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*Types of Mitigation*

PG&E may utilize a variety of approaches to fulfill its mitigation obligation. Descriptions of these approaches appear below; the specific approval process and requirements for each type of mitigation appears in the *Mitigation Approval Process.*

Fee Title: PG&E may purchase lands in fee. Lands purchased in fee will be protected through a conservation easement or equivalent site protection mechanism approved by the Service, and will include a management plan and associated endowment. In most cases, PG&E will not own or manage mitigation sites, but will have qualified land conservation organizations hold title or easement and manage the property.

Conservation Easements: PG&E may purchase conservation easements from willing sellers to be used as mitigation. A management plan and associated endowment will also be included. In most cases, PG&E will work with a qualified land conservation organization to secure conservation easements on high-quality habitat. PG&E also owns several parcels of land that have high conservation values and that may be suitable for mitigation.

Conservation Partnerships: PG&E may partner with conservation organizations to further regional conservation efforts. In the Bay Area, many local, state, and federal government organizations and nonprofit organizations (including but not limited to land trusts and special districts) have species or habitat conservation as part of their mission. PG&E funds contributed to land acquisitions and management will serve as mitigation. Further, several regional, multiple-species HCPs/NCCPs and conservation strategies have been adopted in the Bay Area (see HCP Table 5-6). PG&E could contribute to these efforts by making other financial contributions or in-kind services to these plans that benefit Covered Species. These types of financial contributions have the advantage of building on species-focused conservation efforts that are part of a broad regional conservation planning effort. Conservation partnerships are most likely to take one of the following two forms :

Financial and In-Kind Contribution to Local Land Managers: Many federal, state, and local land managers, including the Golden Gate National Recreation Area, National Wildlife Refuges (NWR), state parks and wildlife areas, park districts, and nonprofit organizations (e.g., The Nature Conservancy, Mid-Peninsula Open Space District) have missions that include the protection and conservation of endangered species. PG&E could contribute to these efforts by making financial or in-kind service contributions to these organizations if these contributions are shown to have direct benefits to Covered Species. PG&E's contributions would be subject to Service review and approval. This type of mitigation will have a discrete timeline for implementation of the restoration project, will result in restoration or habitat enhancement for the Covered Species and demonstrates that PG&E's contribution resulted in a measurable benefit to the species that meets PGE's mitigation needs.

Financial and In-Kind Contribution to Restoration Efforts: Extensive restoration activities by various agencies are underway in the North Bay and South Bay. PG&E contributed to the first phase of the South Bay Restoration Project by upgrading the footings of facilities in Alviso Pond A-6 in South San Francisco Bay to facilitate the breaching and restoration of the pond. This action was analyzed in the biological opinion for the South Bay Salt Pond

Restoration Project, and the project itself was analyzed in the South Bay Salt Pond Restoration Project Final Environmental Impact Statement/Report (EDAW *et al.* 2007). PG&E subsequently executed a mitigation credit agreement with the Service that provided 1 acre of credit available initially and then PG&E received the additional 4 acres of mitigation credit when the pond was breached in 2010. These credits can be used solely by PG&E and can be used for Covered Activities under the Bay Area O&M HCP.

Conservation/Mitigation Banks: PG&E may purchase credits from a conservation or mitigation bank with the approval of the Service. Conservation/mitigation bank credits are available to meet some of PG&E's needs, but currently there are no credits for some species. However, additional conservation/mitigation banks will likely be created and approved over the next 30 years, expanding the number of sensitive species for which credits would be available. Upon the Service approval of the bank, PG&E may use these banks to mitigate its impacts if credits are available.

Habitat Enhancement and Restoration: PG&E may consider enhancement or restoration projects to serve as mitigation. This approach will be implemented in instances where other mitigation approaches are infeasible or very difficult to achieve. For example, there may be very limited or no opportunities to purchase fee title lands or easements for some wildlife species, such as Lange's metalmark butterfly, San Bruno elfin butterfly, Callippe silverspot butterfly, and most covered plants. In these instances, PG&E may fund specific enhancement and restoration projects to benefit those species. Examples of habitat enhancement or restoration efforts to promote recovery include planting host plants for listed butterflies and relocating or transplanting covered plants. In some instances, other restoration enhancement and restoration efforts for more common species may also serve as mitigation; examples include dredging ponds to make them more suitable for California red-legged frog, creating new aquatic habitat, or contributing to bullfrog eradication efforts.

*Mitigation Approval Process*

All mitigation is subject to the Service's review and approval. The mitigation approval process for land acquisitions generally consists of six steps: (1) habitat acquisition site evaluation; (2) conceptual approval; (3) submittal of a habitat acquisition package; (4) Service review of the habitat acquisition package; (5) incorporation of Service edits into the habitat acquisition package; and (6) completion of the mitigation transaction. For a more detailed description of the mitigation approval process see HCP Section 5.6.4.

Conservation partnerships, use of conservation banks, and habitat restoration and enhancement actions, are also subject to Service review and approval. For a detailed description of the approval process for these see HCP Section 5.6.4.2, 5.6.4.3, and 5.6.4.4.

The intent of habitat acquisition is to purchase and preserve high-quality natural lands, especially those already supporting multiple Covered Species. Lands that do not require intensive management to maintain existing habitat quality and those that provide opportunities for habitat enhancement are also considered a high priority for acquisition as mitigation lands. When mitigation for critical habitat is necessary, lands currently designated or proposed for designation as critical habitat, and which have the appropriate primary constituent elements, will be used. Additionally, PG&E will work with the Service to identify critical or high-threat areas that could be pursued for mitigation and priority conservation.

The following characteristics are desirable attributes of conservation lands.

- Demonstrated species use or occupancy.
- Overall habitat suitability and quality.
- Proximity and connectivity to other mitigation lands, mitigation banks, or other protected areas.
- Proximity and connectivity to other important habitats (e.g., wetlands, vernal pools, riparian areas) that may not be a target of mitigation efforts.
- Minimum levels of past site disturbance or high potential for restoration from disturbance.
- Of high conservation priority due to high threat of impacts (i.e., development or land conversion).

Candidate sites must either have either: (1) confirmed species presence; or (2) meet suitability criteria. Suitability criteria are: (a) biologist provides qualitative assessment of the presence, suitability for presence, or ability of the site to support presence (including vegetation structure and suitability of the site as habitat, proximity to CNDDB occurrences, and observations of scat or other signs of Covered Species' presence); or (b) the property contributes to protecting important corridors.

For some species, factors may render it challenging to demonstrate that habitat is occupied habitat because of population fluctuations (e.g., butterflies); difficulty detecting species (e.g., San Francisco garter snake); or infrequent species occurrence in the study area (e.g., San Joaquin kit fox). In these instances, the mitigation site will be selected based on criterion 2 above (suitability). For additional information on mitigation land selection, see HCP Section 5.6.5.1.

Location of Mitigation Areas

PG&E will locate mitigation opportunities in accordance with land-selection factors and attributes identified above. The location of potential mitigation opportunities will vary based on species distribution. These opportunities are conceptually described in HCP Table 5-4 (page 81 of this opinion) and in text earlier in the chapter, although specific mitigation locations may change based on available mitigation opportunities. PG&E will implement mitigation in three regions: the North Bay (Marin, Napa, and Sonoma Counties); the East Bay (Solano, Contra Costa, and Alameda Counties); and the Peninsula/South Bay (San Francisco, San Mateo, and Santa Clara Counties). This regional framework will ensure that mitigation coincides appropriately with impacts from Covered Activities.

Mitigation Management Plans

Management plans for each conservation parcel will be prepared in consultation with the Service. Management plans will include a Property Analysis Record (PAR), or PAR-like analysis to determine the required endowment amount for management.
All management plans require approval by the Service. The Service will review and comment or approve management plans within 60 days of submittal.

Management plans prepared under thes HCP will include information as outlined in Appendix C of the HCP. These plans typically will contain the following elements

- List of Covered Species to be managed under the plan.
- Management goals.
- Description of management and enhancement activities.
- Maps of existing habitat.
- Acreage table for each habitat type included within conserved land.
- Maps of needed fence and sign locations.
- Description of anticipated management activities to be performed, including vegetation management.
- Maps of habitat anticipated to result from enhancement.
- Success criteria for habitat enhancement or restoration and restoration plans to be implemented if success criteria are unmet.
- Description of applicable monitoring activities.
- Name and agreement with conservation easement holder, if any, or deed restrictions on fee-owned land.
- Cost of management and endowment (PAR or PAR-like analysis).
- Name and agreement with managing entity.
- Description of other activities allowed on the preserve (e.g., education, flood control) and how their impacts on Covered Species will be minimized.
- Determination of whether public access would be permitted.
- Description of potential revenue-generating activities to be permitted, if applicable.
- Description of how unwanted or illegal activities will be eliminated or reduced in the preserve.
- Description of methods for predator control (e.g., feral cats, coyotes, bullfrogs), if necessary.

9. Summary of Conservation Strategy: HCP Tables 5-7 (page 95 of this opinion) and 5-8 (page 97 of this opinion) provide a species-by-species summary of how implementation of the conservation strategy will avoid, minimize, and mitigate impacts on the covered wildlife and plant species. The conservation strategy will ensure that the impacts from Covered Activities are avoided, minimized, and mitigated in a way that is preferable to ad-hoc permitting, and that serves to create a more consistent program that benefits Covered Species.

**HCP Table 5-7. Conservation Strategy Summary for Covered Wildlife Species**

| Species | Avoidance and Minimization Measures | Mitigation | Conclusion |
|---|---|---|---|
| **Invertebrates** | | | |
| California freshwater shrimp | FP-04, FP-11, FP-12, FP-15, FP-16, Hot Zone-1, Wetland-2 | Restore and enhance habitat if direct impacts cannot be avoided and preserve 2.9 acres for freshwater shrimp mitigation. | Direct impacts avoided or minimized with the hot zone AMM and application of large activity AMM and FPs. Mitigation ensures impacts will be mitigated. |
| Conservancy fairy shrimp | FP-04, FP-11, FP-12, FP-15, FP-16, Wetland-1 | Preserve 3.5 acres of habitat. | Direct impacts avoided or minimized with the application of large activity AMM and FPs. Any remaining impacts will be mitigated. |
| Longhorn fairy shrimp | FP-04, FP-11, FP-15, FP-16, Hot Zone-2, Wetland-1 | Contribute to the conservation of 1.3 acres of habitat. | Direct impacts avoided or minimized with the hot zone AMM, large activity AMM, and application of FPs. Any remaining impacts will be mitigated. |
| Vernal pool fairy shrimp | FP-04, FP-11, FP-15, FP-16, Wetland-1 | Preserve 40 acres for vernal pool mitigation. | Direct impacts avoided or minimized with the application of large activity AMM and FPs. Any remaining impacts will be mitigated. |
| Vernal pool tadpole shrimp | FP-04, FP-11, FP-15, FP-16, Wetland-1 | See vernal pool fairy shrimp. | Direct impacts avoided or minimized with the application of large activity AMM and FPs. Any remaining impacts will be mitigated. |
| Delta green ground beetle | FP-11, FP-15, FP-16, Wetland-1 | Mitigation for this species (8 acres) is provided in conjunction with vernal pool fairy shrimp if purchased in Solano County. | Direct impacts avoided or minimized with the application of large activity AMM and FPs. Any remaining impacts will be mitigated. |
| Bay checkerspot butterfly | FP-07, FP-10, FP-14, Hot Zone-5 | PG&E will provide 74 acres of mitigation. | Direct impacts avoided or minimized with the application of the hot zone AMM and FPs. Any remaining impacts will be mitigated. |
| Callippe silverspot butterfly | FP-03, FP-04, FP-07, FP-10, FP-14, Hot Zone-3 | Preserve 145 acres for habitat management or enhancement programs. | Direct impacts avoided or minimized with the application of the hot zone AMM on San Bruno Mountain and FPs elsewhere. Any remaining impacts will be mitigated. |
| Lange's metalmark butterfly | FP-03, FP-04, FP-07, FP-10, Hot Zone-4 | Enhance or preserve 1.9 acres of habitat. | Direct impacts avoided or minimized with the application of the hot zone AMM and FPs. Habitat enhancement is expected to exceed direct impacts, resulting in a benefit to this species. |

**HCP Table 5-7. Conservation Strategy Summary for Covered Wildlife Species**

| Species | Avoidance and Minimization Measures | Mitigation | Conclusion |
|---|---|---|---|
| **Invertebrates (continued)** | | | |
| Mission blue butterfly | FP-03, FP-04, FP-07, FP-10, FP-14, Hot Zone-3 | Contribute funds to San Bruno Mountain HCP towards preservation of 26 acres of habitat. | Direct impacts avoided or minimized with the application of the hot zone AMM on San Bruno Mountain and FPs. Any remaining impacts will be mitigated. |
| San Bruno elfin butterfly | FP-03, FP-04, FP-07, FP-10, Hot Zone-3 | See Mission blue butterfly. | Direct impacts avoided or minimized with the application of the hot zone AMM on San Bruno Mountain and FPs. Any remaining impacts will be mitigated. |
| **Amphibians** | | | |
| California tiger salamander (Central California DPS) | FP-04, FP-11, FP-12, FP-13, FP-15, FP-16, Hot Zone-6, Wetland-1, Wetland-2 | Acquire up to 2,183 acres of upland habitat; acquire 624 acres of critical habitat; acquire wetland habitat consistent with impacts – up to 31 acres. | Direct impacts avoided or minimized with the application of hot zone AMM, large activity AMM, and FPs. Any remaining impacts will be fully mitigated. |
| California tiger salamander (Sonoma County DPS) | FP-04, FP-11, FP-13, FP-15, FP-16, Hot Zone-6, Wetland-1, Wetland-2 | Acquire 119 acres consistent with the *Santa Rosa Plain Conservation Strategy*. | Direct impacts avoided or minimized with the application of AMMs and FPs in known locations and in hot zones and AMMs for large activities. Any remaining impacts will be fully mitigated. |
| California red-legged frog | FP-11, FP-12, FP-13, FP-15, FP-16, Wetland-2 | Acquire up to 1,110 acres of dispersal habitat; acquire 177 acres of critical habitat; acquire 503 acres of modeled breeding habitat (25 acres of actual wetted habitat). Approximately 30 percent of mitigation may co-occur with mitigation for impacts on Central California tiger salamander dispersal habitat. | Direct impacts avoided or minimized with the application of AMMs and FPs and AMM for large activities. Any remaining impacts will be mitigated. |
| **Reptiles** | | | |
| Alameda whipsnake | FP-04, FP-07, FP-10, FP-13, FP-14 | Contribute to the conservation of up to 101 acres of core habitat and 245 acres of movement habitat. | Direct impacts avoided or minimized with the application of FPs. Any remaining impacts will be fully mitigated. |
| San Francisco garter snake | FP-04, FP-11, FP-12, FP-13, FP-15, FP-16, Hot Zone-7 Wetland-2 | Contribute to the conservation of 38 acres of habitat. | Direct impacts avoided or minimized with the application of the hot zone AMM, large activity AMM, and FPs. Any remaining impacts will be mitigated. |

**HCP Table 5-7. Conservation Strategy Summary for Covered Wildlife Species**

| Species | Avoidance and Minimization Measures | Mitigation | Conclusion |
|---|---|---|---|
| **Birds** | | | |
| California Ridgway's rail | FP-02, FP-03, FP-04, FP-05 FP-16,FP-18, Hot Zone-8 | See Salt marsh-harvest mouse. | Direct impacts avoided or minimized with the application of the hot zone AMM and FP. Any remaining impacts will be mitigated. |
| **Mammals** | | | |
| Salt marsh harvest mouse | FP-05, FP-06, FP-13, Hot Zone-8 | 46 acres of marsh preservation or restoration. | Direct impacts avoided or minimized with the application of the hot zone AMMs and FPs. Any remaining impacts will be mitigated. |
| San Joaquin kit fox | FP-04, FP-06, FP-07, FP-08, FP-13, FP-14, SJKF-1 | Contribute to the conservation of 733 acres of grassland habitat. | Direct impacts avoided or minimized with the application of the species-specific AMM for large activities and FPs. Any remaining impacts will be fully mitigated. |

FP-01 and FP-02 benefit all species and are not included in table.
NWR = National Wildlife Refuge

**HCP Table 5-8. Conservation Strategy Summary for Covered Plant Species by Category**

| Plant Species | Avoidance and Mitigation Measures | Mitigation | Conclusion |
|---|---|---|---|
| Pallid manzanita | Plant-01, Plant-02, Plant-04, Plant-05, Plant-07, Plant-08 | 1. Salvage and replant as a component of ROW restoration, plus monitor success. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. Additional coordination with the Service and custom mitigation may be necessary to ensure impacts are mitigated. |
| Sonoma sunshine | Plant-01, Plant-02, Plant-03, Plant-04, Plant-05, Plant-06 | 1. Salvage topsoil, replace and recontour as a component of ROW restoration, plus monitor success.<br>2. Partner with conservation entity working to support the *Santa Rosa Plain Conservation Strategy*.<br>3. Acquire lands or conservation easements consistent with the *Santa Rosa Plain Conservation Strategy*.<br>4. Purchase mitigation credits. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. |

**HCP Table 5-8. Continued**

| Plant Species | Avoidance and Mitigation Measures | Mitigation | Conclusion |
|---|---|---|---|
| Coyote ceanothus | Plant-01, Plant-02, Plant-04, Plant-05, Plant-07 | 1. Salvage and re-plant as a component of ROW restoration, plus monitor to determine success.<br>2. Partner with *Santa Clara Valley Habitat Plan* implementing agency to enhance restoration efforts.<br>3. Acquire lands or conservation easements consistent with the Santa Clara Valley Habitat Plan. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. |
| Fountain thistle | Plant-01, Plant-02, Plant-05, Plant-07 | 1. Salvage and re-plant as a component of ROW restoration, plus monitor to determine success.<br>2. Acquire lands or conservation easements consistent with the *Santa Clara Valley Habitat Plan*. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. Additional coordination with the Service and custom mitigation may be necessary to ensure impacts are mitigated. |
| Santa Clara Valley dudleya | Plant-01, Plant-02, Plant-05, Plant-07 | 1. Salvage and re-plant as a component of ROW restoration, plus monitor to determine success.<br>2. Propagate replacement stock and transplant into ROW locations with suitable habitat, plus monitor to determine success.<br>3. Partner with *Santa Clara Valley Habitat Plan* implementing agency to enhance restoration efforts.<br>4. Acquire lands or conservation easements consistent with the *Santa Clara Valley Habitat Plan*. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. |
| Contra Costa wallflower | Plant-01, Plant-02, Plant-05, Plant-07 | 1. Establish a conservation easement on PG&E lands at Antioch Dunes NWR.<br>2. Coordinate with the Service to fund habitat restoration activities or propagation and transplantation activities. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. |
| Marin dwarf flax | Plant-01, Plant-02, Plant-03, Plant-04, Plant-06 | 1. Salvage topsoil, replace and recontour as a component of ROW restoration, plus monitor success.<br>2. Coordinate with SFPUC to fund restoration activities. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. |

