.86 acre of Hall's bush mallow occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Hall's bush mallow. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Oil neststraw (*Stylocline citroleum*)

Oil neststraw is an inconspicuous annual herb in the sunflower family (Asteraceae) which grows low to the ground and does not have showy flowers. The round, wooly flower heads are 5 millimeters or less in diameter. The trailing, wooly stems are less than 5 inches long (California Native Plant Society 2001, Morefield 1992, 1993).

Listing Status
Oil neststraw is not federally listed. A detailed account of the taxonomy, ecology, and biology of the Oil neststraw is presented in the *Recovery Plan for the Upland Species of San Joaquin Valley, California* (USFWS 1998). Oil neststraw is not listed by the California Department of Fish and Game. The California Native Plant Society has placed oil neststraw on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology
Oil neststraw is an annual that blooms March–April, but reproduces strictly by self-pollination (Hickman 1993; California Native Plant Society 2001).

Essential Habitat Components
All the extant occurrences of oil neststraw are in the Valley Saltbush Scrub plant community in undeveloped areas. This species grows on flats and on slopes. Oil neststraw has been found at elevations of 200 to 1,050 feet on both sandy and clay soils (Morefield 1992, EG&G Energy Measurements unpublished data, D. Taylor pers. comm.)

Historical and Current Range
Oil neststraw is endemic to California. Five populations of oil neststraw were known historically, based on collections made from 1883 to 1935. Four of the historic occurrences were in Kern County, in the vicinities of Bakersfield, McKittrick, and Taft (two sites, including the type locality). The fifth historical collection was made in San Diego County. Urban development has almost certainly eliminated the historical populations in the vicinities of San Diego and Bakersfield, and possibly the one near Taft (Skinner and Pavlik 1994)

The CNDDB (2007) identifies 79 extant occurrences of oil neststraw, with 78 occurrences in Kern County and 1 occurrence in San Diego County. Oil neststraw is known from Elk Hills and the nearby Coles Levee Ecosystem Preserve in western Kern County (Enterprise Advisory Services, Inc. 1997, 1998, QUAD 1997, Jay Hinshaw pers. comm.). The status of other western Kern County occurrences at Taft and Kern River Canyon is unknown; although natural land remains at most sites, the location descriptions are vague. The known occurrences at Elk Hills represent a single metapopulation.

Reasons for Decline and Threats to Survival
Oil neststraw is threatened by urbanization and possibly by energy development, flooding, and fire (California Native Plant Society 2001, CNDDB 2002). Petroleum production is the primary use in the other areas where oil neststraw occurred historically, but actual population losses to oilfield activities have not been documented. Any surface-disturbing activities would be detrimental to oil neststraw (J. Morefield pers. comm.). The population trend of this species is unknown (CNDDB 2002).

The HCP estimated that the potential geographic range of oil neststraw inside the HCP San Joaquin Valley planning area totals 361,000 acres, all in Kern County. The HCP calculated that 0.003-percent, 163 acres, of this 361,000-acre potential geographic range are presently occupied by the species.

Environmental Baseline and Status within the action area

There are 10 extant occurrences for oil neststraw in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). These occurrences are located in the Kern County portion of the of the action area. These occurrences occupy approximately 13 acres of existing PG&E right-of-ways within the 276,350-acre action area (CNDDB 2007). The 10 occurrences are approximately 13% of the total occurrences for the species.

The HCP land-cover type utilized by oil neststraw is Upland Scrub. The HCP classifies oil neststraw as an "other" plant covered-species (a plant covered-species that is not a "narrowly endemic" species.

