# Attachment N

## U.S. Fish and Wildlife Service Biological Opinion

**Sunrise Powerlink Transmission Project**

Mitigation Monitoring, Compliance, and Reporting Program

California Public Utilities Commission
and
Bureau of Land Management
U.S. Department of Interior

November 2009

# U. S. Fish and Wildlife Service
# Biological Opinion
# FWS-2008B0423-2009F0097

# Sunrise Powerlink Project
# 2009

# Imperial and San Diego Counties, California

Carlsbad Fish and Wildlife Office
Carlsbad, California

January 2009

# TABLE OF CONTENTS



## TABLES



## APPENDICES

**Acronyms and Abbreviations Used in the Sunrise Power Line Project Biological Opinion**

**A**

| | |
|---|---|
| ac | acre or acres |
| Act | Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.) |

**B**

| | |
|---|---|
| BA | Biological Assessment |
| BAER | Burned Area Emergency Response |
| BLM | Bureau of Land Management |
| BMPs | Best Management Practices |

**C**

| | |
|---|---|
| Cal-IPC | California Invasive Plant Council |
| CDFG | California Department of Fish and Game |
| CEQA | California Environmental Quality Act |
| cm | centimeter or centimeters |
| CNDDB | California Natural Diversity Database |
| CNF | Cleveland National Forest |
| Corps of Engineers | U.S. Army Corps of Engineers |
| CPUC | California Public Utilities Commission |
| CPSD | Consumer Protection and Safety Division |

**D**

| | |
|---|---|
| DAPTF | Declining Amphibian Population Task Force |

**E**

| | |
|---|---|
| EA | Environmental Assessment |
| ECMSCP | East County Multiple Species Conservation Program |
| EIR | Environmental Impact Report |
| EIS | Environmental Impact Statement |
| EPA | Environmental Protection Agency |
| ESSR | Environmental Superior Southern Route |

**F**

| | |
|---|---|
| FTHL | Flat-tail Horned Lizard |
| flycatcher | Southwestern willow flycatcher |
| ft | foot or feet |

**G**

| | |
|---|---|
| G-CM | General Conservation Measures |
| GIS | Geographic Information System |
| gnatcatcher | California gnatcatcher |

**H**

| | |
|---|---|
| ha | hectare or hectares |
| HCP | Habitat Conservation Plan |

**I**

**J**

**K**

| | |
|---|---|
| km | kilometer or kilometers |

**L**

| | |
|---|---|
| LMS | Laguna Mountains skipper |

**M**

| | |
|---|---|
| m | meter or meters |
| MA | Management Area |
| MCAS | Marine Corps Air Station |
| mi | mile or miles |
| MOU | Memorandum of Understanding |
| MP | mileposts |
| mph | mile/s per hour |
| MRD | Modified Route D |
| MSCP | Multiple Species Conservation Program |
| MSHCP | Western Riverside County Multiple Species Habitat Conservation Plan |

**N**

| | |
|---|---|
| NEPA | National Environmental Policy Act |

**O**

| | |
|---|---|
| O&M | Operations and Maintenance |

**P**

| | |
|---|---|
| PAR | Property Analysis Record |
| PBS | Peninsular bighorn sheep |
| PCA | Pest Control Advisor |

**Q**

| | |
|---|---|
| Quino | Quino Checkerspot Butterfly |

**R**

| | |
|---|---|
| ROW | Right of Way |

**S**

| | |
|---|---|
| SDG&E | San Diego Gas and Electric Company |
| Service | U.S. Fish and Wildlife Service |
| SKR | Stephens' kangaroo rat |
| SRPL | Sunrise Powerlink |
| SS-CM | Species-Specific Conservation Measures |
| SWPPP | Storm Water Pollution Prevention Plan |

**T**

| | |
|---|---|
| toad | Arroyo toad |

**U**

| | |
|---|---|
| USFS | U.S. Forest Service |
| USFWS | U.S. Fish and Wildlife Service |

**V**

| | |
|---|---|
| vireo | least Bell's vireo |

**W**

| | |
|---|---|
| Wildlife Agencies | Service and CDFG, collectively |
| WQCB | State and/or Regional Water Resources Control Board |

**X**

**Y**

**Z**

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-2008B0423-2009F0097

JAN 16 2009

Memorandum

To: Field Manager, El Centro Field Office, Bureau of Land Management
El Centro, California

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

Subject: Biological and Conference Opinion on the Construction and Long-term Operation and Maintenance Program for the Sunrise Powerlink Project, Imperial and San Diego Counties, California

This document transmits the U.S. Fish and Wildlife Service's (Service) biological and conference opinion regarding effects on federally listed species and their designated and proposed critical habitats from the proposed construction and long-term operation and maintenance program for the Sunrise Powerlink (SRPL) Project, including a new 193-kilometer (km) (120-mile (mi)) transmission line and related facilities traversing lands under the jurisdiction of the Bureau of Land Management (BLM), U.S. Forest Service (USFS), and local San Diego County and San Diego City agencies and private lands in Imperial and San Diego counties, California. This biological and conference opinion has been prepared in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*), and is the result of a process-oriented consultation with the BLM, USFS, and the non-Federal agency representative, San Diego Gas and Electric Company (SDG&E), on the proposed transmission line project.