**HCP Table 5-8. Continued**

| Plant Species | Avoidance and Mitigation Measures | Mitigation | Conclusion |
|---|---|---|---|
| Burke's goldfields | Plant-01, Plant-02, Plant-03, Plant-04, Plant-06 | 1. Salvage topsoil, replace and recontour as a component of ROW restoration, plus monitor success.<br>2. Partner with conservation entity working to support the *Santa Rosa Plain Conservation Strategy*.<br>3. Acquire lands or conservation easements consistent with the *Santa Rosa Plain Conservation Strategy*.<br>4. Purchase mitigation credits. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. |
| Contra Costa goldfields | Plant-01, Plant-02, Plant-03, Plant-04, Plant-06 | 1. Salvage topsoil, replace and recontour as a component of ROW restoration, plus monitor success.<br>2. Partner with conservation entity working to support the Solano HCP conservation efforts.<br>3. Acquire lands or conservation easements in Solano County.<br>4. Purchase mitigation credits. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. |
| Sebastopol meadowfoam | Plant-01, Plant-02, Plant-03, Plant-04, Plant-06 | 1. Salvage topsoil, replace and recontour as a component of ROW restoration, plus monitor success.<br>2. Partner with conservation entity working to support the *Santa Rosa Plain Conservation Strategy*.<br>3. Acquire lands or conservation easements consistent with the *Santa Rosa Plain Conservation Strategy*.<br>4. Purchase mitigation credits. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. |
| Antioch Dunes evening primrose | Plant-01, Plant-02, Plant-04, Plant-07 | 1. Establish a conservation easement on PG&E lands at Antioch Dunes NWR.<br>2. Coordinate with the Service to fund habitat restoration activities or propagation and transplantation activities. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. |
| White-rayed pentachaeta | Plant-01, Plant-02, Plant-04, Plant-05, | 1. Salvage topsoil, replace and recontour as a component of ROW restoration, plus monitor success.<br>2. Coordinate with SFPUC to fund restoration activities. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. Additional coordination with the Service and custom mitigation may be necessary to ensure impacts are mitigated. |

**HCP Table 5-8. Continued**

| Plant Species | Avoidance and Mitigation Measures | Mitigation | Conclusion |
|---|---|---|---|
| Metcalf Canyon jewelflower | Plant-01, Plant-02, Plant-03, Plant-04, Plant-05, Plant-06 | 1. Salvage topsoil, replace and recontour as a component of ROW restoration, plus monitor to determine success.<br>2. Partner with *Santa Clara Valley Habitat Plan* implementing agency to enhance restoration efforts.<br>3. Acquire lands or conservation easements consistent with the *Santa Clara Valley Habitat Plan*. | Direct impacts minimized with AMMs. Any remaining impacts will be mitigated. |

NWR = National Wildlife Refuge

10. Implementation Structure: PG&E's Environmental Management group is responsible for environmental planning and permitting of all utility infrastructure and projects. The Environmental Management group will be responsible for the overall management of the HCP through a dedicated team of employees that will implement the program. The HCP team will include an HCP administrator and land planning analysts. Direct support to the HCP team will come from company-wide land planners and biologists who will work with the HCP team to ensure successful implementation and compliance of the HCP. Biological monitors and field crews will have direct roles for implementing and following AMMs in the field. For additional information on implementation structure see HCP Section 6.1.

11. Implementation Tasks: Implementation tasks are partially described in HCP Chapter 5, *Conservation Strategy*, which has been incorporated into the *HCP Conservation Strategy* above. Additional implementation tasks are described below:

    *Conduct Education and Training*

    Two types of training will be given to PG&E staff and contractors: annual training and project-specific training. Annual training is broad and will cover multiple aspects of the HCP, including the HCP as a program, Covered Activities, Covered Species, AMMs, compliance requirements, and the conservation strategy. The targeted audience that will receive HCP education and training include construction crew members, project managers, land planners, land management staff, construction contractors, and environmental management staff. Annual training will be conducted either in-person or as computer-based training.

    Project-specific training (i.e., tailboards) will be provided for staff working on Covered Activities for which AMMs are required, when work is conducted in a hot zone, when species-specific AMMs are required on large projects, and as required when PG&E is working in Map Book zone areas.

    *Conduct Environmental Review, Planning and Screening*

    PG&E will continue to conduct its environmental review, planning, and screening processes for ongoing O&M work activities. These standard operating procedures provide the foundation for ensuring work is conducted in a manner that avoids and minimizes impacts on the environment and natural resources. In addition to compliance with HCP requirements, land planners and biologists ensure that all environmental, regulatory, and land management requirements are followed.

    *Utilization of the Species Habitat Models*

    PG&E will integrate the species habitat models into Map Guide, PG&E's system-wide GIS system that contains all facility, environmental, and land use GIS data and information. The Environmental Management group and the HCP team will be trained on the use of the species habitat models and their relationship to the conservation strategy. The Environmental Management group will also be trained on the requirements for working in hot zones and Map Book zones to ensure successful implementation of AMMs and BMPs when Covered Activities are conducted in those areas.

The HCP team, land planners, and biologists will utilize species habitat models and other data sources in Map Guide during their respective environmental review, planning, and screening processes to determine the use of AMMs for Covered Activities. Land planners and biologists will work with the HCP team to review, confirm, or identify where Covered Activities could impact Covered Species habitat and where mitigation is necessary to compensate for Covered Activity impacts. Environmental management staff will be trained on how the models will be used to determine required mitigation for impacts unless additional site review reveals that the site or area is no longer habitat as described in the *Purpose and Application of Habitat Models.*

*Implement AMMs and Vegetation Management BMPs*

As part of the initial HCP implementation training, environmental management staff will be trained on the AMMs and vegetation management BMPs as described in *Avoidance and Minimization of Impacts.* PG&E will implement field protocols and AMMs described in HCP Table 5-1 (found on page 50 of this opinion), the BMPs described in HCP Table 5-2 (found on page 59 of this opinion), and the conservation strategy summary approach illustrated in HCP Table 5-3 (found on page 65 of this opinion). HCP Table 5-3 provides additional information on screening of hot zone and Map Book zone locations, flexibility of work locations, ability to avoid burrows, PG&E's ability to report and track impacts on modeled habitat, and if onsite restoration is anticipated. PG&E will conduct an assessment and review of its AMMs and vegetation management BMPs, as described under in the section titled *Effectiveness Monitoring* below, to determine if they are performing as anticipated.

General Restoration Efforts

PG&E land planners and biologists will ensure restoration efforts are implemented after completion of Covered Activities affecting more than 0.1 acre and report this information to the HCP administrator. Information on the number of restoration sites and the status of the restoration efforts will be aggregated quarterly and summarized for the Service annually.

Covered Plant Salvage and Monitoring

For activities affecting more than 0.1 acre in Map Book zones for which AMMs are ineffective or cannot be implemented, a biologist will develop a site-specific restoration plan that contains the following information: number of individual plants to be salvaged in advance of Covered Activities; an assessment of the impact site; a description of methods for collecting, storing, or propagating plant material from the impact site; information on site preparation and reintroduction of collected plant material; measurable success criteria for a 3 year period; adaptive management measures to ensure the desired success criteria are achieved; monitoring and reporting methods and schedules; identification of funding sources and responsible parties; and identification of the acreage or number of individual plants expected to benefit from implementing the restoration plan.

For perennials, PG&E biologists will salvage individual plants in advance of the impact and replant them within the ROW. For annuals, PG&E biologists will salvage topsoil and replace it within the ROW. PG&E biologists will monitor the success of the replanting of perennial species and recovery of annual species for up to 3 years. If the

plants recover in 1 year, no further monitoring will be required and this information will be presented in the annual report. If monitoring efforts indicate that restoration is unsuccessful, a permanent impact would be included in the annual report for the restoration activity and mitigation would be acquired at the permanent impact ratio.

*Maintain Mitigation Requirements*

PG&E will keep track of the acres of habitat acquired, its location, and the species benefiting from the mitigation. PG&E will also account for the acres of habitat debited from mitigation lands. PG&E will track the types of habitat acquired, and identify any issues associated with the habitat acquisitions or management. If there are acquisition or management issues, PG&E will work with the Service to adjust the process. Additional information on tracking impacts and mitigation is provided in the sections titled *Impact Accounting* and *Mitigation Accounting.*

12. Monitoring: The HCP team will conduct three types of annual, required monitoring, compliance, effects, and effectiveness. Compliance monitoring tracks compliance with the requirements of the HCP. The HCP administrator and HCP analysts will be responsible for overseeing the compliance monitoring as Covered Activities are planned and completed. Effects monitoring tracks and organizes the impacts of the Covered Activities on the Covered Species habitat. The HCP administrator will be responsible for ensuring that impact estimates are being evaluated and revised as necessary.Effectiveness monitoring tracks the effectiveness of the measures in meeting the HCP's biological goals and objectives. Management at PG&E and the HCP administrator will be responsible for ensuring that the biological goals and objectives are being met.

The monitoring obligations are described in more detail below.

*Compliance Monitoring*

PG&E will verify the HCP's conservation measures are being implemented as required. This will include collecting information that:

- Confirms education and training is conducted.
- Demonstrates environmental review, planning and screening are occurring.
- Shows biological surveys and monitoring are conducted, when necessary.
- Confirms AMMs and vegetation management BMPs are being implemented.
- Provides an accounting of impacts and mitigation.

Compliance monitoring information will be provided in the annual report as described in the section titled *Reporting.*

*Effects Monitoring*

PG&E will verify its impacts are in-line with the assumptions and impact estimates used in developing the HCP. As described earlier in the HCP, impacts will vary from year to year. PG&E will use a combination of disturbance estimates for small activities and actual impact data (on the ground measurements) for medium and large activities to track its impacts, as described in Chapter 5, *Conservation Strategy*, and presented in HCP Table 5-3 (page 65 of this opinion). To confirm the estimates for small activities are accurately portrayed and have not changed over

time, the HCP team will conduct a validation study by reviewing 25 to 50 activities in implementation years 5, 10, 15, 20 and 25. The validation study will analyze activities shown in HCP Table 5-3, specifically, activities G6, G7, G12, E6a, E8b, E15, G10, G12, E12, E13, G9, G11, G16, G18, E9a and E10d. A combination of GIS-based desktop and in-the-field measurements will be used to evaluate the impact estimates from Covered Activities during HCP implementation. PG&E will compare these results with the impact estimates used during HCP development. The validation study will help ensure the impacts are accounted for correctly. If PG&E determines, and the Service concurs, that these validation efforts are ineffective (i.e., the surveys continue to demonstrate the activities are small and unchanging, or PG&E is unable to detect impacts), PG&E may reprioritize its staff time to focus on other areas of effects monitoring. Effects monitoring information will be provided in the annual report, as described in Section 6.4, Reporting.

*Effectiveness Monitoring*

The purpose of effectiveness monitoring is to ensure the overall program is being implemented effectively. Effectiveness monitoring will focus on two areas: (1) HCP effectiveness as related to the effectiveness of the AMMs, permit consistency, tracking, and reporting, and (2) mitigation effectiveness to benefit Covered Species.

HCP Effectiveness

The HCP team will collect, compile, and summarize data from the land planners and biologists regarding completed Covered Activities, biological surveys, monitoring reports, release to construction documentation, and other information to evaluate overall effectiveness of the program. Based on this information, the HCP team will answer the following questions.

- Is the program operating as anticipated?
- Is the program effectively avoiding and minimizing take of Covered Species?
- Are there changes that would make the program more effective?
- Can changes be made within the scope, budget, and staffing available?
- Are changes consistent with the permits?
- Will the Service support changes?
- In addition, the HCP team will complete the following actions.
- Identify instances where AMMs were unsuccessful or infeasible.
- Collect and analyze information from crews and the biologists as to why AMMs may have been ineffective or difficult to implement, and ask crews and biologists for ideas for improvement.
- Coordinate with all the necessary stakeholders to determine what is working or not working regarding program implementation.

Information gathered from these actions may identify problems associated with implementation of the hot zone or species-specific AMMs and subsequently help the HCP team to develop modifications to existing measures for the purpose of minimizing habitat disturbance and take of Covered Species or other ways to make measures more effective and efficient. Further, additional AMMs measures may be identified over time. Changes in AMMs or new AMMs will be implemented only with the concurrence of the Service.

Mitigation Effectiveness

The HCP team will also ensure its mitigation program is effective. It will ensure PG&E achieves the HCP's biological goals and objectives and that PG&E's mitigation benefits Covered Species. The HCP team will ensure (Goal 2) mitigation lands contribute to a network of permanently protected and managed lands, and (Goal 3) ensure mitigation lands benefit Covered Species. Mitigation properties will include regular management, monitoring, and reporting, and the results of these efforts will be summarized in PG&E's annual report.

13. Reporting: The HCP team will prepare annual reports to document permit compliance and implementation of the conservation strategy. Each annual report will summarize the previous calendar year's activities and will be completed by March 31 following the reporting year. Annual reports will be submitted to designated representatives of the Service.

    The annual report will meet the following goals:

    - Provide the necessary information to demonstrate PG&E is implementing the HCP successfully and in compliance with the Section 10 permit.
    - Document problems with plan implementation that occurred during the reporting year and the steps taken to resolve the problems.
    - Document foreseeable issues with implementation that may require consultation with the Service.
    - Make recommendations for increasing the success of the conservation strategy, including revisions to AMMs or the implementation process.
    - Document mitigation is being secured and benefiting Covered Species.

    The annual report will organize and summarize reporting information in two ways. First, each annual report will summarize the previous calendar year's activities, documenting all compliance requirements for the reporting year. Second, the annual report will compile and summarize all compliance reporting requirements from the previous years, starting from the date the Service issues the permit. At a minimum, each annual report will include the following information to document the previous year's activities.

    - A summary of the annual training provided to staff and contractors.
    - A summary of the results of the environmental review, planning, and screening processes.
        - Impacts on modeled species habitat.
            - Number of Covered Activities completed (as shown in HCP Table 5-3, page 65 of this opinion).
            - Total of temporary impact acreages by species.
            - Total of permanent impact acreages by species.
            - Total acreages of impact on critical habitat.
        - Remaining take authorization.
        - A summary of any injury or mortality-related take that occurred during the year.
    - Documentation of compliance with mitigation requirements.
        - Total acreage of mitigation (i.e., approved via land acquisition form).
        - Total acreage purchased.
        - Acreage of mitigation obtained for each Covered Species during the year.
        - Acreage of mitigation applied to offset Covered Species impacts during the year.

    - End-of-year acreage balance of mitigation remaining for each Covered Species.
    - Description of PG&E-owned mitigation land-area monitoring.
    - Summary of monitoring reports from the qualified mitigation land managers with responsibility for ensuring habitat quality and suitability is maintained for PG&E habitat acquisitions (See Appendix C, Checklist for Mitigation Site Annual and Monitoring Reports).
- In addition to the annual compliance reporting, the annual report will compile and summarize the following information from the previous years, starting from the date the Service approves the HCP and issues the permit.
    - Total year over year impacts on modeled species habitat.
        - Total of temporary impact acreages by species.
        - Total of permanent impact acreages by species.
        - Total acreages of impact on critical habitat.
        - Total impact acreages combined (temporary and permanent).
        - Overall acreage balance of mitigation remaining for each Covered Species.
        - Overall remaining take authorization.
    - Confirmation that take is not exceeding 10-year thresholds or the total cap.
- A summary of the validation study to be conducted in implementation years 5, 10, 15, 20, and 25 of the permit term.
- Description of any adaptive management measures proposed for the following year for mitigation lands.
- A list of all amendments or other important decisions made to date, starting with the permit issuance.
- Additional information as agreed to by PG&E and the Service.

14. Impact Accounting: The HCP team will keep a running total of annual Covered Activity impacts and Covered Species take, including impacts on critical habitat, over the permit term. Figure 5-2 (in the HCP) and HCP Table 5-3 (page 65 of this opinion), the determination of impacts resulting from Covered Activities is based on estimated or actual on-the-ground impacts recorded after the activity is completed. The HCP team is responsible for recording temporary and permanent impacts as reported by the land planners and biologists, as well as the data collected from internal data systems (e.g., AEA). For wildlife habitat impacts, PG&E will record habitat losses in acreage or square feet to the nearest hundredth of an acre. For all plant species, PG&E will record all habitat losses as acreage or square feet to the nearest hundredth acre, as individual plant losses, or as both. If planners or biologists determine restoration plans are ineffective and impacts become permanent, these impacts will also be tracked. To ensure that impacts on Covered Species are not disproportionately large in any 10-year period, PG&E will monitor impacts on covered wildlife closely to ensure that the authorized take is not exhausted unevenly throughout the permit term. The following impact parameters will be monitored.

    - One-third of the take authorization will not be exceeded in a 10 year period for California tiger salamander (both the Central California and Sonoma County DPS).
    - One-third of the take authorization will not be exceeded in a 10-year period for the California red-legged frog.
    - For all other wildlife species, take will not exceed 50 percent of the take authorization in a 10 year period.

These amounts are not intended to be firm 10-year caps because the amount of take will be limited by the overall permit. Rather, these amounts should be considered interim limitations that could be exceeded by up to 20 percent of the total permitted take if PG&E can demonstrate its impacts are dispersed, mitigation is assured, and mitigation is provided ahead of impacts.

*Mitigation Accounting*

The HCP team will use the estimated habitat loss acreages in HCP Table 4-1 (found on page 73 of this opinion) and actual impact determinations for projects reported from land planners and biologists (HCP Table 5-3, page 65 of this opinion) to calculate the mitigation that is required to offset the prior years' impacts by species. Temporary and permanent impacts for the reporting year will be mitigated accordingly using: (1) the affected species modeled habitat and (2) the ratio of compensation for that species based on whether the impacts are temporary, and mitigated in advance, or permanent. The HCP team will use an internal mitigation accounting reporting system (MARS) to keep track of all annual impacts and the mitigation required as part of the conservation strategy. MARS will track and deduct "species-acre credits" from approved mitigation acquisitions. MARS will track all mitigation in order to stay ahead of Covered Activity impacts. If planners find that temporary impacts become permanent, the data will be updated in MARS.