Effects of the Action

Direct and Indirect Effects

PG&E estimated the effects of the proposed action on oil neststraw as discussed above in *Methods for Estimating Plant Species Effects*. The actual acres of impact to oil neststraw occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a oil neststraw survey is not possible during an appropriate period March and April, and 1) any CNDDB oil neststraw occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

PG&E estimates that ground-disturbing covered-activities implemented within the existing right-of-ways of the action area would directly disturb 0.62 acre of occupied oil neststraw habitat, and would permanently remove (hardscape) 0.007 acre of occupied habitat over the 30-year term of the proposed permit. These effects would occur on the 13 acres of PG&E right-of-way currently occupied by oil neststraw (see *Species Baseline* above). PG&E estimates that implementing the "minor construction" covered activities (outside the existing right-of-ways) would directly disturb an additional 0.62 acre and permanently remove (hardscape) an additional 0.007 acre of oil neststraw occupied habitat over the 30-year term of the proposed permit. In total, PG&E estimates that covered activities will directly disturb 1.24 acre and permanently remove (hardscape) 0.014 acre of oil neststraw occupied habitat over the 30-year term of the permit (1.25 acres total).

Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in oil neststraw occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied oil neststraw habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding

capacity, soil fertility, or loss of microhabitat-features features essential to this species. Soil excavations or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with oil neststraw for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, transpiration, and respiration during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied oil neststraw habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for oil neststraw that is present in the disturbance site.

Because the HCP does not classify oil neststraw as a "narrowly endemic" plant covered-species, covered-activity ground-disturbance in or near oil neststraw occupied habitat would not trigger the "Confer Process". To minimize direct and indirect effects on oil neststraw, PG&E will apply one or more of the plant AMMs. Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a small amount of oil neststraw take over the 30-year term of the proposed Permit.

AMM14 would not be effective on oil neststraw, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of an oil neststraw extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individuals oil neststraw plants in the next and subsequent growing seasons, possibly extirpating oil neststraw from the disturbance site.

Effects of Compensation Measures
Although PG&E will avoid oil neststraw occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for oil neststraw. Therefore, PG&E may provide between 0.05 acre and 2.6 acres of oil neststraw compensation over the 30-year Permit term.

Compensation lands for effects to oil neststraw will be located in areas that include occupied habitat, or PG&E might preserve other lands that directly benefit the plant species, as discussed

above in *Compensation Mechanisms.* The Service refers to this type of compensation as "in-kind compensation". Compensation for oil neststraw will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion

We anticipate that the proposed action will directly and indirectly affect oil neststraw as described in the analysis above, including the permanent loss of up to 1.25 acres of occupied oil neststraw habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to oil neststraw occupied-habitat. PG&E will provide compensation if covered-activity ground-disturbance occurs in oil neststraw occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to oil neststraw occupied-habitat, preserving between 0.05 acre and 2.6 acres of oil neststraw occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of oil neststraw.

We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

King's gold *(Tropidocarpum (Twisselmannia) californica)*

King's gold is a small annual herb in the mustard family (Brassicaceae) (California Native Plant Society 2001). King's gold was first described in 1999; it is not included in The Jepson Manual (Al-Shehbaz 1999).

Listing Status

King's gold is not federally listed and is not listed by the California Department of Fish and Game. The California Native Plant Society has placed King's gold on List 1B (rare or endangered throughout its range).

Life History, Reproductive Ecology

King's gold is an annual that blooms in March (California Native Plant Society 2001). Other aspects of the life history and reproductive biology are unknown.

Essential Habitat Components

King's gold is known from sandy clay soil in a chenopod scrub plant community of spinescale saltbrush (*Atriplex spinifera*), at an elevation of approximately 200 feet (California Native Plant Society 2005, HT Harvey & Associates 2005).

Historical and Current Range, Dispersal
King's gold is endemic to California in a narrow range of Kings County at an elevation of approximately 200 feet. King's gold is known from only one occurrence near Kettleman City in Kings County, along a pipeline access road east of Interstate 5 (California Native Plant Society 2001; CNDDB 2005, H.T. Harvey & Associates 2005).

The HCP did not estimate the potential geographic range of King's gold inside the San Joaquin Valley planning area, or the acres of potential geographic range presently occupied by the species.