Application for section 404 permits under the Clean Water Act may be necessary for the SRPL Project. Consultation with the Service to address potential impacts to listed species in association with such permits has not been initiated by the U.S. Army Corps of Engineers (Corps of Engineers). Thus, this biological and conference opinion does not satisfy the section 7 consultation requirements of the Corps of Engineers for the SRPL Project. We acknowledge, however, that actions requiring permits from the Corps of Engineers may overlap with the impacts addressed in this biological and conference opinion. Thus, future consultation with the Corps of Engineers on the SRPL Project, including development of a biological opinion, may be facilitated and/or streamlined by referencing this biological and conference opinion.

During the course of this consultation and related environmental review processes (National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA)) for the SRPL Project, endangered and threatened species surveys were conducted along proposed

alternative alignments; however, along some portions of the selected alignment, the "Final Environmentally Superior Southern Route" or ESSR, site specific surveys are still pending. The Service has determined, based on the best available scientific data, that existing information, and that gained through the consultation and NEPA/CEQA processes, are sufficient to render jeopardy/no jeopardy determinations on the six listed species known to occur along the proposed transmission line Right –of-Way (ROW) and within the greater action area we have defined for this consultation (See Environmental Baseline Section below). The conclusions rendered in this biological and conference opinion are also supported by the commitment of SDG&E to implement General and Species-Specific Conservation Measures to avoid, minimize and offset the impacts of this project on endangered and threatened species and their designated and proposed critical habitats. These measures include conducting endangered and threatened species surveys along the final selected ROW and implementing specific avoidance and minimization measures to reduce impacts to listed species. For example, selected tower sites may be aligned to avoid listed plant populations or minimize impacts to listed animal feeding, breeding, and sheltering sites. In this manner, incidental take of listed animal species may be minimized or even avoided and the anticipated levels of incidental take more appropriately specified following the evaluation of the survey information and a determination by SDG&E in coordination with the Service, BLM, and the USFS of site-specific conservation measures to implement.

In addition, the Service has determined that the actions proposed by SDG&E are process-oriented in nature because the project includes a long-term operation and maintenance program whereby future actions may require project-level consultation as additional project-specific details become available or change over the life of the project. For example, while the general effects of emergency repairs and vegetation management are considered in this opinion, impacts to listed species are anticipated to be minor and do not include specific information regarding habitat losses beyond those considered during the project construction phase. If additional habitat losses are anticipated from emergency repairs or other actions during ongoing operations and maintenance (O&M) activities, project-level consultation may be warranted. The Service will continue to coordinate with SDG&E and the BLM and USFS, as appropriate, to determine if future activities require project-level consultation. We anticipate future consultations for site-specific actions may be streamlined and any required incidental take statement appended to this biological and conference opinion. A flow chart identifying the coordination process for this biological and conference opinion is provided as Appendix A and B.

Finally, through NEPA and CEQA processes three projects were identified that were closely related to the proposed project and considered part of the project for the purposes of NEPA and CEQA analysis. These projects include: 1) a Sempra Generation (Sempra) wind project in northern Mexico's La Rumorosa area with associated transmission and substation improvements in the U.S.; 2) the Stirling Energy Systems solar facility, and 3) the Esmeralda-San Felipe Geothermal Project. All of these projects require Federal approval through the Department of Energy and will be subject to separate NEPA and CEQA environmental review. These projects were not evaluated or considered under this consultation.

In addition, the Central East Substation is designed to accommodate four 230kV and one 500 kV transmission lines in addition to the two 230 kV and one 500 kV lines included as part of the SRPL Project. These future transmission lines will also undergo separate review under NEPA and CEQA and are not evaluated or considered under this consultation. In the *Biological Assessment for the Sunrise Powerlink Project, October 2008* (SDG&E *et. al* 2008) (Biological Assessment or BA), the BLM did not consider, and the Service concurs, that the actions described above and not evaluated under this consultation are not interrelated or interdependent actions nor should they be evaluated as indirect effects of the SRPL Project.