15. Adaptive Management for Mitigation Lands: Adaptive management is a necessary component of habitat conservation plans to ensure the effective management and protection of mitigation lands. The Service's 5 Point Policy (note this is no longer a separate policy, and was intergrated into the revised HCP handbook in 2016) describes adaptive management as an integrated method for addressing uncertainty in natural resource management. In the context of the HCP, natural resource management will focus on managing mitigation lands. For each management plan that is prepared for the HCP, PG&E will include a contingency of approximately 5–10 percent of the total endowment to allow the mitigation land manager to complete the following actions.

    - Identify and resolve emerging issues.
    - Develop alternative and experimental management strategies.
    - Support a monitoring of the new management strategies.
    - Incorporate information collected during monitoring to inform the management decision-making process.
    - Respond to changed circumstances.

    Adaptive management actions will likely take place at the following junctures:

    1. In response to downward trends in the status of Covered Species or key natural-community attributes.
    2. When new information from the literature or other relevant research indicates that a feasible and superior alternative method for achieving the biological goals and objectives exists.
    3. When monitoring indicates that the expected or desired result of a management action did not occur.

    Most adaptive management measures will be implemented when conservation actions do not produce the desired outcome or when species or natural-community trends decrease. In these

cases, new actions would be implemented to try and improve the outcome for species and communities. Such actions could include following.

- Alter the timing, location, intensity or type of grazing.
- Reduce, increase or otherwise change the pattern of management actions.
- Modify age, timing, location, or type of restoration.
- Modify approach to noxious weed control.
- Modify species-specific conservation actions based on monitoring results.

Most land management will focus on simple and proven management and enhancement actions. Adaptive management decisions will be based on the data collected as part of ongoing monitoring and management.

16. Regulatory Assurances, Changed Circumstances and Unforeseen Circumstances: For specific information regarding regulatory assurances, changed and unforeseen circumstances, see HCP Section 6.6.

17. Other Considerations:

*Listing of Species not Covered*

Currently unlisted species that are not addressed as Covered Species in the Bay Area O&M HCP will not be included in the permit and will not be treated as Covered Species in the event that the species is listed after the Service issues the incidental take permit (if the Service determines the application meets the issuance criteria). PG&E will work with the Service to determine if a newly listed species could be affected by the Covered Activities and if additional consultation is necessary.

*Section 7 Consultation*

An important goal of the HCP is to provide a framework for compliance with the Act for all Covered Activities in the Plan Area. Whether a Covered Activity is implemented under section 7 or 10 of the Act, the HCP will provide the framework for future section 7 consultations. For some future projects, consultation (through section 7) will still be required even after the HCP is complete. The HCP is not intended to alter the obligation of another federal agency to consult the Service or NMFS pursuant to section 7 of the Act.

18. Permit Renewal, Plan Amendments, Permit Suspension and Revocation: It may be necessary for the Service or PG&E to clarify provisions of the Bay Area O&M HCP or the permit to address issues that arise during implementation. Such clarifications can take two forms: minor modifications or amendments. For a detailed description of minor modifications and amendments see HCP Section 6.7.

19. Role of the Service in Decisions Regarding Plan Implementation: See HCP Section 6.8 for a detailed description of the Service's role during implementation.

20. Funding: For a detailed description of the funding program see HCP Section 6.9.

**Action Area**

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the proposed project, the action area is the Plan Area, which consists of 402,440 acres of PG&E's facilities (both existing and future additions) spanning 9 Bay Area counties: Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara, San Mateo, and San Francisco.

**Analytical Framework for the Jeopardy Determination**

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this biological opinion considers the effects of the proposed Federal action, and any cumulative effects, on the rangewide survival and recovery of the listed species. It relies on four components: (1) the *Status of the Species*, which describes the rangewide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the species.

**Analytical Framework Adverse Modification**

Section 7(a)(2) of the ESA requires that Federal agencies insure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. A final rule revising the regulatory definition of "destruction or adverse modification" (DAM) was published on February 11, 2016 (81 FR 7214). The final rule became effective on March 14, 2016. The revised definition states:

> "Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features."

The DAM analysis in this biological opinion relies on four components: (1) the *Status of Critical Habitat*, which describes the range-wide condition of the critical habitat in terms of the key components (i.e., essential habitat features, primary constituent elements, or physical and biological features) that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the listed species; (2) the *Environmental Baseline*, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the value of the critical habitat in the

action area for the conservation/recovery of the listed species; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated and interdependent activities on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the conservation value of the affected critical habitat; and (4) *Cumulative Effects*, which evaluate the effects of future non-Federal activities that are reasonably certain to occur in the action area on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the conservation value of the affected critical habitat.

For purposes of making the DAM determination, the Service evaluates if the effects of the proposed Federal action, taken together with cumulative effects, are likely to impair or preclude the capacity of critical habitat in the action area to serve its intended conservation function to an extent that appreciably diminishes the rangewide value of critical habitat for the conservation of the listed species. The key to making that finding is understanding the value (i.e., the role) of the critical habitat in the action area for the conservation/recovery of the listed species based on the *Environmental Baseline* analysis.

**Status of the Species**

*California Freshwater Shrimp*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *California Freshwater Shrimp (*Syncaris pacifica*) 5-Year Review: Summary and Evaluation* (Service 2007a). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2007 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *California Freshwater Shrimp Recovery Plan, California* (Service 1998a), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Conservancy Fairy Shrimp*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Conservancy Fairy Shrimp (*Branchinecta conservatio*) 5-Year Review: Summary and Evaluation* (Service 2012). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2012 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005a), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Longhorn Fairy Shrimp*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Longhorn Fairy Shrimp (*Branchinecta longiantenna*) 5-Year Review: Summary and Evaluation* (Service 2007b). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2007 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern*

*Oregon* (Service 2005a), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Vernal Pool Fairy Shrimp*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Vernal Pool Fairy Shrimp (*Branchinecta lynchi*) 5-Year Review: Summary and Evaluation* (Service 2007c). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2007 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005a), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Vernal Pool Tadpole Shrimp*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Vernal Pool Tadpole Shrimp (*Lepidurus packardi*) 5-Year Review: Summary and Evaluation* (Service 2007d). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2007 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005a), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Delta Green Ground Beetle*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Delta Green Ground Beetle (*Elaphrus viridis*) 5-Year Review: Summary and Evaluation* (Service 2009a). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2009 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005a), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Bay Checkerspot Butterfly*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Bay Checkerspot Butterfly (*Euphydryas editha bayensis*) 5-Year Review: Summary and Evaluation* (Service 2009b). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2009 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (Service 1998b), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Callippe Silverspot Butterfly*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Callippe Silverspot Butterfly (*Speyeria callippe callippe*) 5-Year Review: Summary and Evaluation* (Service 2009c). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2009 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *5-year Review*, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Lange's Metalmark Butterfly*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Lange's Metalmark Butterfly (*Apodemia mormo langei*) Antioch Dunes evening-primrose (Oenothera* deltoides *subsp.* howellii*) Contra Costa Wallflower (*Erysimum capitatum *var.* angustatum*) 5-Year Review: Summary and Evaluation* (Service 2008). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2008 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Three Endangered Species Endemic to Antioch Dunes, California* (Service 1984a), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Mission Blue Butterfly*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *San Bruno Elfin Butterfly (*Callophrys mossii bayensis*) and Mission Blue Butterfly (*Icaricia icarioides missionensis*) 5-Year Review: Summary and Evaluation* (Service 2010). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2010 5-year review was finalized. While threats have continued throughout the regions identified in the *Recovery Plan for the San Bruno Elfin and Mission Blue Butterflies* (Service 1984b), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*San Bruno Elfin Butterfly*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *San Bruno Elfin Butterfly (*Callophrys mossii bayensis*) and Mission Blue Butterfly (*Icaricia icarioides missionensis*) 5-Year Review: Summary and Evaluation* (Service 2010). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2010 5-year review was finalized. While threats have continued throughout the regions identified in the *Recovery Plan for the San Bruno Elfin and Mission Blue Butterflies* (Service 1984b), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Central California Tiger Salamander*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (*Ambystoma californiense*)* (Service 2017). No change in the species' listing status was recommended in the 5-year review. Threats evaluated during that review have continued to act on the species since the recovery plan was published, with loss of habitat being the most significant effect. While there have been continued losses of Central California tiger salamander habitat, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Sonoma California Tiger Salamander*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Recovery Plan for the Santa Rosa Plain:* Blennosperma bakeri *(Sonoma sunshine);* Lasthenia burkei *(Burke's goldfields);* Limnanthes vinculans *(Sebastopol Meadowfoam); California Tiger Salamander Sonoma County Distinct Population Segment (*Ambystoma californiense*)* (Service 2016). Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2016 recovery plan was finalized. To date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*California Red-Legged Frog*

Listing Status: The California red-legged frog was listed as a threatened species on May 23, 1996 (Service 1996). Critical habitat was designated for this species on April 13, 2006 (Service 2006) and revisions to the critical habitat designation were published on March 17, 2010 (Service 2010). At this time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer *et al.* 2010). A recovery plan was published for the California red-legged frog on September 12, 2002 (Service 2002).

Description: The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches in length (Stebbins 2003). The abdomen and hind legs of adults are largely red, while 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. Dorsal spots usually have light centers (Stebbins 2003), and dorsolateral folds are prominent on the back. Larvae (tadpoles) range from 0.6 to 3.1 inches in length, and the background color of the body is dark brown and yellow with darker spots (Storer 1925).

Distribution: The historic range of the California red-legged frog extended from the vicinity of Elk Creek in Mendocino County, California, along the coast inland to the vicinity of Redding in Shasta County, California, and southward to northwestern Baja California, Mexico (Fellers 2005; Jennings and Hayes 1985; Hayes and Krempels 1986). The species was historically documented in 46 counties but the taxa now remains in 238 streams or drainages within 23 counties, representing a loss of 70 percent of its former range (Service 2002). California red-legged frogs are still locally abundant within portions of the San Francisco Bay area and the Central California Coast. 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 (CDFW 2017).

Status and Natural History: California red-legged frogs predominately inhabit permanent water sources such as streams, lakes, marshes, natural and manmade ponds, and ephemeral drainages in valley bottoms and foothills up to 4,921 feet in elevation (Jennings and Hayes 1994, Bulger *et al.* 2003, Stebbins 2003). However, they also inhabit ephemeral creeks, drainages and ponds with minimal riparian and emergent vegetation. California red-legged frogs breed from November to April, although earlier breeding records have been reported in southern localities. Breeding generally occurs in still or slow-moving water often associated with emergent vegetation, such as cattails, tules, or overhanging willows (Storer 1925, Hayes and Jennings 1988). Female frogs deposit egg masses on emergent vegetation so that the egg mass floats on or near the surface of the water (Hayes and Miyamoto 1984).

Habitat includes nearly any area within 1-2 miles of a breeding site that stays moist and cool through the summer including vegetated areas with coyote brush, California blackberry thickets, and root masses associated with willow and California bay trees (Fellers 2005). Sheltering habitat for California red-legged frogs potentially includes all aquatic, riparian, and upland areas within the range of the species and includes any landscape feature that provides cover, such as animal burrows, boulders or rocks, organic debris such as downed trees or logs, and industrial debris. Agricultural features such as drains, watering troughs, spring boxes, abandoned sheds, or hay stacks may also be used. Incised stream channels with portions narrower and depths greater than 18 inches also may provide important summer sheltering habitat. Accessibility to sheltering habitat is essential for the survival of California red-legged frogs within a watershed, and can be a factor limiting frog population numbers and survival.

California red-legged frogs do not have a distinct breeding migration (Fellers 2005). Adults are often associated with permanent bodies of water. Some individuals remain at breeding sites year-round, while others disperse to neighboring water features. Dispersal distances are typically less than 0.5-mile, with a few individuals moving up to 1-2 miles (Fellers 2005). Movements are typically along riparian corridors, but some individuals, especially on rainy nights, move directly from one site to another through normally inhospitable habitats, such as heavily grazed pastures or oak-grassland savannas (Fellers 2005).

In a study of California red-legged frog terrestrial activity in a mesic area of the Santa Cruz Mountains, Bulger *et al.* (2003) categorized terrestrial use as migratory and non-migratory. The latter occurred from one to several days and was associated with precipitation events. Migratory movements were characterized as the movement between aquatic sites and were most often associated with breeding activities. Bulger *et al.* (2003) reported that non-migrating frogs typically stayed within 200 feet of aquatic habitat 90 percent of the time and were most often associated with dense vegetative cover, i.e., California blackberry, poison oak and coyote brush. Dispersing frogs in northern Santa Cruz County traveled distances from 0.25 mile to more than 2 miles without apparent regard to topography, vegetation type, or riparian corridors (Bulger *et al.* 2003).

In a study of California red-legged frog terrestrial activity in a xeric environment in eastern Contra Costa County, Tatarian (2008) noted that 57 percent of frogs fitted with radio transmitters in the Round Valley study area stayed at their breeding pools, whereas 43 percent moved into adjacent upland habitat or to other aquatic sites. Her study reported a peak seasonal terrestrial movement occurring in the fall months associated with the first 0.2 inch of precipitation and tapering off into spring. Upland movement activities ranged from 3 to 233 feet, averaging 80 feet, and were associated with a variety of refugia including grass thatch, crevices, cow hoof prints, ground squirrel burrows at the base of trees or rocks, logs, and under man-made structures; others were associated

with upland sites lacking refugia (Tatarian 2008). The majority of terrestrial movements lasted from 1 to 4 days; however, one adult female was reported to remain in upland habitat for 50 days (Tatarian 2008). Upland refugia closer to aquatic sites were used more often and were more commonly associated with areas exhibiting higher object cover, e.g., woody debris, rocks, and vegetative cover. Subterranean cover was not significantly different between occupied upland habitat and non-occupied upland habitat.

California 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). Egg masses containing 2,000 - 5,000 eggs are attached to vegetation below the surface and hatch after 6 - 14 days (Storer 1925, Jennings and Hayes 1994). In coastal lagoons, the most significant mortality factor in the pre-hatching stage is water salinity (Jennings *et al.* 1992). Eggs exposed to salinity levels greater than 4.5 parts per thousand resulted 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 - 7 months following hatching and reach sexual maturity at 2 - 3 years of age (Storer 1925; Wright and Wright 1949; Jennings and Hayes 1985, 1990, 1994). Of the various life stages, larvae probably experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings *et al.* 1992). California red-legged frogs may live 8 to 10 years (Jennings *et al.* 1992). Populations can fluctuate from year to year; favorable conditions allow the species to have 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, the animal may temporarily disappear from an area when conditions are stressful (e.g., during periods of drought, disease, etc.).

The diet of California red-legged frogs is highly variable and changes with the life history stage. The diet of the larvae is not well studied, but is likely similar to that of other ranid frogs, feeding on algae, diatoms, and detritus by grazing on the surface of rocks and vegetation (Fellers 2005; Kupferberg 1996a, 1996b, 1997). Hayes and Tennant (1985) analyzed the diets of California red-legged frogs from Cañada de la Gaviota in Santa Barbara County during the winter of 1981 and found invertebrates (comprising 42 taxa) to be the most common prey item consumed; however, they speculated that this was opportunistic and varied based on prey availability. They ascertained that larger frogs consumed larger prey and were recorded to have preyed on Pacific chorus frogs, three-spined stickleback, and, to a limited extent, California mice, which were abundant at the study site (Hayes and Tennant 1985, Fellers 2005). Although larger vertebrate prey was consumed less frequently, it represented over half of the prey mass eaten by larger frogs suggesting that such prey may play an energetically important role in their diets (Hayes and Tennant 1985). Juvenile and subadult/adult frogs varied in their feeding activity periods; juveniles fed for longer periods throughout the day and night, while subadult/adults fed nocturnally (Hayes and Tennant 1985). Juveniles were significantly less successful at capturing prey and all life history stages exhibited poor prey discrimination, feeding on several inanimate objects that moved through their field of view (Hayes and Tennant 1985).

Recovery Plan: The recovery plan for the California red-legged frog identifies eight recovery units (Service 2002). The establishment of these recovery units is based on the determination that various regional areas of the species' range are essential to its survival and recovery. The status of the California red-legged frog was considered within the small scale recovery units as opposed to their overall range. These recovery units are delineated by major watershed boundaries as defined by U.S. Geological Survey hydrologic units and the limits of its range. The goal of the recovery plan is to protect the long-term viability of all extant populations within each recovery unit. Within each

recovery unit, core areas have been delineated and represent contiguous areas of moderate to high California red-legged frog densities that are relatively free of exotic species such as bullfrogs. The goal of designating core areas is to protect metapopulations. Thus when combined with suitable dispersal habitat, will allow for the long term viability within existing populations. The management strategy identified within the Recovery Plan will allow for the recolonization of habitats within and adjacent to core areas that are naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of California red-legged frogs.

Threats: Habitat loss, non-native species introduction, and urban encroachment are the primary factors that have adversely affected the California red-legged frog throughout its range. Several researchers in central California have noted the decline and eventual local disappearance of California and northern red-legged frogs in systems supporting bullfrogs (Jennings and Hayes 1990, Twedt 1993), red swamp crayfish, signal crayfish, and several species of warm water fish including sunfish, goldfish, common carp, and mosquitofish (Moyle 1976, Barry 1992, Hunt 1993, Fisher and Schaffer 1996). This has been attributed to predation, competition, and reproduction interference. Twedt (1993) documented bullfrog predation of juvenile northern red-legged frogs, and suggested that bullfrogs could prey on subadult California red-legged frogs as well. Bullfrogs may also have a competitive advantage over California red-legged frogs. For instance, bullfrogs are larger and possess more generalized food habits (Bury and Whelan 1984). In addition, bullfrogs have an extended breeding season (Storer 1933) during which an individual female can produce as many as 20,000 eggs (Emlen 1977). Furthermore, bullfrog larvae are unpalatable to predatory fish (Kruse and Francis 1977). Bullfrogs also interfere with California red-legged frog reproduction by eating adult male California red-legged frogs. Both California and northern red-legged frogs have been observed in amplexus (mounted on) with both male and female bullfrogs (Jennings and Hayes 1990, Jennings 1993, Twedt 1993). Thus bullfrogs are able to prey upon and out-compete California red-legged frogs, especially in sub-optimal habitat.