Reasons for Decline and Threats to Survival
King's gold is threatened by development (California Native Plant Society 2001). The population trend of King's gold is unknown (CNDDB 2002). King's gold was first described in 1999. The occurrence site was last reported (in 1999) to have fewer than 50 individual plants present (California Native Plant Society 2001).

Environmental Baseline and Status within the action area
PG&E identifies no extant occurrences for King's gold in the existing PG&E right-of-ways of the 276,350-acre action area (CNDDB 2007). The single occurrence of King's gold occurs within 0.1 mile of a gas pipeline access road (CNDDB 2005).

The HCP land-cover type utilized by King's gold is Upland Scrub. The HCP classifies King's gold as a "narrowly endemic plant covered-species.

Effects of the Action
Direct and Indirect Effects
The actual acres of impact to King's gold occupied-habitat will be quantified during the pre-construction surveys for medium and large disturbance activities sites, and will be estimated for the actual number of small disturbance activities conducted each year. In situations where scheduling a King's gold survey is not possible during an appropriate period in March and 1) any CNDDB King's gold occurrence record is within 200 meters of the activity site, and 2) a PG&E botanist determines that suitable land-cover and habitat is present at the proposed activity site, then PG&E will assume that the entire area of the disturbance is occupied, and is adversely affected.

Ground-disturbing covered-activities implemented within the existing right-of-ways of the action area and the "minor construction" covered activities (outside the existing right-of-ways) would permanently remove 0.01 acres of occupied King's gold habitat over the 30-year term of the proposed permit.
Information on the acres of "other disturbance" covered activities (activities that do not disturb land-cover, such as tree trimming or off-road travel) that may occur in King's gold occupied-habitat is not available to the Service.

Soil excavations or other ground disturbances in or near occupied King's gold habitat could also indirectly affect plants later in time due to a permanent loss of soil structure, soil water-holding capacity, soil fertility, or loss of microhabitat-features essential to this species. Soil excavations

or other ground disturbances in occupied habitat are likely to fragment the occurrence, which could isolate individuals and affect genetic variability within that plant population. Occupied habitat might be permanently degraded if the disturbance site is invaded by non-native weedy plant species following the ground-disturbing activities. Weedy invasive species could compete with King's gold for space, soil moisture, and nutrients, and could extirpate the species from the site over time. Invasion by weedy species could result in an accumulation of thatch, which would inhibit seed germination and eventually extirpate King's gold from the disturbance site. Any construction dust generated from ground-disturbing covered-activities in or adjacent to occupied habitat may adversely affect plant-photosynthesis, respiration, transpiration, pollination, and seed-set during that growing season, which would adversely affect the number of plants germinating in the next and subsequent growing seasons. PG&E did not quantify the acres of occupied King's gold habitat likely to be impacted by these indirect-effects, but Service anticipates that indirect effects will occur on the same acreages as the direct-effects discussed in the preceding paragraph. The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities will permanently remove any occupied habitat for King's gold that is present in the disturbance site.

To minimize direct and indirect effects on King's gold, PG&E will confer with the USFWS and/or CDFG when any ground-disturbing covered-activity cannot completely avoid plant occupied habitat (see *Confer Process* and *HCP Conservation Strategy* above). The *Confer Process* will determine which plant AMMs would be best in that situation (AMMs 12, 13, 14, or 15). Plant AMMs include staking and flagging work-exclusion zones of 100 feet around plant occupied habitat (standing individuals and seed bank individuals) (AMM 12). This AMM will minimize direct effects and indirect effects of the covered-activity, but will not eliminate the potential for a very small amount of King's gold take over the term of the proposed Permit.

AMM14 would likely not be effective on King's gold, and this topsoil-stockpiling procedure should not be viewed as an avoidance or minimization measure for this plant species. PG&E shall not implement general AMM 10 (broadcast-seeding grassland disturbance sites larger than 0.25 acre with a non-native commercial seed-mix) within the polygon-boundaries of a King's gold extant occurrence. Non-native grasses and other plants in the commercial seed-mix will compete with and harm individual King's gold plants in the next and subsequent growing seasons, possibly extirpating King's gold from the disturbance site.