We received your request dated November 5, 2008, for formal section 7 consultation on the SRPL Project on November 6, 2008. Your consultation request and accompanying BA indicated that ten federally listed species and their designated and proposed critical habitats, where appropriate, would be adversely affected by the SRPL Project including two federally threatened species, the San Diego thornmint (*Acanthomintha ilicifolia*) and the coastal California gnatcatcher (*Polioptila californica californica*; "gnatcatcher") and its designated critical habitat, and eight federally endangered species: the least Bell's vireo (*Vireo bellii pusillus*; "vireo"), southwestern willow flycatcher (*Empidonax traillii extimus*; "flycatcher"), Quino checkerspot butterfly (*Euphydryas editha quino*; "Quino") and its designated and proposed critical habitat, arroyo toad (*Bufo californicus*), Peninsular bighorn sheep (*Ovis canadensis nelsoni*); "PBS") and its designated critical habitat, San Bernardino bluegrass (*Poa atropurpurea*), Laguna Mountains skipper (*Pyrgus ruralis lagunae*; "LMS"), and Stephens' kangaroo rat (*Dipodomys stephensi*; "SKR").

Based on information provided by SDG&E on December 3, 2008, and our review of other available information for the San Bernardino bluegrass, LMS, and flycatcher, including known species occurrence data, we have determined that the SRPL Project is not likely to adversely affect these three species or their designated critical habitat. In addition, since the proposed SRPL Project is located outside the known range of the SKR, we believe the SRPL Project will not impact the SKR[1]. Finally, although critical habitat has been designated for the San Diego thornmint, arroyo toad, flycatcher, and vireo, no designated critical habitat for these species will be impacted by the SRPL Project.

Designated critical habitat for the gnatcatcher and PBS and designated and proposed critical habitat for Quino were recognized in the BA as being affected by the SRPL Project. The project also affects proposed critical habitat for PBS. In summary, six species and their designated critical habitats, as appropriate, are evaluated within this biological opinion, including the federally threatened San Diego thornmint and gnatcatcher and its designated critical habitat and the federally endangered vireo, arroyo toad, Quino and its designated critical habitat, and PBS and its designated critical habitat. We have also evaluated the impacts of the project on proposed critical habitat for the Quino and PBS; thus, this opinion also serves as a conference opinion that addresses impacts of the SRPL Project on these two proposed designations.

[1] If preconstruction surveys for SKR, flycatcher, or San Bernardino bluegrass detect any of these or other listed species not addressed in this biological or conference opinion, consultation should be reinitiated.

This biological opinion is based on information provided in the: (1) *The Sunrise Powerlink Project Final Environmental Impact Statement/Environmental Impact Report* (EIR/EIS), dated October, 2008; (2) Biological Assessment, dated, October, 2008; (3) the Service's Species Occurrence Database; (4) the California Natural Diversity Database (CNDDB); (5) numerous electronic mails and telephone conversations between the Service, SDG&E, BLM, and the USFS; and (6) various other documents as cited herein.

## CONSULTATION HISTORY

This consultation spans an initial time period of informal consultation between September 13, 2006, and October 15, 2008, when the Service met, provided informal guidance, and prepared and provided written comments to the California Public Utilities Commission (CPUC), BLM, and SDG&E during preparation and formal review of the Draft EIR/EIS and the re-circulated Draft EIR/EIS. The numerous meetings, guidance, and comments addressed the Service's concerns for the overall environmental impacts associated with the various transmission line alternatives being evaluated and also specifically addressed endangered and threatened species issues. During this extended period of informal consultation, the Service, BLM, USFS, and SDG&E jointly developed proposed conservation measures to avoid, minimize, and offset impacts to listed species and their designated and proposed critical habitats.

The BLM provided the Service the Biological Assessment for the SRPL Project and requested initiation of formal section 7 consultation in a letter dated November 5, 2008, received by the Service on November 6, 2008, to address the effects of the selected transmission line alternative, the Final ESSR, on federally listed endangered and threatened species. The BLM requested an expedited timeframe for Service issuance of the biological opinion by January 2, 2009, rather than the normal 135-day regulatory timeframe for issuance of March 20, 2009. This request was made to accommodate timely completion of BLM's NEPA process (*i.e.*, the BLM's Record of Decision on ROW approval for the transmission line). Due to the significant coordination through NEPA and informal consultation processes over a two-year period, the Service agreed informally during subsequent telephone conversations to accommodate this request by January 16, 2009.

Between our November 6, 2008, receipt of the BLM's request for consultation, and our issuance of this biological and conference opinion, we spoke almost daily, and at least weekly, with the BLM and SDG&E to clarify information in the BA. Although a formal draft of the opinion was not provided due to time constraints, the Project Description section of the opinion was provided to SDG&E for review and comment, and their comments on this important section of the document were incorporated into this final biological and conference opinion.

The complete administrative record for this consultation is on file at the Carlsbad Fish and Wildlife Office.

## PROJECT DESCRIPTION

The proposed action is the issuance of a ROW permit by the BLM and a Special Use Authorization by the USFS to SDG&E to facilitate the construction and O&M of the SRPL Project through Federal lands in accordance with the Federal Land Policy Management Act of 1976 (43 U.S.C. 1761). The SRPL Project includes the proposed transmission line ROW, the Final ESSR, and related facilities, as identified in the Final EIR/EIS for the project prepared by the CPUC, as the lead State agency under CEQA, and the BLM as the lead Federal agency under NEPA, and issued in October 2008.