The urbanization of land within and adjacent to California red-legged frog habitat has also affected the threatened amphibian. These declines are attributed to channelization of riparian areas, enclosure of the channels by urban development that blocks dispersal, and the introduction of predatory fishes and bullfrogs. Diseases may also pose a significant threat, although the specific effects of disease on the California red-legged frog are not known. Pathogens are suspected of causing global amphibian declines (Davidson *et al.* 2003). Chytridiomycosis and ranaviruses are a potential threat because these diseases have been found to adversely affect other amphibians, including the listed species (Davidson *et al.* 2003; Lips *et al.* 2006). Mao *et al.* (1999 cited in Fellers 2005) reported northern red-legged frogs infected with an iridovirus, which was also presented in sympatric threespine sticklebacks in northwestern California. Non-native species, such as bullfrogs and non-native tiger salamanders that live within the range of the California red-legged frog have been identified as potential carriers of these diseases (Garner *et al.* 2006). Human activities can facilitate the spread of disease by encouraging the further introduction of non-native carriers and by acting as carriers themselves (i.e., contaminated boots, waders or fishing equipment). Human activities can also introduce stress by other means, such as habitat fragmentation, that results in the listed species being more susceptible to the effects of disease.

*Alameda Whipsnake*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Alameda Whipsnake (*Masticophis lateralis euryxanthus*) 5-year review: Summary and evaluation* (Service 2011a). No change in the species' listing status was recommended in the 5-year review. Threats

evaluated during that review have continued to act on the species since the review was published. To date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*San Francisco Garter Snake*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *San Francisco Garter Snake (*Thamnophis sirtalis tetrataenia*) 5-Year Review: Summary and Evaluation* (Service 2006b). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2008 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for the San Francisco Garter Snake* (Service 1985), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*California Clapper Rail (also known as Ridgeway's Rail)*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Recovery Plan for Tidal marsh Ecosystems of Northern and Central California* (Service 2013a). Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2013 recovery plan was finalized. To date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Salt Marsh Harvest Mouse*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Recovery Plan for Tidal marsh Ecosystems of Northern and Central California* (Service 2013a). Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2013 recovery plan was finalized. To date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*San Joaquin Kit Fox*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *San Joaquin kit fox (*Vulpes macrotis mutica*) 5-Year Review: Summary and Evaluation* (Service 2010b). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2010 5-year review was finalized, with loss of grassland and desert habitat being the most significant effect. While there have been continued losses of grassland habitat throughout the regions identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998c), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Pallid Manzanita*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Recovery Plan for* Arctostaphylos pallida (Service 2015). Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2015 recovery plan

was finalized. To date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Sonoma Sunshine*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Recovery Plan for the Santa Rosa Plain* (Service 2016). Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2016 recovery plan was finalized. To date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Coyote Ceanothus*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the Ceanothus ferrisae *(Coyote ceanothus) 5-Year Review: Summary and Evaluation* (Service 2011b). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2011 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (Service 1998b), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Fountain Thistle*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the Acanthomintha obovata ssp. duttonii *(San Mateo thornmint)*, Cirsium fontinale var. fontinale *(fountain thistle),* Pentachaeta bellidiflora *(white-rayed pentachaeta) 5-Year Review: Summary and Evaluation* (Service 2010c). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2010 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (Service 1998b), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Santa Clara Valley Dudleya*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the Dudleya setchellii *(Santa Clara Valley dudleya),* Streptanthus albidus ssp. albidus *(Metcalf Canyon jewelflower) 5-Year Review: Summary and Evaluation* (Service 2013a). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2013 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (Service 1998b), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Contra Costa Wallflower*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Lange's Metalmark Butterfly (*Euphydryas editha bayensis*) Antioch Dunes evening-primrose (*Oenothera

deltoides *subsp.* howellii*) Contra Costa Wallflower (*Erysimum capitatum *var.* angustatum*) 5-Year Review: Summary and Evaluation* (Service 2008). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2008 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Three Endangered Species Endemic to Antioch Dunes, California* (Service 1984a), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Marin Dwarf Flax*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the Hesperolinon congestum *(Marin dwarf flax) 5-Year Review: Summary and Evaluation* (Service 2011c). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2011 5-year review was finalized. To date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Burke's Goldfields*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Recovery Plan for the Santa Rosa Plain* (Service 2016). Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2016 recovery plan was finalized. To date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Contra Costa Goldfields*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the Lasthenia conjugens *(Contra Costa Goldfields) 5-Year Review: Summary and Evaluation* (Service 2013b). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2013 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Sebastopol Meadowfoam*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Recovery Plan for the Santa Rosa Plain* (Service 2016). Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2016 recovery plan was finalized. To date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Antioch Dunes Evening Primrose*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the *Lange's Metalmark Butterfly (*Apodemia mormo langei*) Antioch Dunes evening-primrose (*oenothera deltoids *subsp.* howellii*) Contra Costa Wallflower (*Erysimum capitatum *var.* angustatum*) 5-Year Review: Summary*

*and Evaluation* (Service 2008). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2008 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Three Endangered Species Endemic to Antioch Dunes, California* (Service 1984a), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*White-Rayed Pentachaeta*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the Acanthomintha obovata ssp. duttonii (San Mateo thornmint), Cirsium fontinale var. fontinale (fountain thistle), Pentachaeta bellidiflora (white-rayed pentachaeta) *5-Year Review: Summary and Evaluation* (Service 2010c). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2010 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (Service 1998b), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

*Metcalf Canyon Jewelflower*

For the most recent comprehensive assessment of the species' range-wide status, please refer to the Dudleya setchellii (Santa Clara Valley dudleya), Streptanthus albidus ssp. albidus (Metcalf Canyon jewelflower) *5-Year Review: Summary and Evaluation* (Service 2013a). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2013 5-year review was finalized. While there have been continued losses of habitat throughout the regions identified in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (Service 1998b), to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species.

**Status of Critical Habitat**

Individualized accounts of the extent of critical habitat that may be affected by the action are presented in the Environmental Baseline section of this biological opinion. Table A: Critical Habitat Summary, presented below, provides an accounting of each unit of critical habitat that may be affected by the action.

**Table A: Critical Habitat Summary**

*1: Highly Intact = >95 percent intact; Intact = 80-95 percent intact; Somewhat Intact = 75-80 percent intact; Moderately Fragmented = 5-75 percent intact; Highly Fragmented = <50 percent intact*

| Species | Critical Habitat Unit | Facilities | percent Potential Upland Habitat in Facility Corridor | percent Potential Aquatic Habitat in Facility Corridor | percent Developed/ Disturbed in Facility Corridor | Overall Assessment of Facility Corridors in Critical Habitat[1] | Overall Quality of Critical Habitat Unit | Corridor Notes |
|---|---|---|---|---|---|---|---|---|
| California red-legged frog | NAP-1 | Elec. Dist. | 94 | 1 | 5 | Intact | Intact, dominated by oak woodland. Some agricultural activities and rural development. | Oak woodland, grassland, pond crossing, stream crossings |
| California red-legged frog | SON-1 | Elec. Trans, Elec. Dist. | 99 | 1 | 0 | Highly Intact | Highly Intact. Dense oak woodland. Includes Ledson Marsh and some streams. | Dense Oak forest, a few stream crossings. Almost all transmission, small amount of distribution |
| California red-legged frog | SON-2 | Elec. Trans, Elec. Dist. | 98 | 1 | 1 | Highly Intact. | Highly intact. Dominated by grassland. Rural residential and agricultural operations, vineyards and dairies. | Grassland, oaks woodland, oaks along ravines/channels. Lots of ponds in unit. Some vineyards. |
| California red-legged frog | SON-3 | Elec. Dist. | 84 | 1 | 15 | Intact | Intact. Dominated by grassland. Rural residential and agricultural operations, grazing and dairies. | Grassland used for pasture, lots of ponds, a few channels. Some distribution along existing roads. |
| California red-legged frog | MRN-1 | Elec. Dist. | 84 | 1 | 15 | Intact | Intact. Dominated by grassland. Rural residential and agricultural operations, grazing and dairies. | Grassland scattered ponds, a few streams. Some distribution along existing roads. |

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*1: Highly Intact = >95 percent intact; Intact = 80-95 percent intact; Somewhat Intact = 75-80 percent intact; Moderately Fragmented = 5-75 percent intact; Highly Fragmented = <50 percent intact*

| Species | Critical Habitat Unit | Facilities | percent Potential Upland Habitat in Facility Corridor | percent Potential Aquatic Habitat in Facility Corridor | percent Developed/ Disturbed in Facility Corridor | Overall Assessment of Facility Corridors in Critical Habitat[1] | Overall Quality of Critical Habitat Unit | Corridor Notes |
|---|---|---|---|---|---|---|---|---|
| California red-legged frog | MRN-2 | Elec. Dist. | 90 | 1 | 9 | Intact | Highly Intact. Mix of grassland and oak woodland. Rural residential cattle grazing, a couple of industrial facilities. | Overall the habitat is intact. Some of the distribution corridors include existing roads though poles themselves are mostly in adjacent grasslands. |
| California red-legged frog | MRN-3 | Elec. Trans, Elec. Dist. | 96 | 1 | 4 | Highly Intact | Highly intact. Mix of grassland and dense conifer/oak forest. Mostly comprised of Point Reyes National Seashore though includes the Town of Olema. | Mostly Elec. Dist. Small section of Elec. Trans. Most lines run cross country, with a few in rural residential areas near Inverness and Olema. Line cross streams/drainages. Some scatted ponds in dairy lands on west end of park. |
| California red-legged frog | SOL-1 | Elec. Trans, Elec. Dist., Gas Trans. | 95 | 1 | 4 | Highly Intact | Highly Intact. Almost all grassland, woodland around drainages. Lines cross drainages. Ponds scattered in unit. Small amount of rural residential | Mostly Elec. Trans and Gas Trans lines, with some Elec. Dist. Annual grassland. Dense urbanization to south and west. |
| California red-legged frog | SOL-2 | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 98 | 1 | 1 | Highly Intact | Highly Intact. Mostly grassland with oak woodland in north eastern portion. | Some past disturbance in upland to construction gas transmission lines but overall the uplands look |

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| Species | Critical Habitat Unit | Facilities | percent Potential Upland Habitat in Facility Corridor | percent Potential Aquatic Habitat in Facility Corridor | percent Developed/ Disturbed in Facility Corridor | Overall Assessment of Facility Corridors in Critical Habitat[1] | Overall Quality of Critical Habitat Unit | Corridor Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Woodlands along drainages. | pretty well intact. Some lines cross drainages and one large pond. |
| California red-legged frog | SOL-3 | Elec. Trans, Elec. Dist. | 98 | 1 | 1 | Highly Intact | Highly intact. Mostly grassland with some clusters of oak woodland and woodland along drainages. | Lines cross some drainages and small ponds/pools. Mostly going over grassland used for cattle grazing. |
| California red-legged frog | CSC-1 | Elec. Trans, Elec. Dist., Gas Trans | 90 | 1 | 9 | Intact | Intact. Mostly grassland with some areas of dense woodland. Some concentrated rural residential and associated agricultural activities. | Electric and gas transmission lines highly intact. Electric distribution lines occurring in road shoulders or other developed areas, almost all distribution areas show on going signs of disturbance. Majority of corridor area occurs in transmission corridors. |
| California red-legged frog | CSC-2A | Elec. Dist. | 98 | 1 | 1 | Highly Intact | Highly Intact. Mostly grassland with some areas of dense woodland and oak savanna. Distribution line mostly cross country with a couple of road crossings. Area | Some stream crossings. Some areas very steep. |

**Table A: Critical Habitat Summary**

*1: Highly Intact = >95 percent intact; Intact = 80-95 percent intact; Somewhat Intact = 75-80 percent intact; Moderately Fragmented = 5-75 percent intact; Highly Fragmented = <50 percent intact*

| Species | Critical Habitat Unit | Facilities | percent Potential Upland Habitat in Facility Corridor | percent Potential Aquatic Habitat in Facility Corridor | percent Developed/ Disturbed in Facility Corridor | Overall Assessment of Facility Corridors in Critical Habitat[1] | Overall Quality of Critical Habitat Unit | Corridor Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | includes Castle Rock park. | |
| California red-legged frog | CSC-2B | Elec. Trans, Elec. Dist., Gas Trans | 89 | 1 | 10 | Intact | Intact. Mostly grassland, oak woodland and chaparral in the northeastern portion. Residential, rural residential, ag, and wind farms | Central portion becoming fragmented by development. Approximately 3/4 of Elec. Dist. in developed areas or road shoulders. Scattered ponds and drainages. |
| California red-legged frog | ALA-1A | Elec. Trans, Elec. Dist., Gas Dist. | 79 | 1 | 20 | Somewhat Intact | Intact. Mostly grassland with oak woodland along drainages. Rural residential on western edge of unit and a new development along the southern edge of unit. | Elec. Distribution lines almost entirely within developed areas and along road shoulders. Elec. Transmission line in intact habitat with some drainage crossings. Gas Distribution in intact and disturbed/developed areas. |
| California red-legged frog | ALA-1B | Elec. Trans, Elec. Dist. | 79 | 1 | 20 | Somewhat Intact | Highly Intact. Mix of grassland and oak woodland. Some development along Palomeres Road but unit is | Elec. Distribution lines almost entirely within developed areas and along road shoulders. Elec. Transmission line in intact habitat with |

**Table A: Critical Habitat Summary**

*1: Highly Intact = >95 percent intact; Intact = 80-95 percent intact; Somewhat Intact = 75-80 percent intact; Moderately Fragmented = 5-75 percent intact; Highly Fragmented = <50 percent intact*

| Species | Critical Habitat Unit | Facilities | percent Potential Upland Habitat in Facility Corridor | percent Potential Aquatic Habitat in Facility Corridor | percent Developed/ Disturbed in Facility Corridor | Overall Assessment of Facility Corridors in Critical Habitat[1] | Overall Quality of Critical Habitat Unit | Corridor Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | largely intact. | some drainage crossings. |
| California red-legged frog | ALA-2 | Elec. Trans, Elec. Dist., Gas Trans | 96 | 1 | 3 | Highly Intact | Highly Intact. Mostly grassland in the north, with oak woodland and chaparral at higher elevations to the southeast. | About half of Elec. Distribution line corridor area along existing roads, but nearly all of Elec. Transmission and Gas Transmission in undeveloped areas, which account for a majority of the area. |
| California red-legged frog | STC-1 | Elec. Trans, Elec. Dist. | 90 | 1 | 9 | Intact | Highly Intact. Mix of grassland and oak woodland. Some areas of rural residential and agriculture but small in comparison to overall size of unit. | Elec. Transmission highly intact and Elec. Distribution moderately intact because some areas have poles within road shoulders. |
| California red-legged frog | STC-2 | Elec. Trans, Elec. Dist. | 96 | 1 | 3 | Highly Intact | Highly intact. Some rural residential and ag but area mostly vegetated with grass and oak woodland. Several ponds and drainages. | Elec. Distribution does pass through ag and rural residential but only represents a relatively small portion of overall corridor area. |

## Table A: Critical Habitat Summary

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| Species | Critical Habitat Unit | Facilities | percent Potential Upland Habitat in Facility Corridor | percent Potential Aquatic Habitat in Facility Corridor | percent Developed/ Disturbed in Facility Corridor | Overall Assessment of Facility Corridors in Critical Habitat[1] | Overall Quality of Critical Habitat Unit | Corridor Notes |
|---|---|---|---|---|---|---|---|---|
| California red-legged frog | SNM-1 | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 90 | 1 | 9 | Intact | Highly Intact. Mostly chaparral, oak woodland, and mixed oak-conifer woodland. | Some corridors are in open areas but a lot of gas and electric along Highway 92 and local roads goes in and out of developed/disturbed areas. |
| California red-legged frog | SNM-2 | Elec. Trans, Elec. Dist. | 90 | 1 | 9 | Intact | Highly Intact. Mostly chaparral, oak woodland, and mixed oak-conifer woodland. | Some corridors are in open areas but a lot of gas and electric along Hwy 1, ag areas, and local roads goes in and out of developed/disturbed areas. |
| California red-legged frog | SCZ-1 | Elec. Dist. | 90 | 1 | 9 | Intact | Highly Intact. Mostly chaparral, oak woodland, and mixed oak-conifer woodland. | Distribution lines occur along Hwy 1 and in adjacent agricultural and natural areas. Even along Hwy 1 pole areas appear to be in suitable upland habitat. |
| California tiger salamander Sonoma DPS | Santa Rosa Plain | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 20 | 1 | 79 | Highly fragmented | Highly fragmented. Lots of urban and rural development, agricultural conversion. | All lines run through developed, ag areas, and/or along existing roads. Some intact habitat on the western edge and in the south and middle of the unit. |
| California tiger salamander Central DPS | CV-2 | Elec. Trans, Elec. Dist., | 93 | 2 | 5 | Intact | Highly intact. Some farmed areas and recreational | Some lines along existing roads and an old rail road. |

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*1: Highly Intact = >95 percent intact; Intact = 80-95 percent intact; Somewhat Intact = 75-80 percent intact; Moderately Fragmented = 5-75 percent intact; Highly Fragmented = <50 percent intact*

| Species | Critical Habitat Unit | Facilities | percent Potential Upland Habitat in Facility Corridor | percent Potential Aquatic Habitat in Facility Corridor | percent Developed/ Disturbed in Facility Corridor | Overall Assessment of Facility Corridors in Critical Habitat[1] | Overall Quality of Critical Habitat Unit | Corridor Notes |
|---|---|---|---|---|---|---|---|---|
| | | Gas Trans | | | | | use areas. | |
| California tiger salamander Central DPS | CV-18 | Elec. Trans, Elec. Dist. | 55 | 0 | 45 | Moderately fragmented. | Highly intact. Some rural residential and past farming along western edge of the unit. | Lines mostly run along the road though GIS mapping shows distribution line in unit it is actually on the edge. Transmission line corridor passes through mix of grassland and dry farmed area. |
| California tiger salamander Central DPS | EB-3 | None | NA | NA | NA | NA | Highly Intact. | |
| California tiger salamander Central DPS | EB-5 | None | NA | NA | NA | NA | Highly Intact. | |
| California tiger salamander Central DPS | EB-6 | Elec. Trans, Elec. Dist. | 95 | 1 | 4 | Intact | Highly Intact. Dominated by a mix of grass and oak woodland. | Distribution lines in western part of the unit occur along road shoulders and in developed areas but in the eastern half transmission and distribution lines are in upland areas. |