Effects of Compensation Measures
King's gold is known from only one occurrence. Although PG&E will avoid King's gold occupied-habitat to the maximum extent practicable, some adverse effects to occupied habitat may result from covered activities. Compensation will be based the actual acres of occupied plant-habitat directly and indirectly affected. The HCP's compensation ratios will be applied: 3:1 for permanent loss of occupied habitat, and 0.5:1 for temporary loss of occupied habitat, as outlined above in *Compensation Ratios.* The Service anticipates that the combined direct and indirect effects of most ground-disturbing covered-activities would result in a permanent loss of occupied habitat for King's gold. If covered-activity impacts occur within the polygon-boundaries of the single occurrence of King's gold, PG&E would be required to provide 0.03 acres of King's gold compensation over the 30-year Permit term.

There is only one occurrence for King's gold in existence. Therefore, in-kind compensation lands are not available for this species. The Service anticipates that the combined direct and indirect effects of implementing most ground-disturbing covered-activities at the single King's gold occurrence would result in a permanent loss of occupied habitat for King's gold. If effects occur and compensation is necessary, the type and quantity of compensation would be determined during the Confer Process. If compensation is necessary for King's gold, it will occur as close as possible to the time of disturbance, but will not occur more than 2 years after the disturbance.

Conclusion

If covered-activity soil-disturbance occurs within the boundaries of the single King's gold occurrence, the direct and indirect affects described in the analysis above could jeopardize the continued existence of the species. With implementation of the Confer Process, the Service anticipates that the proposed action would not to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its very limited range (one known occurrence). After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of King's gold.

We anticipate that the proposed action will directly and indirectly affect King's gold as described in the analysis above, including the permanent loss of up to 0.01 acre of occupied King's gold habitat over the 30-year Permit term. Implementation of the avoidance, minimization, and mitigation measures included in the HCP will reduce these impacts to King's gold occupied-habitat. PG&E will provide compensation if ground-disturbance occur in King's gold occupied-habitat. PG&E will provide compensation for all direct, indirect, permanent, and temporary effects to King's gold occupied-habitat, preserving 0.03 acres of King's gold occupied habitat over 30 years. The "other disturbance" effects of vehicle travel through upland areas are expected to be individually small, widely dispersed, and likely to be insignificant and discountable.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects expected in the action area, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of King's gold. We reached this conclusion because the impacts to this species, when viewed in conjunction with the compensation measures long-term protection and management of occupied habitat, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the proposed action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with this Incidental Take Statement.

The proposed HCP, its associated documents, and this Biological Opinion clearly identify the anticipated impacts to affected species likely to result from the proposed taking and the measures that are necessary and appropriate to minimize those impacts. Based on the proposed HCP and the analysis of the effects of the proposed action provided in this Opinion, the Service anticipates that the amount or extent of incidental take specified in the *Species by Species Evaluations* may occur as a result of the proposed action. The associated reporting requirements for this take are as described in the HCP and this Opinion. Provisions for disposition of dead or injured animals are described in the accompanying section 10(a)(1)(B) permit. The effect of the take is stated in the *Species by Species Evaluations*. The Service determined that the level of anticipated incidental take is not likely to result in jeopardy to any of the Species or result in destruction or adverse modification of Species designated Critical Habitat.

Of the 65 Species addressed in this biological and conference Opinion, 35 Species are currently not federally listed. As such, there is no take prohibition under the ESA for these species at the time of writing. The incidental take statement provided in this conference Opinion for the unlisted species that are Covered Species does not become effective until an unlisted Species is listed under the ESA and this conference Opinion on that unlisted species is adopted as the biological Opinion issued through formal consultation.