The entire project will traverse approximately 193 km (120 mi) between the El Centro area of Imperial County and southwestern San Diego County, in southern California. The proposed ROW for the project crosses Federal lands (BLM, USFS, and Department of Defense) for about 113 km (70 mi) of its 193-km (120-mi) length . In addition, one new substation, Modified Route D (MRD) and three system upgrades (reconductors from Sycamore Canyon Substation to Pomerado, Scripps, and Elliott substations) will be required to reliably operate the new transmission line. The entire route and upgrades are shown in Figure 1.

The proposed ESSR ROW has been assigned mileposts (MP), which range from the Imperial Valley Substation (MP 0) to the Sycamore Canyon Substation (MP 119). The SRPL Project is described in three separate segments or "links" according to the following geographical locations: Desert South Link, Cleveland National Forest (CNF) South Link, and Inland Valley South Link (See General Environmental Baseline Section below).

### *PROJECT CONSTRUCTION PHASE*

#### 1. System Upgrades

Several system upgrades will be required to allow for full use of the proposed new transmission line, which includes substation improvements, reconductoring (*i.e.*, changing smaller capacity wires to larger capacity wires), and regrading and clearing access roads and pulling pads/staging areas to facilitate the upgrades. At the Sycamore Canyon and Encina substations, new transformers will be installed. A third 230/69 kV transformer will be installed within the existing fence line at the Sycamore Canyon Substation. At the Encina Substation, a new 230/138 kV transformer will be installed within the existing substation boundaries. Substation breakers and disconnects within the Scripps, Sycamore Canyon, and Pomerado substations will also be upgraded.

Reconductoring actions will occur along the Sycamore-Scripps, Sycamore-Pomerado, and Sycamore-Elliott 69 kV lines. Portions of the Sycamore-Scripps line across Marine Corps Air Station (MCAS) Miramar will be reconductored using the existing overhead transmission line structures, with the exception of the overhead to underground transition structures. Three existing underground portions of this line will be upgraded from single to bundled cable and

require new underground trench construction along 283 m (930 ft) to relocate a portion of the line into city streets. Along 3 km (2 mi) of the Sycamore-Pomerado line, conductors will be replaced using existing transmission structures, and along 13 km (8 mi) of the Sycamore-Elliott line, work will include replacing overhead conductors, 11 wood poles, and changing insulators and/or pole tops on 24 wood poles within the existing ROW. To facilitate the reconductor and repair work along these three existing 69 kV transmission lines, existing access roads may need to be cleared and regraded, vegetation cleared around poles, and temporary trails created to poles that lack existing foot or vehicular access. Some vegetation clearing may also be needed for pulling pads/staging areas.

**2. New Substation**

The MRD Substation will be constructed on about 16 ha (40 ac) and located on private land west of Japatul Valley Road. The substation will accommodate four potential future 230 kV circuits exiting the substation when demand growth justifies the need for additional lines. It will also accommodate a future 500 kV circuit. At the MRD Substation, the 500 kV line will convert to 230 kV. The 230 kV line will exit the substation overhead, then continue northwest for approximately 1 mi (2 km) where it transitions to the Inland Valley South Link about 8 km (5 mi) east of the village of Alpine near MP 92.

**3. Transmission Line Construction Features**

The SRPL Project will include a number of permanent and temporary features necessary to construct and support the proposed transmission line including staging areas, access and spur roads, tower pads and structures, wire installation, pull sites, and underground construction (*e.g.*, trenching). Ground disturbance acreage estimates for these features and the new substation are provided in Table 1.

Staging/Fly Yard Areas and Access and Spur Roads

Staging/fly yard areas are used to store and assemble cconstruction equipment and parts and to shuttle crews back and forth to work pads via carpooling or helicopter. They are typically 4 to 12 ha (10 to 30 ac) in size, and some may be used for the duration of construction while others may be used for only 6 months. In all areas, vegetation will be cleared. In some areas, the staging/fly yard area may need to be scraped by a bulldozer and a temporary layer of rock put down to provide an all weather surface. Unless otherwise directed by the landowner, the rock will be removed from the staging area upon completion of construction, and the area will be restored to its original condition. All staging/fly yard areas will be fenced for security.