**Table A: Critical Habitat Summary**

*1: Highly Intact = >95 percent intact; Intact = 80-95 percent intact; Somewhat Intact = 75-80 percent intact; Moderately Fragmented = 5-75 percent intact; Highly Fragmented = <50 percent intact*

| Species | Critical Habitat Unit | Facilities | percent Potential Upland Habitat in Facility Corridor | percent Potential Aquatic Habitat in Facility Corridor | percent Developed/ Disturbed in Facility Corridor | Overall Assessment of Facility Corridors in Critical Habitat[1] | Overall Quality of Critical Habitat Unit | Corridor Notes |
|---|---|---|---|---|---|---|---|---|
| California tiger salamander Central DPS | EB-7 | Elec. Dist. | 50 | 0 | 50 | Moderately fragmented. | Highly Intact. Mix of grassland and oak woodland. Scattered ponds. | About half of distribution lines in areas that are in ag use or on a maintained road shoulder. Some cross country lines and some poles in proximity to road but in semi-natural habitat. |
| California tiger salamander Central DPS | EB-8 | Elec. Trans, Elec. Dist. | 50 | 0 | 50 | Moderately fragmented. | Intact, mostly grassland with some woodland to west. Reservoir, rural residential, and industrial also present. | About half of distribution lines in areas that are in developed areas or along roads. Others are in proximity to the road but in what appears to be natural habitat. Transmission line corridor has access road with associated disturbance and other activity. |
| California tiger salamander Central DPS | EB-9 | Elec. Dist., Gas Trans | 75 | 1 | 24 | Somewhat Intact | Intact. Southern 1/3rd of unit has rural residential development. Reservoir bisects unit. | Gas transmission approximately 80 percent intact. Elec. Distribution partly in road shoulder and adjacent uplands. No cross country lines. |

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|---|---|---|---|---|---|---|---|---|
| California tiger salamander Central DPS | EB-10A | Elec. Dist. | 25 | 0 | 75 | Highly fragmented | Somewhat intact. Large private residential lots occur within the unit with relatively large footprints. Mostly grassland and scattered oaks. One pond and a few drainages | Distribution lines almost entirely within road shoulder or developed areas. One cross country route. |
| California tiger salamander Central DPS | EB-10B | Elec. Dist. | 96 | 0 | 4 | Highly intact | Highly intact. Mostly grassland with oaks in drainages. Rural residences and livestock operation. | Distribution lines mostly within grassland areas with some poles in developed areas around residences and ag outbuildings. |
| California tiger salamander Central DPS | EB-11 | Elec. Dist. | 100 | 0 | 0 | Highly intact | Highly intact. Mix of grassland and oak woodland. Ponds and drainages across unit. | Only a very small segment of a distribution line falls within the unit. No poles visible in aerial photos. |
| California tiger salamander Central DPS | EB-12 | Elec. Dist., Gas Trans | 96 | 1 | 3 | Highly intact | Highly to moderately intact. Some farming activity and rural residential development in the units. Mostly grassland with oaks in drainages. Lots | Gas transmission in grassland near ponds. Distribution lines going to rural residences mostly cross country. |

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|---|---|---|---|---|---|---|---|---|
| | | | | | | | of ponds. | |
| Alameda whipsnake | 1 | Elec. Trans, Elec. Dist., Gas Trans | 95 | NA | 5 | Intact | Intact. Mostly grassland with some areas of dense woodland. Some concentrated rural residential and associated agricultural activities in the central portion of the unit. | Electric and gas transmission lines highly intact. Electric distribution lines occurring in road shoulders or other developed areas, most of distribution areas show ongoing signs of disturbance. Majority of corridor area occurs in transmission corridors. |
| Alameda whipsnake | 2 | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 97 | NA | 3 | Highly intact | Highly intact. Mix of grassland, chaparral, and oak woodland | Electric transmission makes up bulk of corridor area, almost all of which goes through undeveloped land. Distribution lines go in and out of natural habitat and developed areas. Small amount of gas transmission and distribution. Gas lines and Elec. Distribution mostly in areas of non-habitat for the species. |

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|---|---|---|---|---|---|---|---|---|
| Alameda whipsnake | 3 | Elec. Trans, Elec. Dist., Gas Dist. | 90 | NA | 10 | Intact | Highly intact. Mix of chaparral, grassland, and oak woodland. | Electric transmission corridor highly intact and accounts for most of the area in the unit. Electric and Gas Distribution mostly occur along existing roadways that are a mix of oaks, other trees, grassland, and landscaping. |
| Alameda whipsnake | 4 | Elec. Trans, Elec. Dist., Gas Trans | 96 | NA | 4 | Highly intact | Highly intact. Mix of chaparral, grassland, and oak woodland. | Electric and gas transmission corridors highly intact and account for most of the area in the unit. Some electric distribution occurs along roads in rural residential areas in the southeast corner of the unit. |
| Alameda whipsnake | 5A | Elec. Trans, Elec. Dist. | 96 | NA | 4 | Highly Intact | Highly intact. Dominated by grassland in the north and mix of grassland, oak woodland, and chaparral in the south of the unit. Scattered rural residential and cattle ranches. | Some of electric distribution occurs along road shoulders but there is also a lot of cross country poles. Transmission line comprises the bulk of corridor area and is highly intact. |

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|---|---|---|---|---|---|---|---|---|
| | | | | | | | Some wind development in north of unit. | |
| Alameda whipsnake | 5B | Elec. Trans, Elec. Dist. | 98 | NA | 2 | Highly Intact | Highly intact. Mix of grassland, chaparral, and oak woodland. Scattered rural residential. | Most of corridors in undeveloped land. |
| Alameda whipsnake | 6 | Elec. Trans, Elec. Dist., Gas Dist. | 97 | NA | 3 | Highly Intact | Highly Intact. Mostly chaparral and oak woodland with some grassland. Some rural residential to the west. | Most of corridors in undeveloped land. |
| Conservancy fairy shrimp | CONSFS 3 | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 90 | 5 | 5 | Intact | Intact. Annual grassland with vernal pool complex. Some grasslands and complex have been converted to hay fields and show recent signs of disturbance. | Corridors pass through intact habitat, disturbed habitat, and also what appears to be a conservation area where pools appear to have been created. |

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|---|---|---|---|---|---|---|---|---|
| Vernal pool fairy shrimp | VERFS 16A | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 90 | 5 | 5 | Intact | Intact. Annual grassland with vernal pool complex. Some grasslands and complex have been converted to hay fields in the north and show recent signs of disturbance. A landfill and some industrial facilities also occur within the unit. | Corridors pass through intact habitat, disturbed habitat, and also what appears to be a conservation area where pools appear to have been created. |
| Vernal pool fairy shrimp | VERFS 16B | Elec. Dist., Gas Dist. | 0 | 0 | 100 | Highly fragmented | Moderately fragmented. A housing development occurs within the western half of the unit and a business park and industrial facility occur in the northern half. | The gas and electric distribution corridors all occur within developed areas or in disturbed road shoulders. |

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|---|---|---|---|---|---|---|---|---|
| Vernal pool fairy shrimp | VERFS 16C | Elec. Trans, Elec. Dist. | 75 | 5 | 20 | Somewhat Intact | Intact. The unit has a road with distribution and transmission lines bordering it to the south and east; a railroad, road, and canal running from the southwest corner to the northern tip of the unit. Some past ground disturbance evidence in northwestern most section | The electric distribution and transmission corridors include roads, railroad tracks, and a canal paralleling them. The corridors do include both natural and artificial habitat (railroad toe ditches). |
| Vernal pool fairy shrimp | VERFS 16D | Elec. Dist., Gas Trans | 75 | 5 | 20 | Somewhat Intact | Intact. The unit includes a rural residence and some associated agricultural facilities. Evidence of past disking/ripping of a large portion of the areas; however numerous pools still persist. | Gas transmission corridor does have wetlands but includes a section of a large landscaped area associated with a rural residence. Small section of electric distribution occurs along the western edge of the unit, which appears to all be in uplands. |

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|---|---|---|---|---|---|---|---|---|
| Vernal pool fairy shrimp | VERFS 17 | Elec. Dist., Gas Dist. | 50 | 5 | 45 | Moderately fragmented. | Highly fragmented. Air is developed as the Napa Airport. In areas where there is not pavement or buildings it appears to have been leveled and graded for construction of the airport. Remnant habitat occurs in spots and along the western edge and southwestern corner. | Corridors largely in areas that have been previously graded or contain pavement. Some remnant pools persist within the corridor along southern edge. |
| Vernal pool fairy shrimp/Longhorn fairy shrimp | VERFS 19A | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 90 | 3 | 7 | Intact | Somewhat intact. Residential development occurs in northeast corner of unit. A road and rural residential occurs in the northwestern portion of the unit. Rest of unit highly intact. | Gas transmission and electric and Gas Distribution corridors occur along existing roads and development. Electric transmission corridors occur mostly in undeveloped areas that highly intact. Corridors do cross some channel and presumably some wetlands. |

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|---|---|---|---|---|---|---|---|---|
| Vernal pool fairy shrimp/Longhorn fairy shrimp | VERFS 19B | Elec. Trans, Elec. Dist., Gas Trans | 85 | 5 | 10 | Intact | Intact. Large intact areas of grassland and vernal pool complex. Some ag, industrial, and rural development spread around unit. | Gas transmission line corridors represents most of the intact habitat. Electric transmission and distribution lines are about half in upland habitat and the other half developed/disturbed road shoulders. |
| Vernal pool fairy shrimp/Longhorn fairy shrimp | VERFS 19C | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 50 | 5 | 45 | Moderately fragmented. | Intact. Large areas of intact habitat. Some residential development and rural residential development. Includes conservation area with created wetland in the north end of the unit. | Electric distribution corridors are about half in developed road shoulders and the other half in grassland adjacent to roads. Electric transmission corridor includes intact uplands and some wetlands but actual poles alongside existing road. Gas Distribution associated with residential development. |
| Vernal pool tadpole shrimp | VERTS 11D | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 90 | 5 | 5 | Intact | Intact. Annual grassland with vernal pool complex. Some grasslands and complex have been | Corridors pass through intact habitat, disturbed habitat, and also what appears to be a conservation area where pools appear to |

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|---|---|---|---|---|---|---|---|---|
| | | | | | | | converted to hay fields in the north and show recent signs of disturbance. A landfill and some industrial facilities also occur within the unit. | have been created. |
| Vernal pool tadpole shrimp | VERTS 11C | Elec. Dist., Gas Dist. | 0 | 0 | 100 | Highly fragmented | Moderately fragmented. A housing development occurs within the western half of the unit and a business park and industrial facility occur in the northern half. | The gas and electric distribution corridors all occur within developed areas or in disturbed road shoulders. |
| Vernal pool tadpole shrimp | VERTS 11B | Elec. Trans, Elec. Dist. | 75 | 5 | 20 | Somewhat Intact | Intact. The unit has a road with distribution and transmission lines bordering it to the south and east; a railroad, road, and canal running from the southwest corner to the northern tip of the unit. Some past ground disturbance | The electric distribution and transmission corridors include roads, railroad tracks, and a canal paralleling them. The corridors do include both natural and artificial habitat (railroad toe ditches). |

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|---|---|---|---|---|---|---|---|---|
| | | | | | | | evidence in northwestern most section | |
| Vernal pool tadpole shrimp | VERTS 11A | Elec. Dist., Gas Trans | 75 | 5 | 20 | Somewhat Intact | Intact. The unit includes a rural residence and some associated agricultural facilities. Evidence of past disking/ripping of a large portion of the areas; however numerous pools still persist. | Gas transmission corridor does have wetlands but includes a section of a large landscaped area associated with a rural residence. Small section of electric distribution occurs along the western edge of the unit, which appears to all be in uplands. |
| Vernal pool tadpole shrimp | VERTS 14A | Elec. Trans | 0 | 0 | 100 | Highly fragmented | Somewhat Intact. CH unit has a portion that is developed as a parking lot and the rest appears to have been restored as a wetland and grassland. | Transmission line is in a portion of the CH unit that is entirely developed as a paved parking lot with landscaping. |

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|---|---|---|---|---|---|---|---|---|
| Vernal pool tadpole shrimp | VERTS 14B | Elec. Trans, Elec. Dist., Gas Trans | 10 | 1 | 89 | Highly fragmented | Highly fragmented. CH unit has a sliver that pass through intact pools and uplands. Most of the CH unit is previously disturbed/graded or developed. | Electric and gas transmission lines pass through mostly developed lands (paved or landscaping). Electric distribution entirely developed. |
| Delta green ground beetle | 1 | Elec. Trans, Elec. Dist. | 90 | 5 | 5 | Intact | Highly Intact. Two Rural residences in the unit the remainder is intact. | Distribution lines head to residences. Transmission crosses corner of the unit. |
| Delta green ground beetle | 2 | Elec. Trans, Elec. Dist. | 94 | 5 | 1 | Highly Intact | Highly Intact. Made up of mostly Jepson Prairie Preserve. A road and an old railroad pass through the unit. | Electric lines pass through intact habitat and cross a road. |
| Bay checkerspot butterfly | 1 | Elec. Trans, Elec. Dist., Gas Trans | 99 | NA | 1 | Highly Intact | Highly Intact. | Electric transmission lines cross through highly intact habitat accept for access road that crosses portion of the corridor. Gas transmission and electric distribution make up a very small component but habitat is generally intact but along the edges of the |

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|---|---|---|---|---|---|---|---|---|
| | | | | | | | | unit in low elevation habitat. |
| Bay checkerspot butterfly | 2 | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 90 | NA | 10 | Intact | Highly Intact. Grass and with scatted oaks. Adjacent to development. | Gas Distribution within paved road. Most of the corridors consist of open grassland but some areas previously disturbed, mostly from fire breaks, or developed, including access roads, paved roads, and a substation. |
| Bay checkerspot butterfly | 3 | Elec. Trans, Elec. Dist., Gas Trans | 80 | NA | 20 | Somewhat Intact | Intact. Dominated by grassland though some chaparral and oak woodland. 280 freeway and roads pass through Unit. | Gas and Electric transmission pass through intact habitat though one transmission corridor parallels and includes a road and crosses the 280 freeway. |
| Bay checkerspot butterfly | 4 | No corridors in unit | NA | NA | NA | NA | Highly Intact. | |

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|---|---|---|---|---|---|---|---|---|
| Bay checkerspot butterfly | 5 | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 96 | NA | 4 | Highly Intact | Highly Intact. Grassland with a few scattered oaks. Roads cross unit. One rural residence present. | Gas Distribution follows existing road, as well as some of the distribution. Electric and Gas Transmission pass through intact habitat. |
| Bay checkerspot butterfly | 6 | Elec. Trans, Elec. Dist. | 96 | NA | 4 | Highly Intact | Highly Intact. Grassland with a drainage passing through. Small segment of road falls within the unit. | Only a small segment of electric distribution passes through the unit. |
| Bay checkerspot butterfly | 7 | Elec. Trans, Elec. Dist. | 97 | NA | 3 | Highly Intact | Highly Intact. Grassland and scattered oaks. Some roads and an industrial facility in the unit. | Highly intact corridors, with some access roads crossing them. |
| Bay checkerspot butterfly | 8 | Elec. Trans, Elec. Dist. | 85 | NA | 15 | Intact | Highly Intact. Grassland and oak woodland. | Past grading and access road for transmission line have affected the habitat in the corridor. |
| Bay checkerspot butterfly | 9A | Elec. Dist. | 100 | NA | 0 | Highly Intact | Highly Intact. Grassland with a few scattered oaks. | Intact corridor. |
| Bay checkerspot butterfly | 9B | No corridors in unit | NA | NA | NA | NA | Highly Intact. | |

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|---|---|---|---|---|---|---|---|---|
| Bay checkerspot butterfly | 10 | Elec. Trans | 98 | NA | 2 | Highly Intact | Highly Intact. Grassland with some oaks | Corridors very intact, access road crosses part of corridor. |
| Bay checkerspot butterfly | 11 | Elec. Dist. | 70 | NA | 30 | Moderately fragmented. | Highly Intact. | Distribution corridor parallels road and poles are set mostly along road shoulder. |
| Bay checkerspot butterfly | 12 | Elec. Trans, Elec. Dist. | 95 | NA | 5 | Intact. | Intact. Grassland with scattered oaks, some residences and associated roads in the unit. | Transmission corridor is highly intact. The distribution lines mostly occur within shoulder of a road leading to some houses. |
| Bay checkerspot butterfly | 13 | Elec. Trans, Elec. Dist., Gas Trans | 95 | NA | 5 | Intact | Intact. Grassland, oaks in drainages. Some industrial activity and rural residences. | Corridors mostly intact but do parallel roads and cross other areas of disturbance. |
| Antioch Dunes evening primrose/Contra Costa Wallflower | 1 | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 30 | NA | 70 | Highly fragmented | Highly fragmented. Most of the unit is developed and undeveloped areas have signs of past disturbance. | Corridors mostly in developed areas. One transmission corridor running north-south has mostly intact habitat but the rest is in developed or heavily disturbed areas. |
| Contra Costa goldfields | CONTR 2 | Elec. Dist. | 75 | 0 | 25 | Somewhat Intact | Intact. Area mostly consists of oak woodland, with some ag and rural residences | Corridor is mostly dense woodland with ag fields and roads. Do not see any vernal pool or wetland habitat in corridor. |

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|---|---|---|---|---|---|---|---|---|
| Contra Costa goldfields | CONTR 3 | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 20 | 2 | 78 | Highly fragmented | Highly fragmented. Mostly in vineyard. Swales and drainages developed with vineyard around them. Some patches of grassland with possible wetlands in unit. Rural residences and other agricultural facilities. | Corridors are highly fragmented but do cross swales and drainages. |
| Contra Costa goldfields | CONTR 5A | Elec. Trans, Elec. Distrib, Gas Trans | 75 | 5 | 20 | Intact | Intact. Mostly grassland with scattered wetlands, pools, and swales. Some rural residences, agricultural facilities, and roads. | Large transmission corridor makes up bulk of area. Other corridors passing through disturbed and developed areas. |
| Contra Costa goldfields | CONTR 5B | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 70 | 5 | 25 | Moderately fragmented. | Moderately fragmented. Industrial facilities and past ground disturbance occur throughout northern half of the unit. Some rural residences in | Corridors parallel some roads and occur within and adjacent to developed areas. Gas Distribution all within developed areas. |

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|---|---|---|---|---|---|---|---|---|
| | | | | | | | the south. | |
| Contra Costa goldfields | CONTR 4A | Elec. Trans, Elec. Dist. | 75 | 5 | 20 | Somewhat Intact | Intact. The unit has a road with distribution and transmission lines bordering it to the south and east; a railroad, road, and canal running from the southwest corner to the northern tip of the unit. Some past ground disturbance evidence in northwestern most section | The electric distribution and transmission corridors include roads, railroad tracks, and a canal paralleling them. The corridors do include both natural and artificial habitat (railroad toe ditches). |
| Contra Costa goldfields | CONTR 4B | Elec. Dist., Gas Dist. | 0 | 0 | 100 | Highly fragmented | Moderately fragmented. A housing development occurs within the western half of the unit and a business park and industrial facility occur in the northern half. | The gas and electric distribution corridors all occur within developed areas or in disturbed road shoulders. |

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|---|---|---|---|---|---|---|---|---|
| Contra Costa goldfields | CONTR 4C | Elec. Trans, Elec. Dist., Gas Trans, Gas Dist. | 90 | 5 | 5 | Intact | Intact. Annual grassland with vernal pool complex. Some grasslands and complex have been converted to hay fields in the north and show recent signs of disturbance. A landfill and some industrial facilities also occur within the unit. | Corridors pass through intact habitat, disturbed habitat, and also what appears to be a conservation area where pools appear to have been created. |
| Contra Costa goldfields | CONTR 6 | Elec. Trans, Elec. Dist., Gas Trans | 80 | 5 | 15 | Intact | Intact. Most grassland with some wetland areas. Roads, highway, and some industrial facilities. | Corridors moderately intact with some roads, highway, and past disturbance in them. |
| Contra Costa goldfields | CONTR 7 | Elec. Trans, Elec. Dist., Gas Trans | 85 | 5 | 10 | Intact | Intact. Large intact areas of grassland and vernal pool complex. Some ag, industrial, and rural development spread around unit. | Gas transmission line corridors represents most of the intact habitat. Electric transmission and distribution lines are about half in upland habitat and the other half developed/disturbed road shoulders. |

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|---|---|---|---|---|---|---|---|---|
| Contra Costa goldfields | CONTR 8A | Elec. Trans | 0 | 0 | 100 | Highly fragmented | Somewhat Intact. CH unit has a portion that is developed as a parking lot and the rest appears to have been restored as a wetland and grassland. | Transmission line is in a portion of the CH unit that is entirely developed as a paved parking lot with landscaping. |
| Contra Costa goldfields | CONTR 8B | Elec. Trans, Elec. Dist., Gas Trans | 10 | 1 | 89 | Highly fragmented | Highly fragmented. CH unit has a sliver that pass through intact pools and uplands. Most of the CH unit is previously disturbed/graded or developed. | Electric and gas transmission lines pass through mostly developed lands (paved or landscaping). Electric distribution entirely developed. |

**Environmental Baseline**

Due to the size of the action area, the environmental baseline will be described in general terms, with estimates of habitat for each Covered Species within the action area provided in Table 2-3 in the HCP. Habitat conditions for Covered Species within the action area range from relatively undisturbed areas, to areas in active agriculture, to areas that have experienced extensive urbanization. PG&E's facilities, other than those that might be built as a result of Minor New Construction, pre-exist this analysis and are the baseline condition throughout the action area. Ongoing operations and maintenance activities that will become Covered Activities under the Service's permit are currently occurring on the landscape in roughly the same scope and frequency as they will be after permit issuance. Thus, for purposes of establishing the environmental baseline, operations and maintenance activities as described above, excluding minor new construction activities, constitute the existing conditions with regard to PG&E facilities and right-of-ways within the action area. General environmental conditions are as follows.