The nature of the take that could result from covered activities is described and analyzed in Chapters 3 and 5 of the HCP and in the Biological Opinion. The take authorized in the incidental take permit will be quantified in terms of acres to establish a specific numerical limit on the amount of authorized take. Although the numerical take limits do not differentiate between different ways in which take may occur, the authorized take is expected to be consistent with Chapters 3 and 5 of the HCP and the Biological Opinion. Covered activities are not expected to cause direct physical injury to blunt-nosed leopard lizards, Buena Vista lake shrews, riparian brush rabbits, limestone salamanders, riparian woodrats, San Joaquin kit foxes, or tri-colored blackbirds because of the nature and location of covered activities and because of the implementation of AMMs. However, if an individual of these species is killed or injured by a direct physical impact caused by a covered activity, PG&E will meet and confer with the Service

to evaluate the cause of the death or injury and to discuss whether modifications to one or more AMMs are necessary to avoid direct physical impacts to individuals of the species in the future. If an AMM modification is necessary, PG&E will incorporate the modification through the Adaptive Management Process. The incidental take permit does not authorize take, as "Take" as defined under section 86 of the Fish and Game Code, of covered species that are "fully protected" under the California Fish and Game Code because take of such species is prohibited under California law. If and when a covered species that is "fully protected" is delisted as a "fully protected" species, or take of "fully protected" species is authorized under California Law, the incidental take permit will authorize take of the species, consistent with table 5-3 of the HCP.

The following Covered Species are also considered fully protected species by the State of California according to Fish and Game Code section 3511, section 4700, section 5050, and section 5515: limestone salamander, blunt-nosed leopard lizard, white-tailed kite, golden eagle, and bald eagle. Take levels for these species have been analyzed in this biological opinion, although the take limit authorized for kill and injury (i.e. harm) of these species on the Permit, if issued, will be consistent with the California fish and Game code. The Service believes that minimal take of all Covered Species will occur if PG&E implements all avoidance and minimization measures to the fullest extent possible. If take of any of the state fully protected species does occur, PG&E and CDFG in consultation with the Service will confer with regard to increasing the effectiveness of take avoidance measures for the covered activity causing the take. In the event that CDFG in the future obtains the legal authority to take these five species, then the Permit will be amended for limestone salamander, blunt-nosed leopard lizard, white-tailed kite, golden eagle, and bald eagle to include take in the form of kill or wound (i.e. harm).

Section 9(a)(2)(B) of the ESA does not prohibit the take of listed plant species, except for the removal of listed plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of listed plants on non-Federal areas when in violation of any law or regulation of any State, or in the course of any violation of a State criminal trespass law. Consequently, section 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species. Nevertheless, the Service must review the effects of its own actions on listed plants, even when those listed plants are found on private lands. In approving the HCP and issuing an incidental take statement during this intra-Service section 7 consultation, the Service must determine that the permit will not "jeopardize the continued existence" of any listed plant. In the interest of conserving the listed plant and non-listed plant -Species and to provide certain regulatory assurances to the applicant, the HCP includes measures to protect listed and non-listed plant Species within the action area. The 17 listed and 25 non-listed plant Species are proposed to be included on the section 10(a)(1)(B) permit.

The section 10 (a) incidental take permit would also constitute a Special Purpose permit under 50 CFR 21.27 for the take of any animal Species which may be listed as threatened or endangered under the Endangered Species Act during the permit term and which are also protected by the MBTA, in the amount and/or number and subject to the terms and conditions specified in the 10(a) permit. The MBTA special purpose permit would become effective upon the listing of the species under the ESA. Any such take shall not be in violation of the MBTA of 1918, as amended (16 U.S.C. 703-712). The Special Purpose permit shall be valid for a period of three years from the effective date, provided the section 10(a) permit remains in effect for such period.

The Special Purpose permit shall be renewed, provided the permittees remain in compliance with the terms of the 10(a) permit and the Implementation Agreement. Each such renewal shall be valid for the maximum period of time allowed by 50 CFR 21.27 or its successor at the time of renewal.