New access or access spur roads will be constructed using a bulldozer or grader, followed by a roller to compact and smooth the ground. Front-end loaders will be used to move the soil locally or offsite. Typically for transmission access roads, 4-m-wide (14-ft-wide) straight sections of

Table 1. Project Feature Ground Disturbance

| Link and Milepost | Feature Type | No. of Structures/ Miles | Permanent Ground Disturbance (acres) | Temporary Ground Disturbance (acres) |
|---|---|---|---|---|
| **Desert South Link** | | | | |
| MP 0.0-MP 29.6 | Lattice Towers | 98 | 27.14 | 106.94 |
| | Access Roads[1] | 12.48 | 30.81 | 0.00 |
| | Helipads | 42 | 0.60 | 0.00 |
| | Staging Areas | 7 | 0.00 | 155.54 |
| | Pull Sites | 15 | 0.00 | 31.79 |
| Subtotal | | | 58.55 | 294.27 |
| | | | | |
| **CNF South Link** | | | | |
| MP 29.6-MP 91.0 | Lattice Towers | 240 | 66.61 | 69.63 |
| | Access Roads | 45.19 | 110.62 | 0.00 |
| | Helipads | 88 | 1.26 | 0.00 |
| | Staging Areas | 28 | 0.00 | 602.31 |
| | Pull Sites[2] | 60 | 2.14 | 121.78 |
| Subtotal | | | 180.63 | 793.72 |
| | | | | |
| **Inland Valley South Link** | | | | |
| MP 91.0-MP 119.3 | Lattice Towers/Poles/Risers | 95/29/4 | 35.04 | 8.69 |
| | Access Roads | 26.5 | 64.35 | 0.00 |
| | Helipads | 14 | 0.20 | 0.00 |
| | Staging Areas | 8 | 0.00 | 101.75 |
| | Pull Sites | 36 | 0.00 | 42.21 |
| Subtotal | | | 99.59 | 152.65 |
| | | | | |
| | New MRDA Substation[3] | | 150.25 | 0.00 |
| Subtotal | | | *150.25* | *0.00* |
| | Reconductor Pole Replacements | 11 | 0.00 | 0.10 |
| | Pull sites | 8 | 0.00 | 3.67 |
| Subtotal | | | 0.00 | 3.77 |
| | | | | |
| **TOTAL** | | | **489.02** | **1244.41** |

1 Includes manufactured slopes and wide-turn radii; road is assumed to end at permanent pad

2 There is only one permanent pull site in the project area

3 Includes Substation pad, impact area, access road, and laydown area

road and 5-6-m-wide (16-20-ft-wide) sections at curves will be required to facilitate safe movement of equipment and vehicles. Existing access roads may be improved for project use, as required. The MRD Substation access road will require a 10-m-wide (32-ft-wide) section of road to facilitate safe movement of equipment and vehicles.

Tower Pads and Structures

There are various configurations of the pad areas for both 500 kV and 230 kV tower structures throughout the SRPL Project alignment, which are identified as Drawings 1 through 7 in Appendix C of the BA. The 500 kV structures that will be built without helicopters will have a temporary 61-122-m (200-400-ft) workspace that will be cleared and graded for construction. These areas will be re-contoured at the extremities after construction to blend in to the original grade. At each structure location, a permanent area approximately 31-m by 31-m (100-ft by 100-ft) will be cleared and graded within the above-described 61-m by 122-m (200-ft by 400-ft) area using a bulldozer or backhoe. Additionally, a permanent 11-m by 23-m (35-ft by 75-ft) flat graded pad will be cleared and graded immediately adjacent to the 31-m by 31-m (100-ft by 100-ft area). These adjacent areas are permanently cleared areas for use during future maintenance and operation activities.

The 500 kV structures that will be built with helicopters will not have a temporary 61-m by 122-m (200-ft by 400-ft) workspace. These areas will include a permanent area approximately 31-m by 31-m (100-ft by 100-ft) and the 11-m by 23-m (35-ft by 75-ft) pad. In addition, these segments will require two 6-m by 6-m (20-ft by 20-ft) helicopter pads or two 6-m by 6-m (20-ft by 20-ft) elevated helicopter platforms per structure with a footpath to the structure. The helicopter pads may be cleared and graded for construction and future line maintenance. The elevated helicopter platforms may be wood or steel platforms.

Helicopters

Helicopters will be used to support construction activities in areas where access is limited (*e.g.*, no suitable access road, limited pad area to facilitate onsite structure assembly area) or there are environmental constraints to accessing the project area with standard construction vehicles and equipment. Helicopters will be used for project activities in portions of all links.

Blasting, Hammering, and Rock-hauling

Where solid rock is encountered, blasting, rock-hauling, or the use of a rock anchoring or mini pile system may be required. The rock anchoring or mini-pile system will be used in areas where site access is limited or adjacent structures could be damaged as a result of blasting or rock-hauling activities. In environmentally sensitive areas, a HydroVac, which uses water pressure and a vacuum, will be used to excavate material into a storage tank. In areas where it is not possible to operate large drilling equipment due to access or environmental constraints, hand

digging may be required. Reinforcing steel anchor bolt cages and concrete will be installed after excavation and prior to structure installation.