*Climate*

The action area has a Mediterranean climate characterized by summer fog along the coast and East Bay, cool summers between coastal areas and Coast Ranges, and hot summers east of the Coast Ranges (CDFW 2003). Precipitation in the action area falls mostly as rain during the late fall, winter, and early spring months, although the higher elevations can receive infrequent snowfalls during the winter months, with snow sometimes lasting for 2 to 3 days on Mount Diablo.

The climate in the action area is influenced strongly by its location and topography. In the summer, a steady marine wind blows through the Golden Gate and up the Carquinez Strait. The eastern part of the action area is not influenced by this marine air to the same extent as the western part. Consequently, temperatures in the eastern part of the action area are generally warmer than those in the western part during the summer. During the winter, temperatures in the western part of the action area are generally warmer than those in the east, owing to the tempering influence of the ocean and bay in the west.

*Topography*

The action area is composed of four general physiographic regions: coastal areas, highlands of the Coast Ranges, intermountain valleys, and the Sacramento–San Joaquin River Delta. These regions have been shaped by a complex geologic history. Because of this complexity, elevations in the action area range from Delta islands that are at or below sea level near Brentwood and Oakley to the 4,216-foot peak of Mount Hamilton, the highest point in the study area. Most of the mountain valleys are geologically young. The foothills have gently to steeply sloping topography.

Geologic features in the action area include a portion of the Coast Ranges, which trend northwest–southeast. These ranges formed over millions of years as a result of uplift along the San Andreas fault and several of its subsidiary faults, including the San Pablo and Hayward faults (Alt and Hyndman 2000). Movement along the faults continues today, subjecting the area to moderate to large earthquakes.

The dominant geologic features in the action area are the Franciscan Complex and the Great Valley Sequence. The Franciscan Complex is a poorly understood assortment of sedimentary and other rocks that were deposited along with basalt flows on the ocean floor. The Great Valley Sequence,

which is better understood, is characterized by oceanic sediments of the same age as the rocks of the Franciscan Complex. Both features are characterized by tilting and uplifting, but the Franciscan Complex has been deformed under pressure from faulting. This complex geologic history has resulted in extremely diverse soils, hydrology, and topography.

*Soils*

Soils in the action area are highly variable because of the complex geology, topography, and hydrology of the area. Most of the soils in the action area were formed from alluvial, sedimentary, and meta-sedimentary sources and have been formed in concert with the complex geologic history of the area. Serpentine soils, which contain relatively high levels of asbestos and certain metals, although generally rare, are found in many locations in the action area. Most plant species do not survive in serpentine soils. Those species that can survive often have evolved specifically for serpentine soil conditions to the point that they may not be found elsewhere (CDFW 2003). Many areas on the lower terraces have been urbanized or converted to agricultural use. For example, most of the low-lying lands in the western Delta have been reclaimed by protective dikes and converted to agricultural uses. As a result, the eastern portions of Solano and Contra Costa Counties have subsided substantially and are currently at or below sea level.

*Hydrology*

The California State Water Board has developed a geographic information system (GIS) database that delineates watersheds in the state. Although much of the action area lies within the San Francisco Bay Hydrologic Region, the study area extends into portions of four adjacent hydrologic regions, as well: the North Coast Hydrologic Region, the Sacramento River Hydrologic Region, the San Joaquin Hydrologic Region, and the Central Coast Hydrologic Region.

Ephemeral and intermittent streams are the dominant hydrologic features in the action area due to the Mediterranean climate's characteristic lack of rainfall during the summer months. Total precipitation falls mostly as winter rain and varies from an average of 12 inches per year in the San Joaquin Delta watershed to almost 60 inches in the Gualala-Salmon watershed in coastal Sonoma County.

Generally, surface flow in ephemeral streams is supplied by rainfall. These streams flow only during and immediately following rain events. Surface flow in intermittent or seasonal streams is supplied by a combination of rainfall runoff and groundwater. Accordingly, these streams generally flow throughout the rainy season and into the late spring or early summer. Perennial streams in the action area also are supported by rainfall runoff and groundwater, but, unlike seasonal streams, they run year-round with major dry-season inputs from both natural and artificial sources (e.g., upwelling springs and surface and subsurface flows from local irrigation, respectively).

The natural hydrology of many of the major streams in the urban areas has been altered for flood control or to convey irrigation water. Many streams have been disconnected from their historical floodplains by levees and channelization, and some of these streams are maintained as flood control channels that support little or no riparian vegetation. Outside the urbanized areas, most drainages remain relatively natural and occupy at least a portion of their historical floodplains. Most of these features are ephemeral or intermittent, however, and generally support narrow floodplains with limited riparian habitat.

*Habitats (Land-cover Type Classification)*

The land-cover type classification system used in the HCP is a combination of the California Wildlife Habitat Relationships System, derived from CALVEG, FRAP Multi-Source, and SFEI's Modern Baylands classification system. Plant species nomenclature follows The Jepson Manual (Baldwin *et al.* 2012). Land-cover type mapping results are presented in HCP Figure 2-2a and shown in more detail in the land-cover type figures developed for each county in the study area (HCP Figures 2-2a – 2-2j).

Land-cover types fall into three major categories: natural, agricultural, and urban. Natural land-cover types consist of all types that are not agricultural or urban types, including forest, grassland, riparian, shrubland, wetland, dune, and barren/ruderal.

*Facilities by Land-Cover Type in the Plan Area*

The Bay Area O&M HCP GIS database consists of three primary data layers: the Plan Area boundary, PG&E gas and electric transmission and distribution facilities,[1] and land-cover types. PG&E determined ROWs by determining a maximum corridor width of mapped facilities that varied depending on the size of the facility and doubled the width to provide a buffer area outside of the ROW. This allowed for a calculation of the total area adjacent to facilities that could be affected by Covered Activities in the action area. These estimates were based on the facility size as presented in HCP Table 2-1, included for reference below.

**HCP Table 2-1. Type and Size of Facilities and Associated Maximum Width of Buffered ROWs**

| Type of Facility | Size of Facility | Maximum Facility Corridor Width (feet) | Buffer Area (feet) | Total Area (feet) |
|---|---|---|---|---|
| Electric transmission | 500 kV | 200 | 200 | 400 |
| Electric transmission | 230 kV | 120 | 120 | 240 |
| Electric transmission | 60/70/115 kV | 80 | 80 | 160 |
| Gas transmission | All | 150 | 150 | 300 |
| All distribution facilities | All | 25 | 25 | 50 |

ROW widths are conservative in that they represent the maximum area in which Covered Activities would occur. The PG&E ROWs and land-cover type data were intersected and the GIS database queried to determine the extent of each land-cover type within the ROWs.

HCP Table 2-2 (page 148 of this opinion) presents the extent of each land-cover type within gas transmission, gas distribution, electric transmission, and electric distribution. As indicated in this table, many PG&E facilities are in urban, grassland, and agricultural land-cover types. The sizes of areas where gas and electric facilities appear to be in natural land-cover types (e.g., grassland and tree- and shrub-dominated lands) are likely overstated because gas and electric facilities are most often located in roadside or other barren or ruderal areas that may be near these land-cover types but are unlikely to actually fall within these classification types. Thus, disturbances to these natural

[1] Not all of PG&E's facilities are available as a GIS data layer. Unmapped facilities are estimated at 1% of electric and gas transmission, 3% of electric distribution, and 10% of gas distribution, based on discussions with facility staff. Additionally, PG&E policy prevents maps of existing facilities to be made public, so facility locations are not shown in the Bay Area O&M HCP figures.

land-cover types are likely to be smaller than the mapped facility would indicate. Similarly, unmapped facilities are likely to be in urban areas or other ruderal areas.

**HCP Table 2-2. Mapped Extent of Land-Cover[a] Types Present**

| | Electricity Distribution (acres) | Electricity Transmission (acres) | Gas Distribution (acres) | Gas Transmission (acres) | Total (acres) | Percent of Total |
|---|---|---|---|---|---|---|
| **Natural Lands[a]** | | | | | | |
| ***Forest*** | | | | | | |
| Blue Oak Woodland | 1,150 | 1,253 | 230 | 104 | 2,737 | 0.73 |
| Blue Oak-Foothill Pine | 179 | 97 | 2 | 7 | 286 | 0.08 |
| Closed-Cone Pine-Cypress | 269 | 217 | 1 | | 487 | 0.13 |
| Coastal Oak Woodland | 4,580 | 4,213 | 2,413 | 782 | 11,988 | 3.18 |
| Douglas Fir | 779 | 336 | 85 | 42 | 1,242 | 0.33 |
| Eucalyptus | 453 | 148 | 286 | 92 | 979 | 0.26 |
| Montane Hardwood | 5,192 | 2,559 | 1,094 | 408 | 9,253 | 2.46 |
| Montane Hardwood-Conifer | 1,690 | 681 | 285 | 60 | 2,716 | 0.72 |
| Ponderosa Pine | 27 | 1 | 13 | | 41 | 0.01 |
| Redwood | 1,796 | 501 | 93 | 28 | 2,417 | 0.64 |
| Sierran Mixed Conifer | 66 | 33 | 6 | | 105 | 0.03 |
| Unknown Conifer Type | 22 | 67 | 0 | | 89 | 0.02 |
| Valley Oak Woodland | 452 | 170 | 213 | 155 | 991 | 0.26 |
| ***Grassland*** | | | | | | |
| Annual Grassland | 18,798 | 19,026 | 5,936 | 11,154 | 54,915 | 14.57 |
| Pasture | 3,824 | 3,182 | 444 | 3,148 | 10,598 | 2.81 |
| Perennial Grassland | 26 | 12 | 0 | 8 | 46 | 0.01 |
| ***Riparian*** | | | | | | |
| Montane Riparian | 594 | 85 | 352 | 100 | 1,131 | 0.30 |
| Valley Foothill Riparian | 421 | 176 | 193 | 128 | 918 | 0.24 |
| Willow Grove (Sausal) | 1 | 0 | 0 | | 1 | 0.00 |
| ***Shrubland*** | | | | | | |
| Alkali Desert Scrub | 3 | 29 | 0 | 18 | 50 | 0.01 |
| Chamise-Redshank Chaparral | 420 | 697 | 77 | 106 | 1,299 | 0.34 |
| Coastal Scrub | 702 | 615 | 94 | 244 | 1,656 | 0.44 |
| Mixed Chaparral | 813 | 760 | 53 | 1 | 1,627 | 0.43 |
| Montane Chaparral | | 0 | | | 0 | 0.00 |
| Unknown Shrub Type | 93 | 55 | 16 | 36 | 200 | 0.05 |
| ***Wetland*** | | | | | | |
| Active Salt Pond | 69 | 558 | | 0 | 627 | 0.17 |
| Crystallizer | 15 | 7 | 1 | | 23 | 0.01 |
| Diked Marsh | 127 | 470 | 26 | 168 | 791 | 0.21 |
| Estuarine | 5 | 1 | | | 7 | 0.00 |
| Farmed Bayland | 270 | 473 | 47 | 92 | 882 | 0.23 |
| Freshwater Emergent Wetland | 64 | 107 | 8 | 86 | 265 | 0.07 |
| Grazed Bayland | 57 | 98 | 3 | 119 | 278 | 0.07 |
| High Elevation Tidal Marsh | 122 | 560 | 15 | 45 | 743 | 0.20 |

| | Electricity Distribution (acres) | Electricity Transmission (acres) | Gas Distribution (acres) | Gas Transmission (acres) | Total (acres) | Percent of Total |
|---|---|---|---|---|---|---|
| Inactive Salt Pond | 22 | 134 | 0 | | 156 | 0.04 |
| Lacustrine | 296 | 285 | 66 | 110 | 758 | 0.20 |
| Lagoon | 56 | 42 | 13 | 7 | 117 | 0.03 |
| Low/Mid Elevation Tidal Marsh | 14 | 210 | 0 | 2 | 227 | 0.06 |
| Major Channel | 39 | 100 | 2 | 26 | 168 | 0.04 |
| Managed Marsh | 365 | 205 | 10 | 331 | 911 | 0.24 |
| Marine | 6 | | 0 | | 6 | 0.00 |
| Muted Tidal Marsh | 23 | 97 | 3 | 9 | 132 | 0.03 |
| Perennial Lake or Pond | 1 | | 0 | | 2 | 0.00 |
| Riverine | 100 | 131 | 11 | 120 | 362 | 0.10 |
| Saline Emergent Wetland | 89 | 101 | 26 | 45 | 262 | 0.07 |
| Tidal Flat | 55 | 243 | 10 | 4 | 312 | 0.08 |
| Water | 8 | 6 | 0 | 0 | 15 | 0.00 |
| Wet Meadow | 2 | | 0 | 2 | 4 | 0.00 |
| ***Dune*** | | | | | | |
| Dune | | | 16 | | 16 | 0.00 |
| ***Barren/Ruderal*** | | | | | | |
| Barren | 1,569 | 983 | 767 | 1,163 | 4,482 | 1.19 |
| Ruderal | 45 | 67 | 21 | 31 | 164 | 0.04 |
| *Subtotal* | 45,774 | 39,795 | 12,930 | 18,980 | 117,480 | 31.18 |
| **Agriculture** | | | | | | |
| Agriculture | 1,667 | 332 | 702 | 499 | 3,201 | 0.85 |
| Cropland | 7,281 | 2,255 | 1,338 | 2,500 | 13,374 | 3.55 |
| Deciduous Orchard | 591 | 286 | 75 | 171 | 1,123 | 0.30 |
| Evergreen Orchard | 5 | 3 | 1 | 2 | 11 | 0.00 |
| Irrigated Grain Crops | 2 | 4 | | 8 | 13 | 0.00 |
| Irrigated Row and Field Crops | 2,182 | 1,549 | 167 | 1,599 | 5,497 | 1.46 |
| Rice | 14 | 1 | | | 14 | 0.00 |
| Vineyard | 1,474 | 583 | 138 | 396 | 2,592 | 0.69 |
| *Subtotal* | 13,216 | 5,013 | 2,422 | 5,174 | 25,825 | 6.85 |
| **Urban** | | | | | | |
| Storage or treatment basin | 31 | 86 | 1 | 38 | 156 | 0.04 |
| Urban | 95,584 | 16,743 | 96,008 | 24,994 | 233,329 | 61.93 |
| *Subtotal* | 95,615 | 16,829 | 96,009 | 25,032 | 233,485 | 61.97 |
| **Total[b]** | **154,606** | **61,637** | **111,361** | **49,186** | **376,789** | 100.00 |

[a] Some land-cover types are present in the study area (see Figure 2-2) but not in the Plan Area (e.g., juniper).
[b] Land-cover types were derived from CALVEG, FRAP Multi-Source, and SFEI Baylands sources. Land-cover totals by facility type were derived by overlapping facility boundaries with mapped land-cover types.
[c] Total acreage does not include unmapped facilities, new facilities, or mitigation lands and therefore does not match Table 1-1 in the HCP. Unmapped facilities are expected to occur in proportion to the land-cover type for mapped facilities; new facilities are expected to occur predominantly in natural lands; and mitigation lands are expected to occur in natural lands.

PG&E derived land-cover types from CALVEG, FRAP Multi-Source, and SFEI Baylands data sources. This data was augmented by habitat data developed for regional conservation plans (as

described in the Description of the Action and HCP Section 2.3.4, *Species Habitat Models*). Together, these data sets provide the broadest, highest resolution land-cover data currently available, although the urban growth boundaries reflect growth only since 2001. More recent urban data was not used because the data resolution was too low and had the potential to eliminate natural land-cover types. Plan Area land-cover types that may be understated are riparian areas, wetlands, and coastal dunes because these areas are often smaller than the minimum mapping unit in the available land-cover data used for purposes of this analysis.