The measures described below are non-discretionary, and must be undertaken by the Service so that they become binding conditions of any grant or permit issued to the Pacific Gas & Electric Company for the exemption in section 7(o)(2) to apply. The Service has a continuing duty to regulate the activity by this Incidental Take Statement. If the Service (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the Permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Service must track the progress of the action and its impact on the species as specified in 50 CFR §402.14(i)(3).

Reasonable and Prudent Measures, and Terms and Conditions.

Reasonable and prudent measures refer to those actions the Service's Regional Director, or his authorized representative, believes necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take (50 CFR 402.02). The terms and conditions set out the specific methods by which the reasonable and prudent measure is to be accomplished.

All conservation measures described in the proposed HCP, together with the terms and conditions described in any associated Implementing Agreement (IA), and any section 10(a)(1)(B) incidental take permit or State permits issued with respect to the proposed HCP, are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement pursuant to 50 CFR 402.14(i). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the ESA to apply. If the permittee or applicant fails to adhere to those terms and conditions, the protective coverage of the section 10(a)(1)(B) permit and section 7(o)(2) may lapse.

Further, the following terms and conditions apply to the Service after issuance of the Permit:

1. The Service shall provide technical assistance to the Applicant throughout the term of the Permit.

2. The Service shall, at all time of listing of any of the currently unlisted Species, reinitiate consultation on the proposed actions in accordance with 50 C.F.R. 402.16.

3. The Service shall ensure that any section 7 consultation with other Federal agencies regarding development activities by the permits are consistent with the conservation goals and objectives of the HCP, and that any such activities reviewed under section 7 and the ESA shall provide levels of listed species protection consistent with the protection afforded under the HCP.

Reporting Requirements
PG&E shall provide an annual HCP Monitoring Report to the Service and CDFG on the progress of the HCP and its impact on species during the prior calendar year. The annual HCP Monitoring Report shall include the information specified in Chapter 6 of the HCP, including quantification of the direct and indirect effects on each species and the accompanying compensation. The compensation monitoring section of the report will summarize the amount of habitat disturbance or direct take by species, the compensation required to mitigate habitat disturbance, and the compensation acreage procured or dedicated to offset those effects. The report will also summarize a running total of disturbance impacts and compensation over the life of the project. This documentation will be used to verify if PG&E is meeting its commitment to achieve a level of compensation that meets or exceeds the requirements of the HCP. The report will indicate if credits acquired in previous years are being applied to the current year's compensation. The compensation element of the HCP Monitoring Report will provide details of compensation actions, including copies of deeds for all land purchases and contracts for compensation transactions. Furthermore, the report will describe anticipated actions to acquire additional lands in advance of impacts. This will help ensure that the HCP's Biological Goals and their objectives are achieved.

In addition, at any other time during the Permit term, the Applicant, at the request of the Service or CDFG, shall provide within thirty (30) days, additional information relevant to implementation of the HCP reasonably available to the Applicant.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary Federal agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

We recommend that the following conservation measures be implemented:

> The Service should pursue available funding sources to enhance and enlarge habitat preservation programs in the San Joaquin Valley. Priority areas for acquisition should have known presence of kit fox or other -species. In addition, kit fox corridors should be acquired to enhance population exchange. Other priority areas for acquisition include riparian habitats for riparian brush-rabbit and riparian woodrat.

REINITIATION NOTICE

This concludes formal consultation and conference on the proposed issuance if an incidental take permit to implement the PG&E San Joaquin Valley O&M Habitat Conservation Plan As provided by 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species not addressed by this document is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The Incidental Take Statements provided in this conference opinion for unlisted Covered Species does not become effective until the unlisted Covered Species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. If you have any questions concerning this consultation, please contact the Service's Sacramento Fish and Wildlife Office at (916) 414-6600.

Enclosure

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