Wire Installation and Pull Sites

Insulators and stringing sheaves are installed to pull conductors (*i.e.*, wires) along the line. Additionally, temporary clearance structures will be erected, where required, prior to stringing any transmission lines. The temporary clearance structures are used to prevent contact during stringing activities and typically consist of vertical wood poles with cross arms that are erected at road crossings or crossings with other energized electric and communication lines. Bucket trucks may also be used to provide temporary clearance. The conductors are pulled along a sock line through the sheaves along the same path the SRPL transmission line will follow. Pulling the sock line is accomplished with a small helicopter that moves along the ROW. Following the initial stringing operation, pulling and tensioning the line will be required.

Pulling and tensioning sites will be required every 2 to 6 km (1 to 2 mi) along the ROW and will encompass approximately 0.4 to 0.8 ha (1 to 2 ac) each to accommodate required equipment. Equipment at these sites will include tractors and trailers with spooled reels that hold the conductors and trucks with the tensioning equipment. Pulling and tensioning sites are located within the ROW except at angle structures where the pulling site must be in line with the conductor. Depending on topography, minor grading may be required at some sites to create level pads for equipment. Vegetation will be cleared throughout the pull site area, but after use, the entire area will be restored and re-vegetated except for two permanent pulling sites proposed for the crossing of I-8.

Underground Construction

Underground construction is proposed in the area in and around Alpine from MP 94 to MP 100. The 230 kV lines will require a trench approximately 1 to 2 m (3 to 7 ft) wide and 2 km (6 ft) deep. Underground segments involve trenching and duck bank and vault installations. Two trenches, separated by 6 m (20 ft), will be excavated for the double circuit 230 kV underground segments within the Inland Valley South Link. Excavated materials not temporarily stored to use for backfill will be hauled offsite to a materials storage yard. Based on the anticipated rate of construction progress (91 to 152 m [300 to 500 ft] open at one time), approximately 306 cubic meters (400 cubic yards) of excavated material will be off-hauled per day.

***OPERATIONS AND MAINTENANCE PROGRAM FEATURES***

Following project construction, O&M of the new line will commence and is anticipated to continue for the life of the SRPL Project. Operation and maintenance activities will include 1) transmission line maintenance; 2) substation maintenance; 3) emergency response; and fire protection and security.

**1. Transmission Line Maintenance**

Overhead transmission lines will be inspected for corrosion, equipment misalignment, loose fittings and other mechanical problems, and the need for vegetation management. Aerial inspection (visual and infrared) of the entire system and climbing inspections of transmission structures will be conducted annually. The aerial inspections will require the use of helicopters. Ground inspections, including underground components, will be conducted by up to three crewmembers every three years.

Electrical equipment such as conductors, switches, and transformers, may require replacement or repair over time and include four-person crews using boom line trucks, aerial trucks, and assist trucks. Routine washing of insulators to prevent arcing will also be conducted as a routine maintenance activity. Insulator washing uses two crew members with high pressure hoses and a water truck and will occur about two times per year. Each insulator washing takes about 30 minutes per transmission structure.

ROW repairs include grading or repairing maintenance access roads and work areas, permanent pulling sites, and helicopter platforms and spot repair of sites subject to flooding or scouring. ROW repair is generally conducted after the rainy season to address erosion problems using heavy equipment such as rubber-tired graders, backhoes, and four-wheeled drive trucks and steel tracked cat loaders. Access roads will be maintained on a 2-year schedule.

SDG&E will maintain a minimum clearance of 3 m (10 ft) around the base or foundation of all electrical transmission structures and work areas adjacent to access roads and electric transmission structures for vehicle and equipment access necessary for operations, maintenance and repair will be maintained free of vegetation. Shrubs and other obstructions will be regularly removed near structures to facilitate inspection and maintenance of equipment and to ensure system reliability. In addition, vegetation with a mature height of 5 m (15 ft) or taller will not be allowed to grow within 3 horizontal m (10 horizontal ft) of any overhead conductor or working area in order to protect system reliability and public safety. Vegetation will be removed using mechanical equipment such as chain saws, weed trimmers, rakes, shovels, mowers and brush hooks. The duration of activities and the size of crew and equipment required will be dependent on the amount and size of the vegetation to be trimmed or removed. Most vegetation removal or tree trimming activities can be completed in one day.

**2. Substation Maintenance**

Substation maintenance includes scheduled equipment repairs, cleaning, and testing to prevent service interruptions. Routine maintenance activities will require about 6 trips annually to each substation by a two to four person crew. In addition, a major maintenance inspection will be conducted annually and require 20 personnel for about a week. Some operations functions of substations are performed remotely, but normal operations also require 1 or 2 persons in a light truck to visit each substation on a weekly basis.

**3. Emergency Response**

Emergencies are events or actions that require immediate response by SDG&E personnel such as car-to-pole contacts, downed poles, fires, transformer outages, downed wires etc. Emergencies may be caused by extreme weather conditions. Responding crews and equipment needs vary depending on the size and severity of the emergency. In general, four-person crews with line, aerial lift, and assist trucks will respond to make emergency repairs. In remote areas with limited or no access, helicopters may be required to immediately respond to emergencies.