*California Freshwater Shrimp*

This species is currently known from 17 stream segments in Napa, Marin, and Sonoma Counties that can be separated into four general drainage units. The first drainage unit includes several tributary streams in the lower Russian River drainage (Austin Creek). The second drainage unit is composed of the coastal streams that flow westward directly into the Pacific Ocean (Salmon Creek and Stemple Creek). The third drainage unit consists of the coastal streams that flow into Tomales Bay (Lagunitas Creek and Walker Creek). The fourth drainage unit is made up of the southward flowing streams that empty into northern San Pablo Bay (Napa River and Sonoma Creek). California freshwater shrimp has only been found in perennial coastal streams at elevations of less than 380 feet (116 meters) with an average gradient of 1 percent or less.

California freshwater shrimp has an estimated 1,636 acres of modeled habitat in the study area, 72 acres of which is within the action area. Modeled habitat is sparsely scattered across three Counties: approximately 48 acres in Sonoma County, 14 acres in Marin County, and 11 acres in Napa County. All modeled habitat within the action area has been identified as hot zones for the species.

*Conservancy fairy shrimp*

Within the study area, this species is known to occur only in Solano County. Conservancy fairy shrimp has an estimated 5,260 acres of modeled habitat within the study area,292 acres of which is within the action area. Modeled habitat for Conservancy fairy shrimp can be found mainly in the eastern portion of Solano County east of Fairfield with a few areas in southern Solano County along the edge of the Delta. The most contiguous, well connected habitat patches are those located east of Travis Air Force Base. There is also habitat in the vicinity of Jepson Prairie.

*Conservancy Fairy Shrimp Critical Habitat*

A portion of critical habitat unit 3, the Jepson Prairie Unit, is within the action area. Unit 3 encompasses a total of 4,414 acres, 324 acres of which are within the action area.

*Longhorn Fairy Shrimp*

Within the study area, this species is known to occur in Alameda and Contra Costa Counties. Longhorn fairy shrimp has an estimated 791 acres of modeled habitat within the study area, 11 acres of which is within the action area. The species occurs within water that is pooled in sandstone depressions.

*Longhorn Fairy Shrimp Critical Habitat*

All habitat for this species within the action area is part of critical habitat unit 1, the Altamont Hills Unit.

*Vernal Pool Fairy Shrimp*

Within the study area, this species is generally found in portions of Solano County, eastern Contra Costa County, and eastern Alameda County and is known from one occurrence in Napa County at the south end of the Napa Airport. This species may co-occur with other covered vernal pool crustaceans. Vernal pool fairy shrimp has an estimated 66,917 acres of modeled habitat the within the study area, 4,963 acres of which are within the action area.

*Vernal Pool Fairy Shrimp Critical Habitat*

Portions of critical habitat units 16 (Jepson Prairie Unit), 17 (Napa River Unit), and 19 (Altamont Hills Unit) are within the action area. Critical habitat designated for the vernal pool fairy shrimp includes 21,124 acres in the study area, 1,133 acres of which are in the action area.

*Vernal Pool Tadpole Shrimp*

Within the study area, this species generally is found in portions of Solano County near Fairfield and in the Baylands near Milpitas. Vernal pool tadpole shrimp has an estimated 61,664 acres of modeled habitat within the study area, 4,382 acres of which are within the action area.

*Critical Habitat for the Vernal Pool Tadpole Shrimp*

Portions of critical habitat units 11 (Jepson Prairie Unit) and 14 (San Francisco Bay Unit) are within the action area Critical habitat designated for the vernal pool tadpole shrimp includes 12,663 acres in the study area, 607 acres of which are in the action area.

*Delta Green Ground Beetle*

Within the study area this species is found only in Solano County. Delta green ground beetle has an estimated 3,380 acres of modeled habitat within the action area, 122 acres of which are within the action area.

*Critical Habitat for the Delta Green Ground Beetle*

Critical habitat designated for the Delta green ground beetle includes 969 acres in the action area, 32 acres of which are in the action area.

*Bay Checkerspot Butterfly*

Within the study area this species occurs in San Mateo County (introduced at Edgewood Park in early 2007) and Santa Clara County. To account for the reintroduction at Edgewood Park, and potential future reintroductions or recolonizations in other portions of San Mateo County, Covered Activity impacts are given for both counties. Bay checkerspot butterfly has an estimated 8,913 acres of modeled habitat within the study area, 912 acres of which are within the action area. Established

Bay checkerspot hot zones include patches of habitat in Santa Clara County (i.e., the east hills from southern San Jose south to an area south of the city of Morgan Hill) and Edgewood Park in San Mateo County. Gas and electric transmission and distribution lines pass through these hot zones.

*Bay Checkerspot Butterfly Critical Habitat*

There are 1,896 acres of critical habitat in the action area. The amount of critical habitat in the action area is greater than the total amount of modeled habitat (912 acres) in the action area because critical habitat includes areas that may be important to the recovery of the species but are not currently suitable (primarily due to lack of appropriate management) or are not currently occupied. Any impacts on this species' habitat are likely to be within critical habitat.

*Callippe Silverspot Butterfly*

Within the study area, this species occurs in portions of San Mateo, Alameda, and Solano Counties, although not all populations have been taxonomically verified (Service 2009c). Callippe silverspot butterfly has an estimated 112,051 acres of modeled habitat within the study area 6,807 acres of which are within the action area. Modeled habitat for Callippe silverspot butterfly occurs just south of San Francisco on San Bruno Mountain (3 percent), in the Cordelia Hills region of Solano County (30 percent), in Napa County (1 percent), and in the East Bay hills from northern Contra Costa County (45 percent) south to southern Alameda County (21 percent) near Sunol.

*Lange's Metalmark Butterfly*

Within the study area, this species occurs only in Contra Costa County. Lange's metalmark butterfly has and estimated 77 acres of modeled habitat within the study area, 13 acres of habitat within the action area. The Lange's metalmark hot zone includes all modeled habitat for the species within the Antioch Dunes. A gas line and two electric transmission towers are present in this hot zone.

*Mission Blue Butterfly*

Within the study area, this species occurs in Marin, San Francisco, and San Mateo Counties. Mission blue butterfly has an estimated 10,693 acres of modeled habitat within the study area, 653 acres of which are within the action area. No gas or electric facilities pass through habitat in the hills west of Millbrae, though there are gas and electric distribution lines adjacent to it. In both Pacifica and San Bruno, gas and electric transmission and electric distribution lines pass through the habitat and gas distribution lines are located along the outer edges of the habitat. A few electric and distribution lines run along the periphery of the habitat in San Francisco. The habitat in Marin Headlands encompasses one electric transmission line and a few electric and gas distribution lines.

*San Bruno Elfin Butterfly*

Within the study area, this species occurs only in San Mateo County. San Bruno elfin butterfly has an estimated 15,036 acres of modeled habitat within the study area, 373 acres of which are within the action area. Modeled habitat for San Bruno elfin butterfly in the study area extends along the coast just south of Bodega Bay, in the Coast Ranges just east of Bolinas, in Contra Costa County near Mount Diablo State Park, San Bruno Mountain, Milagra Ridge County Park, and an area stretching from McNee Ranch State Park to San Pedro Valley County Park in San Mateo County. The most contiguous, well-connected habitat patches are those in San Mateo County on San Bruno Mountain,

in Milagra Ridge County Park, and in the area of McNee Ranch State Park and San Pedro Valley County Park. Although urbanization surrounds these three sites, they remain undeveloped.

Patches of habitat at San Bruno Mountain and Milagra Ridge County Park each contain a number of electric and gas utility corridors, some of which bisect the habitat. Two electric utility corridors in the western portion of the habitat patch bisect the patch that stretches between McNee Ranch State Park and San Pedro Valley County Park. A few electric distribution lines pass through the smaller, disjunct patches of habitat in Marin and Contra Costa Counties.

*California Tiger Salamander Central DPS*

Within the study area, the California tiger salamander Central DPS occurs in Santa Clara, Alameda, Contra Costa, and Solano Counties. The California tiger salamander Central DPS has an estimated 1.14 million acres of modeled habitat within the study area, 41,152 acres of which are within the action area. This species occurs throughout much of the non-urbanized parts of the action area, with numerous occurrences in eastern Contra Costa, Alameda, and Santa Clara Counties. The species is also known to occur in and around the Stanford University campus in Palo Alto. Specific areas with high-quality habitat include Solano County in east Fairfield (around Travis Air Force Base and between Highway 113 and Jepson Prairie); from Alameda County north of Livermore into northern Contra Costa County; and in Santa Clara County northeast of Gilroy and surrounding San Felipe Lake.

Modeled habitat is based on a number of sources, as mentioned in Habitat Modeling section of this biological opinion (and further explained in the HCP). California tiger salamander modeled habitat includes breeding and upland components. The breeding components are those that support breeding habitat and represent the areas where the population density is highest during the breeding period, though not all juveniles and adults return to these areas. Modeled breeding habitat currently represents less than one-quarter of one percent (i.e., 0.17 percent) of the action. Upland habitat is broadly defined to include non-urbanized areas within 1.3 miles of breeding habitat. Modeled upland habitat represents 58.9 percent of the action area, with the majority located in PG&E's electric transmission ROWs. Overall, modeled habitat is distributed over the Plan Area as follows: 33 percent in Contra Costa County, 28 percent in Alameda County, 23 percent in Santa Clara County, and 16 percent in Solano County.

*Central California Tiger Salamander Critical Habitat*

There are a total of 199,109 acres of designated critical habitat for the Central California tiger salamander. Within the study area there are approximately 47,381 acres of designated critical habitat, 5,438 acres of which are within the action area. The primary constituent elements of critical habitat for Sonoma California tiger salamander include standing bodies of fresh water that allow the species to complete the aquatic portion of its life cycle, adjacent upland areas that contain small mammal burrows for shelter, and accessible upland habitat to allow dispersal between occupied sites. Approximately 2.7 percent of the total designated critical habitat for the DPS is in the action area.

*California Tiger Salamander Sonoma DPS*

Within the study area, the California tiger salamander Sonoma DPS only occurs in the Santa Rosa Plain in Sonoma County. The Sonoma California tiger salamander has an estimated 31,555 acres of

modeled habitat within the study area, 2,404 acres of which are within the action area. The species' habitat is fragmented by rural residential areas and other urbanization.

Modeled habitat is based on a number of sources, as mentioned in Habitat Modeling section of this biological opinion (and further explained in the HCP). In this area, the model utilizes data from the Santa Rosa Plain Conservation Strategy. Sonoma California tiger salamander modeled habitat does not differentiate between wetland and upland components because a wetland dataset was not available. However, the wetland components are those that support breeding habitat and represent the areas where the population density may be higher during the breeding period, though not all adults return to ponds each year. Total modeled habitat for this species represents 2.87 percent of the action area. Wetland habitats are expected to be similar to other areas with mapped habitat (i.e., less than 1 percent of the ROW) and a small fraction of the modeled habitat.

*California Tiger Salamander Sonoma DPS Critical Habitat*

Within the study area there are approximately 47,383 acres of designated critical habitat, 2,404 acres of which are within the action area 870 acres of which are in the action Area. The primary constituent elements of critical habitat for Sonoma California tiger salamander include standing bodies of fresh water that allow the species to complete the aquatic portion of its life cycle, adjacent upland areas that contain small mammal burrows for shelter, and accessible upland habitat to allow dispersal between occupied sites. Approximately 1.9 percent of the total designated critical habitat for the DPS is in the action area.

*California Red-Legged Frog*

Within the study area, this species occupies all 9 Bay Area counties. The California red-legged frog has an estimated 1.19 million acres of modeled habitat within the study area, 33,242 acres of which are in the action area.

Modeled habitat is based on a number of sources, as mentioned in Habitat Modeling section of this biological opinion (and further explained in the HCP). Modeled habitat is distributed in the following proportions across the Plan Area: 27 percent in Contra Costa County, 27 percent in Alameda County, 23 percent in Santa Clara County, 9 percent in San Mateo County, 6 percent in Solano County, 4 percent in Sonoma County, 3 percent in Marin County, 2 percent in Napa County and less than 1 percent in San Francisco County. These percentages are related more to the extent and density of gas and electric infrastructure in the action area than the distribution of California red-legged frogs in those counties. Within modeled habitat, Covered Activities would affect both potential breeding and dispersal habitat.

Habitat models indicate that approximately 10.75 percent of all ROWs in the action area may contain suitable breeding habitat. The potential breeding habitat is characterized as the riparian area and the actual wetted areas of the stream, creek, or drainage. PG&E used a conservative estimate of 300 feet on each side of the stream to delineate suitable breeding habitat. However, the areas of wetted habitat most important for breeding within the breeding habitat model are typically much smaller, ranging from 5 to 30 feet wide. Therefore, actual wetted habitat used for breeding would be approximately 5 percent of the modeled breeding habitat (i.e., 30 feet ÷ 600 feet =.05, or 5 percent). The habitat models indicate that about 35 percent of all ROWs in the action area may contain suitable upland habitat for California red-legged frog. Upland habitat is characterized as dispersal habitat, critical habitat, and recovery areas within the Plan Area.

*California Red-Legged Frog Critical Habitat*

There are a total of 1.63 million acres of designated critical habitat for the California red-legged frog. Within the study area there are approximately 640,112 acres of designated critical habitat, 10,348 acres of which are in the action area. The primary constituent elements of critical habitat for California red-legged frog include bodies of fresh water which must be inundated for at least 20 weeks for aquatic breeding habitat or that provide shelter and dispersal benefits, and upland habitat adjacent to or surrounding habitat up to a distance of 1 mile for dispersal. Approximately 0.63 percent of the total designated critical habitat is in the action area.

*Alameda Whipsnake*

Suitable habitat for this species includes communities in the inner Coast Ranges that support mixed chaparral, coastal scrub, annual grassland, and oak woodlands that are adjacent to scrub habitats. Grassland areas with rock outcrops linked to scrub by river corridors are also primary constituent elements for the species. (Service 2002b). Within the study area, this species occurs in Alameda and Contra Costa Counties with historic occurrences in portions of Santa Clara County (CDFW 2017). The Alameda whipsnake has an estimated 335,452 acres of modeled habitat within the study area, 10,804 acres of which are in the action area. The majority (64 percent) of the modeled habitat for Alameda whipsnake falls within Contra Costa County, with 35 percent in Alameda County and 1 percent Santa Clara County.

Modeled habitat for Alameda whipsnake is based on a number of sources, as mentioned in Habitat Modeling section of this biological opinion (and further explained in the HCP). Alameda whipsnake modeled habitat in the action area includes 0.5 percent core habitat. Core habitat consists of scrub and chaparral communities where Alameda whipsnake is most likely to occur. The action area contains 1.65 percent perimeter core habitat, which includes primary dispersal areas of 500 feet around core habitats. These areas could be used during daily movements or as whipsnakes move from one core habitat block to another. There are 34 acres of core habitat within gas transmission line corridors and 17 acres of core habitat within gas distribution line corridors.

*Alameda Whipsnake Critical Habitat*

There are a total of 154,834 acres of designated critical habitat for the Alameda whipsnake. Within the study area there are approximately 154,169 acres of designated critical habitat, 4,255 acres of which are within the action area. Primary constituent elements for the species consist of scrub/shrub communities with a mosaic of open and closed canopy; woodland or annual grassland plant communities contiguous to lands containing scrub/shrub communities; and lands containing rock outcrops, talus, and small mammal burrows within or adjacent to scrub/shrub communities.

*San Francisco Garter Snake*

Within the study area, San Francisco garter snake occurs only in San Mateo County, This species has an estimated 6,020 acres of modeled habitat within the study area, 573 acres of which are within the action area.

PG&E has identified hot zones in association with modeled habitat for San Francisco garter snake in the study area, which includes freshwater habitats in and around the city of Half Moon Bay, open

water habitat within the mountains to the east of Half Moon Bay (i.e., Crystal Springs Reservoir), habitat south of Pacifica, off Highway 1 near Año Nuevo State Reserve, and habitat west of Highway 101 near San Francisco International Airport. Gas and electric transmission lines pass through the hot zones near the airport, in habitat adjacent to the reservoirs just west of I-280, and in some of the habitat around Half Moon Bay. Gas and electric distribution lines are present in the habitat near Pacifica, Half Moon Bay, San Francisco International Airport, and in habitat just south of Skyline College.

*California Clapper Rail (also known as Ridgeway's Rail)*

Within the study area, California clapper rails occur in all 9 Bay Area counties. This species has an estimated 137,662 acres of modeled habitat within the study area, 2,622 acres of which are within the action area.

Modeled habitat for California clapper rail occurs along the fringe of San Francisco Bay, extending into remnant salt marshes bordering the salt ponds of the South Bay, Suisun Marsh, Petaluma Marsh, Napa Sonoma Marsh, and other areas along northern San Pablo Bay. The largest, most contiguous patch of habitat is Suisun Marsh. One gas transmission line traverses this habitat patch, crossing into it from the east near Birds Landing and one electric transmission line crosses the northern extent of Suisun Marsh. Several electric distribution lines are also situated within this marsh. Another large patch of habitat is the Napa Sonoma Marsh north of San Pablo Bay, which has one electric transmission line and a few electric distribution lines crossing it. Additional habitat can be found around San Francisco and San Pablo Bays. Included are Petaluma Marsh and habitat extending into remnant salt marshes bordering the salt ponds of the South Bay. Many of these smaller habitat patches contain electric transmission and distribution lines.

*Salt Marsh Harvest Mouse*

Within the study area, salt marsh harvest mouse occur in Alameda, Contra Costa, Napa, Marin, San Mateo, Santa Clara, Solano, and Sonoma Counties. This species has an estimated 60,064 acres of modeled habitat within the study area, 2,138 acres of which are within the action area.

Because this is a narrow-distribution species, patches of contiguous, well-connected pickleweed (*Salicornia* spp.) habitat that support movement are important to the viability of local populations. Habitat for this species occurs in salt marsh and the sloughs and channels that border salt marsh habitat along the Bay fringe in the South San Francisco Bay, San Pablo Bay, Suisun Bay, and Grizzly Bay. Patches of high-quality habitat also occur in a number of sloughs of the South Bay, as well as sloughs and salt marshes of San Pablo and Suisun Bays. Many of these patches of habitat are relatively large and contiguous, but isolated from one another by unsuitable habitat and urban development. A number of PG&E facilities cross the most suitable patches located throughout bay fringe habitats, including electric and gas facility corridors and boardwalks in a number of locations.

A small number of electric transmission and distribution lines and gas transmission lines cross the most suitable patches of habitat in the marshes bordering Suisun Bay and Grizzly Bay. Included is one of this area's highly suitable, contiguous patches of habitat, located just north of China Camp State Park. An electric transmission line bisects the area. Large blocks of salt marsh harvest mouse habitat lie along and north of San Pablo Bay (Napa Sonoma Marsh and Petaluma Marsh); only a few electric transmission and distribution lines cross these areas.