**4. Fire Protection and Security**

SDG&E employs a full time Fire Coordinator and Pole Protection Crews who work with local fire protection jurisdictions to implement fire safety requirements and protocols related to fire prevention. Specific practices aimed at preventing fires during construction and maintenance/repair activities include: brush clearing prior to work, stationing water trucks at job sites to keep the ground and vegetation moist during extreme weather conditions, enforcing red flag warnings, and providing "fire behavior" training to personnel. While SDG&E personnel do not directly fight fires, they will extinguish any remaining pole fires once a fire has passed through the work area.

***CONSERVATION MEASURES***

The SRPL Project includes the following conservation measures and/or design features that will be implemented to avoid, minimize, and offset potential adverse effects to listed species. These measures were developed and coordinated with the BLM, USFS, and SDG&E and based on information in the SRPL BA, Final EIR/EIS, and supplemental material provided during the consultation process. Conservation measures will be implemented during the project construction phase and during long-term O&M of the project. To facilitate future coordination on these conservation measures they are identified as General Conservation Measures (G-CM) or Species-Specific Conservation Measures (SS-CM) and numbered sequentially in this document.

**General Conservation Measures**

General Conservation Measures were developed during NEPA/CEQA process and in coordination with the California Department of Fish and Game (CDFG). General Conservation Measures minimize the impacts of the SRPL Project on wildlife resources in broad manner and are included here because of their overall benefit to the natural landscapes and habitats supporting federally endangered and threatened species. A few General Conservation Measures address species not specifically covered in this biological and conference opinion but are retained to facilitate coordination with State requirements for protection of wildlife resources or address additional survey needs.

**1. Project Construction Phase**

**G-CM-1** A qualified biologist[2] will monitor all work areas to ensure that all impacts occur within designated limits. Monitoring entails communicating with contractors, taking daily notes, and ensuring that the requirements of the Conservation Measures are met by being present during construction activities including all initial grubbing and clearing of vegetation. The qualified biologist will conduct monitoring for any area subject to disturbance from construction activities. The qualified biologist will perform periodic inspections of construction once or twice per week, as defined by the Wildlife Agencies (the Service and CDFG, collectively), depending on the sensitivity of the resources. The qualified biologist will send weekly monitoring reports to the CPUC and BLM and will record any reduction or increase in construction impacts so that compensation requirements can be revised accordingly. The final impact calculations will be submitted to the CPUC, BLM, USFS (for sections of the Project that require monitoring on National Forest lands), and Wildlife Agencies for review and approval.

- SDG&E, its contractors and subcontractors, and their respective project personnel, will refer all environmental issues, including wildlife relocation, sick or dead wildlife, hazardous waste, or questions about environmental impacts to the qualified biologist. Experts in wildlife handling (*e.g.*, Project Wildlife) may need to be brought in by the qualified biologist for assistance with wildlife relocations.
- The qualified biologist will have the authority to issue stop work orders if any part of the Conservation Measures are being violated. The qualified biologist will immediately notify the CPUC, BLM, USFS and Wildlife Agencies of any significant events discovered during the monitoring. Reinitiation of work following a stop work order will only occur when the CPUC, BLM, USFS, and Wildlife Agencies are satisfied that the impacts have been fully documented, that compensation for these impacts will be made, and that any additional protection measures they deem necessary will be undertaken.

**G-CM-2** Throughout the construction process all crews will use the SDG&E Water Quality Construction Best Management Practices Manual (BMPs) (SDG&E 2002). Following are some of the general guidelines:

- Construction activities will use existing bridges to cross major streams and culverts in most dry intermittent streams;
- Surface water, riparian areas, and floodplains will be spanned where feasible; A Storm Water Pollution Prevention Plan (SWPPP) will be prepared and implemented;

[2] A qualified biologist or biological monitor must have (1) a bachelor's degree with an emphasis in ecology, natural resource management, or related science; (2) previous experience with applying the terms and conditions of a biological opinion; and (3) approval of the Service if conducting focused or protocol surveys for federally listed species.

Storm Water BMPs for construction will be implemented per the requirements of the project's SWPPP;

- Silt fencing, straw mulch, and straw bale check dams will be installed as appropriate to contain sediment within construction work areas and staging areas. Where soils and slopes exhibit high erosion potential, erosion control blankets, matting, and other fabrics and/or other erosion control measures will be implemented.

- The potential for increased sediment loading will be minimized by limiting road improvements to those necessary for project construction.

- Upland pull sites will be selected to minimize impacts to surface waters, riparian areas, wetlands, and floodplains; and

- Structures will not be placed in streambeds or drainage channels to the extent feasible.

**G-CM-3** SDG&E will secure any required General Permit for Storm Water Discharges Associated with Construction Activity (National Pollutant Discharge Elimination System (NPDES permit) authorization from the State Water Resources Control Board and/or the Regional WQCB to conduct construction-related activities to build the project and establish and implement a SWPPP during construction to minimize hydrologic impacts.