A number of patches occur throughout the salt marshes of the South Bay. Some of these patches are relatively large and well-connected with one another and with patches of higher suitability. A number of electric transmission lines and a few electric distribution and gas transmission lines cross these patches. Electric transmission lines and associated boardwalks cross a large, well connected patch of habitat located near Redwood City.

Smaller, disjunct patches compose the rest of the habitat for this species, and many of these patches contain electric transmission and distribution lines and a few gas transmission lines; however the overall number of lines in these habitats is low. Many of these patches are near urbanized areas along the Bay fringe. Ground-disturbing activities associated with these lines could temporarily impact salt marsh harvest mouse habitat.

Tidal brackish emergent marsh bordering San Francisco, San Pablo, Grizzly Bay, and Suisun Bay are generally of particular concern. A gas transmission line passes through occupied habitat in Suisun Marsh. This line runs through habitat from the east starting around Bird's Landing and heading ultimately to the west toward Grizzly Bay. PG&E has designated all marshes a hot zone.

Several large-scale restoration projects are underway in San Francisco Bay that could expand this species' habitat.

*San Joaquin Kit Fox*

Within the study area, San Joaquin kit fox occur in Alameda, Contra Costa, and Santa Clara Counties; however, observations in these areas are rare. According to Cypher *et al.* (2013), the northern range is characterized by highly fragmented medium suitability habitat consisting primarily of dense grasslands dominated by wild oats. None the less, this species has an estimated 182,959 acres of modeled habitat within the study area, 8,279 acres of which are within the action area.

Numerous electric transmission lines and a gas transmission line traverse the area near the Bethany Reservoir. Habitat models being relied upon for this species categorize some areas within the Plan Area as low use/quality due to lack of recent records, surrounding land use, unsuitable land cover or unsuitable slopes and barriers identified as part of other regional conservation planning efforts; East Contra Costa HCP/NCCP uses the term "suitable low use," Santa Clara Valley Habitat Plan uses the terms "secondary habitat" and "secondary habitat low use," and East Alameda Conservation Strategy uses the term "low quality habitat."

*Pallid Manzanita*

There are eight extant element occurrences (EO) and one extirpated occurrence in the study area (CDFW 2017), five of which were surveyed in 2012. Five occurrences, EO's 1, 2, 8, 12, and 15, would not be affected by Covered Activities.

- EO 1: Sobrante Ridge Regional Preserve, three polygons (one extirpated); nearest facilities more than 100 feet from the two southern extant polygons (surveyed in 2012).

- EO 2: Tilden Regional Preserve, two polygons (transplanted); gas and electric distribution lines undergrounded at roadside, not in habitat.

- EO 8: Oakland Hills; two polygons, nearest electric distribution facility more than 1,000 feet from occurrence.

- EO 12: Oakland Hills, occurrence extirpated; habitat converted to residential development.

- EO 15: Sibley Volcanic Regional Preserve; nearest electric distribution facility more than 800 feet from occurrence.

Electric distribution lines cross four occurrences, electric transmission lines cross one occurrence, and gas distribution lines cross four occurrences:

- EO 3: Joaquin Miller Park; eight polygons, a gas distribution line crosses two polygons, an electric distribution line crosses one polygon (surveyed in 2012).

- EO 4: Huckleberry Botanical Regional Preserve; 14 polygons, multiple electric and gas distribution lines cross area, most polygons with lines undergrounded at roadside, not in habitat, the largest polygon is crossed by electric distribution and transmission lines with at least four poles and four towers within the polygon (surveyed in 2012).

- EO 9: Redwood Regional Preserve; two polygons, one polygon with six poles in urban setting, electric and gas distribution lines not in habitat but within 100 feet, second polygon with nearest facilities more than 100 feet away (surveyed in 2012).

- EO 13: Tilden Regional Preserve; one polygon, transplant site, electric distribution lines cross the polygon (surveyed in 2012).

*Sonoma Sunshine*

Sonoma sunshine is known from 23 occurrences in Sonoma County, 18 of which are presumed extant (CDFW 2017). Map Book surveys were conducted at 10 occurrences in 2011. The following five occurrences are extirpated or possibly extirpated.

- EO 2: Sonoma Valley, south of El Verano; all habitat at this location has been converted to vineyards (CDFW 2017).

- EO 3: Sonoma; all habitat at this location has been converted to residential development (CDFW 2017) (surveyed in 2011).

- EO 13: Santa Rosa; all habitat at this location converted to a residential development (school) (CDFW 2017).

- EO 18: South of Santa Rosa along Horn Road, extirpated by land alterations (CDFW 2017); potential habitat remains in area but no PG&E facilities are in the habitat (surveyed in 2011).

Nine occurrences are not located near PG&E facilities:

- EO 7: East of Laguna de Santa Rosa; nearest electric distribution facility located more than 600 feet from occurrence.

- EO 12: North of Laguna de Santa Rosa; nearest electric distribution facility located more than 1,400 feet from occurrence.
- EO 24: Northwest of Santa Rosa; nearest electric distribution facility located more than 200 feet from occurrence.
- EO 28: Southwest of Santa Rosa; nearest electric distribution facility located more than 100 feet from occurrence.
- EO 29: North of Rohnert Park; nearest electric distribution facility located more than 500 feet from occurrence.
- EO 30: Southwest of Santa Rosa and North of Todd Road; nearest electric distribution facility located more than 300 feet from occurrence.
- EO 31: Southwest of Santa Rosa and North of Todd Road; nearest electric distribution facility located more than 200 feet from occurrence.
- EO 32: Sonoma County Airport; nearest electric distribution facility located more than 150 feet from occurrence.

Ten occurrences have PG&E facilities within 100 feet, but the facilities are not located within habitat for Sonoma sunshine, but are within a distance that activities at these facilities may result in indirect effects to the species. These occurrences include the following:

- EO 5: Sonoma Valley Restoration Preserve; an electric distribution line at roadside is not in habitat but is within 100 feet of habitat (surveyed and tagged Map Book zone in 2013).
- EO 6: Northwest of Santa Rosa and West of Fulton Road; electric distribution lines at roadside are not in habitat but are within 100 feet of habitat (surveyed and tagged Map Book zone in 2013).
- EO 8: Southeast of Sebastopol along Todd Road; electric distribution lines at roadside are not in habitat but are within 100 feet of habitat (surveyed in 2011).
- EO 9: West of Santa Rosa and South of Piner Avenue; electric distribution line in vineyard along west side of occurrence is not in habitat but is within 100 feet of habitat; other lines at roadside are more than 100 feet from occurrence (surveyed in 2011 and tagged Map Book zone in 2013).
- EO 15; West of Santa Rosa and North of Piner Avenue; electric distribution lines at roadside are not in habitat but are within 100 feet of habitat (surveyed in 2011).
- EO 16: North of Bonneau Road; electric distribution lines at roadside are not in habitat but are within 100 feet of habitat (surveyed in 2011).
- EO 17: South of Santa Rosa and North of Scenic Avenue; electric distribution lines at roadside along south side of road are not in habitat but are within 100 feet of habitat on north side of road (surveyed in 2011).
- EO 20: Northwest of Cotati along Stoney Point Road, part of occurrence on west side of road extirpated (CDFW 2017); electric distribution lines at roadside on west side of road are not in habitat but are within 100 feet of habitat on east side of road (surveyed in 2011).
- EO 22: Sonoma; undergrounded electric distribution line at west edge of parcel outside of habitat (surveyed in 2011), population not observed at this occurrence since 1995 (CDFW 2017).
- EO37: Slippery Rock Conservation Bank, south of Hall Road (a translocated population), poles are located with 100 feet of created pools.

Two occurrences are crossed by a gas transmission line. EO 10 (includes former occurrences 23, 25, 26, and 27): Northwest of Santa Rosa on East side of Francisco Road, a gas transmission line crosses the east edge of the occurrence, and electric distribution and transmission lines are within 100 feet of the occurrence; north of Raplee Terrace, a gas transmission line crosses the east edge of the occurrence, and an electric transmission line is within 100 feet of the occurrence.

The reported population size for EO 23 was 74,000 in 1991 and for EO 25 was 750 in 1988 but the populations have been combined in the latest version of CNDDB and the population has been estimated to be as large as 1.8 million (CDFW 2017).

*Coyote Ceanothus*

Coyote ceanothus is known from four occurrences in Santa Clara County, all of which are within the study area (CDFW 2017). Three of the occurrences are located on the Morgan Hill 7.5-minute USGS quadrangle, and one is located on the Loma Prieta 7.5-minute USGS quadrangle. PG&E facilities overlap with three of these occurrences; however, EO 4 is a non-specific occurrence that appears to be erroneous because no coyote ceanothus has been observed in the area during multiple surveys (CDFW 2017). The two specific occurrences more likely to be affected by Covered Activities are:

- EO 6; formerly EO 8: Both sides of Anderson Lake Dam; gas transmission line crosses main part of occurrence.

- EO 12: Northwest of Llagas Road between Murphy Springs Court and Castle Lake Drive in Morgan Hill (CDFW 2017); electric transmission line crosses one occurrence and a tower is in habitat.

Occurrence 11 is located north of Morgan Hill at Kirby Canyon. The nearest electric distribution facilities are over 250 feet away.

Occurrence 4 is based on a specimen collected in Croy Canyon in 1929 (CDFW 2017). The location of the collection is not known with certainty, and because the specimen consists of non-reproductive material, it cannot be definitively identified to species. An electric distribution line along Croy Road crosses this location. The poles are located at roadside.

Occurrence 6 is located east of Morgan Hill on both sides of Anderson Dam. A gas transmission line crosses the main part of the occurrence west of Anderson Dam, crossing 3,066 linear feet of mapped habitat. At Occurrence 6, 188,175 Coyote ceanothus plants were surveyed in 2009 in the polygons west of Anderson Dam (CDFW 2017). Most of these plants were established in 2003 after a fire and are now reproductively mature, appearing healthy with no observed herbivory or other signs of distress (CDFW 2017).

Occurrence 12 is located in northwest Morgan Hill, north of Llagas Road. Two habitat polygons are mapped at this occurrence. An electric transmission line crosses the smaller polygon, with one tower located within the polygon. Access to the tower is provided by an existing unpaved access road. At Occurrence 12, about 30 plants are present along a ravine in the smaller of two polygons (Service 2011b; CDFW 2017). These plants are on the slopes below the hilltop where the electric transmission tower is located, so no direct impacts on these individuals would result from Covered Activities.

*Fountain Thistle*

There are four extant occurrences (EOs 1, 4, 7, and 8) and one possibly extirpated occurrence (EO 6) of fountain thistle in the state, all of which occur in the study area (CDFW 2017).

- EO 1: Both sides of I-280 between Upper and Lower Crystal Springs Reservoirs to the west and Pulgas Ridge to the east; electric distribution and gas transmission lines cross two of the 10 occurrences. At Occurrence 1 the 10 stands comprise a total of 21 acres. PG&E facilities cross two of the stands. An electric distribution line crosses a 2.1-acre stand, located on the west side of I-280 and the north side of Ralston Avenue. Two wooden poles are present. The same electric distribution line and a gas transmission line cross a second 1.8-acre stand on the east side of I-280. One wooden pole is present within the stand. No facilities come within 100 feet of the eight other stands that make up this element occurrence. About 25,000 plants are present in this occurrence, 97 percent of which occur in a single patch adjacent to Lower Crystal Springs Reservoir
- EO 4: West of Edgewood Park, occurrence has declined and may no longer be extant (Service 2010c); nearest electric transmission facility located more than 400 feet from the occurrence
- EO 6: South end of Edgewood Park, occurrence based on a single plant, last observed in 1993; nearest electric transmission facility located more than 500 feet from the occurrence
- EO 7: Stulsaft Park; nearest electric distribution facilities located in residential lots more than 100 feet from the occurrence
- EO 8: East of Woodside Glens; gas transmission line crosses 150 feet of the occurrence. Occurrence 8 consists of a single 8-acre stand that contained about 20 plants in 1993 (CDFW 2017). The current status of the population is not known. A gas transmission line crosses 150 feet of the stand. At EO 8, the 20 plants were observed scattered across 8 acres of habitat

*Santa Clara Valley Dudleya*

There are 55 extant occurrences of Santa Clara Valley dudleya in the study area (CDFW 2017). The following occurrences are far from PG&E facilities:

- EO 2: At Calero County Park; more than 3,600 feet to nearest electric distribution facilities.
- EO 6: About 4.5 miles east of Morgan Hill; more than 2,700 feet from nearest electric distribution facilities.
- EO 8: San Jose, between Guadalupe Parkway and Monterey Highway, most of which has been converted to urban development; electric and gas distribution facilities overlapping the map polygons are underground along city streets in urban areas.
- EO 12: San Jose, Valley Christian School site, most of which has been converted to urban development; electric distribution facilities overlapping the map polygons are underground along city streets in urban areas.
- EO 15: Northwest of Morgan Hill; more than 250 feet from nearest electric distribution facilities.
- EO 18: Morgan Hill, near junction of Llagas Creek and Paradise Creek, part of occurrence converted to urban development; electric distribution facilities underground along a city street.
- EO 19: At New Almaden Quicksilver Mine County Park; more than 250 feet from nearest electric distribution facilities.

- EO 24: Morgan Hill, along Llagas Ave, part of occurrence converted to urban development; electric distribution facilities underground along a city street.
- EO 25: In Morgan Hill, at the foot of the Santa Teresa Hills; more than 500 feet from nearest electric distribution facilities.
- EO 26: West of Calero Reservoir; more than 1,000 feet from nearest electric transmission facilities.
- EO 27: Near the Santa Teresa Mine; more than 1,000 feet from nearest electric transmission facilities.
- EO 28: In the hills southwest of Santa Clara County Fairgrounds, south polygon converted to urban development; more than 100 feet from nearest gas distribution facilities, with electric distribution facilities underground along a city street.
- EO 29: Specific polygon near Santa Teresa Golf Course; more than 150 feet from nearest electric distribution facilities.
- EO 31: At New Almaden Quicksilver Mine County Park; more than 100 feet from nearest electric distribution facilities.
- EO 33: On the north slope of Almaden Canyon; more than 600 feet from nearest electric transmission facilities.
- EO 34: Near the south shore of Calero Reservoir; more than 2,000 feet from nearest electric distribution facilities.
- EO 37: West of Anderson Reservoir; more than 1,100 feet from nearest gas transmission facilities.
- EO 39: In Baldy Ryan Canyon; more than 2,500 feet from nearest electric distribution facilities.
- EO 40: At the head of Llagas Creek, southwest of Portezuela; more than 4,000 feet from nearest electric distribution facilities.
- EO 43: At Mount Madonna County Park; more than 500 feet from nearest electric transmission facilities.
- EO 44: West of Mud Springs; more than 2,000 feet from nearest electric distribution facilities.
- EO 45: Southwest of the mouth of Baldy Ryan Canyon; more than 600 feet from nearest electric distribution facilities.
- EO 46: Near Fern Peak; more than 4,500 feet from nearest electric distribution facilities.
- EO 47: Non-specific polygon, along Gilroy Hot Springs Road; more than 10,000 feet from nearest electric distribution facilities.
- EO 50: North of Kelly Lake; more than 4.5 miles from nearest electric distribution facilities.
- EO 55: Near Coyote Reservoir; more than 1,700 feet from nearest electric distribution facilities.
- EO 58: South of Chesbro Reservoir; more than 700 feet from nearest electric distribution facilities.
- EO 59: Henry Coe State Park; no facilities in vicinity.
- EO 60: Mine Hill Area in Almaden Quicksilver Park; nearest facilities are over 400 feet away. EO 61: Sierra Azul Open Space; no facilities in vicinity.
- EO 62: Sierra Azul Open Space; nearest facilities are over 350 feet away. EO 63: West of San Felipe Road; nearest facilities are over 1,000 feet away. EO 65: Young Ranch; nearest facilities are over 650 feet away.

- EO 66: Young Ranch; nearest facilities are over 1,000 feet away.
- EO 67: Young Ranch; nearest facilities are over 1,000 feet away.

The following occurrences are nearer to PG&E facilities:

- EO 1: On Tulare Hill, an unpaved access road to an electric transmission line crosses one polygon.
- EO 4: On Coyote Ridge, an electric distribution line spans one polygon, with one pole within 100 feet.
- EO 22: Along Coyote Ridge near Kirby Canyon, electric transmission lines are close to two polygons, with three towers within 100 feet.
- EO 23: South of Morgan Hill, along Hayes Lane, an electric distribution line along the road spans the occurrence, with two poles within 100 feet.
- EO 30: On the north slope of Coyote Peak, an electric distribution line passes between two polygons, with one pole within 100 feet.
- EO 51: Along the Almaden-Calero Canal, an electric transmission line spans the occurrence, with one tower within 100 feet.
- EO 56: Adjacent to the Almaden Reservoir Dam, an electric distribution line spans the occurrence, with one pole within 100 feet.
- EO 57: In south San Jose, near Malech Road, three electric transmission lines span the occurrence, with one tower within 100 feet, a gas transmission line within 100 feet, and unpaved access roads crossing the occurrence.
- EO 64: Along Metcalf Canyon Road; electric distribution line crosses or passes near the occurrence.
- EO 3: Near Morgan Hill, upslope from the northwest ends of Murphy Springs Court and Llagas Vista Drive, electric transmission lines cross the occurrence, with three towers located in the occurrence and an unpaved access road to the towers crossing the occurrence.
- EO 5: In Metcalf Canyon, an electric transmission line crosses one polygon, with one tower in the polygon and two towers within 100 feet, with unpaved access roads.
- EO 7: Southeast end of San Jose, at Cerra Plata Development, gas transmission lines cross three polygons and electric transmission lines cross two polygons, with three towers in the polygons, with unpaved access roads.
- EO 9: In San Martin, north of Highland Avenue, an electric transmission line crosses the occurrence, with one tower in the occurrence.
- EO 10: At the IBM Almaden Research Center and the southern portion of Santa Teresa County Park, an electric transmission line crosses one polygon, with one tower within the polygon, and an electric distribution line crosses another polygon, with one pole in the polygon and two poles within 100 feet, with unpaved access roads.
- EO 11: In the Santa Teresa Hills, an electric transmission line crosses the occurrence, with one tower in the occurrence, with unpaved access roads.
- EO 32: At the Almaden Quicksilver Mine Park, along Mine Hill Road, an electric distribution line crosses the occurrence, with one pole in the occurrence and one pole within 100 feet, with an unpaved access road.
- EO 36: On Bernal Hill, multiple electric transmission lines cross the occurrence, with 17 towers and one pole in the occurrence, with unpaved access roads.