**G-CM-4** Prior to construction, all of SDG&E's contractors, subcontractors, and project personnel will receive training regarding the appropriate work practices necessary to effectively implement the Conservation Measures and to comply with the applicable environmental laws and regulations including appropriate wildlife avoidance and impact minimization procedures, the importance of these resources, and the purpose and necessity of protecting them.

**G-CM-5** In addition to regular watering to control fugitive dust created during clearing, grading, earth-moving, excavation, and other construction activities, which could interfere with plant photosynthesis, a 24 km (15 mi) per hour speed limit will be observed on dirt access roads to reduce dust and allow reptiles and small mammals to disperse.

**G-CM-6** The area limits of project construction and survey activities will be predetermined based on the temporary and permanent disturbance areas noted on the final design engineering drawings, with activity restricted to and confined within those limits. In addition, survey personnel will keep survey vehicles on existing roads. No paint or permanent discoloring agents will be applied to rocks or vegetation to indicate limits of survey or construction activity where any sensitive biological resources or wildlife habitats occur. Any impacts associated with unauthorized activity (*e.g.*, exceeding approved construction limits) will be mitigated at a 5:1 ratio (5.5:1 in Flat-tail Horned Lizard (FTHL) Management Area (MA)). Restoration of the unauthorized impacts will be credited at a 1:1

ratio (*i.e.*, offset by in-place habitat restoration); the remaining 4:1 (or 4.5:1 in FTHL MA) will be acquired offsite.

**G-CM-7** During project surveying activities, brush clearing for footpaths, line-of-sight cutting, and land surveying panel point placement in sensitive habitat will require prior approval from the project biological monitor in conformance with the Conservation Measures. Hiking off roads or paths for survey data collection is allowed year-round as long as applicable Conservation Measures to minimize impacts are met.

**G-CM-8** Stringing of new wire and reconductoring for the project will be allowed year round in sensitive habitats if the conductor is not allowed to drag on the ground or in brush and all vehicles used during stringing remain on project access roads. Where stringing requires that conductor drop within brush or drag on or through the brush or ground or vehicles leave project access roads, SDG&E will perform a site survey(s), to determine presence or absence of nesting migratory birds (including the three federally listed bird species subject to this consultation) or other listed species in the work area. Details of protocol survey requirements are outlined in the species-specific measures below. SDG&E will submit results of this survey(s) to the Wildlife Agencies, prior to dropping wire in brush, dragging wire on the ground or through brush, or taking vehicles off project access roads.

**G-CM-9** Project personnel will not deposit or leave any food or waste in the project area, and no biodegradable or non-biodegradable debris will remain in the ROW following completion of construction. All refuse will be placed in appropriate wildlife-proof containers and removed from job sites daily.

**G-CM-10** Repairs may be required during the construction of the project to address emergency situations (*e.g.*, downed lines, slides, slumps, major subsidence, etc.) that potentially or immediately threaten the integrity of the project facilities. During emergency repairs, all Conservation Measures will be followed to the fullest extent practicable. Once the emergency has been abated, any unavoidable environmental damage will be reported to the project biological monitor, who will promptly submit a written report of such impacts to the Wildlife Agencies and any other government agencies having jurisdiction over the emergency actions. If required by the government agencies, the biological monitor will develop a reasonable and feasible mitigation plan consistent with the Conservation Measures and any permits previously issued for the project by the governmental agencies.

**G-CM-11** In areas designated as sensitive by SDG&E or the Wildlife Agencies, to the extent feasible, structures and access roads will be designed to minimize impacts to sensitive features. These areas of sensitive features include, but are not limited to, high-value wildlife and plant habitats, sensitive vegetation communities, and habitat occupied by listed species. If the sensitive features cannot be completely avoided or spanned, structures and access roads will be placed to minimize the disturbance to the extent feasible. When it is not feasible to avoid constructing poles or access roads in designated sensitive areas, SDG&E will perform a site survey to determine presence or absence of endangered species in sensitive habitats as

required in G-CM-32 below. SDG&E will submit results of this survey to the Wildlife Agencies prior to constructing structures or access roads.

**G-CM-12** In construction areas where grading or re-contouring is not required, vegetation will be left in place wherever possible to avoid excessive root damage and allow for re-sprouting. Only the minimum amount of vegetation necessary for the construction of structures and facilities will be removed. Topsoil located in areas containing sensitive habitat will be conserved during excavation and reused as cover on disturbed areas to facilitate regrowth of vegetation. Topsoil located in developed or disturbed areas is excluded from this measure. Disturbed soils will be restored based on a Habitat Restoration Plan per G-CM-16.

**G-CM-13** Night lighting within the project area adjacent to preserved habitat will be of the lowest illumination allowed for human safety, selectively placed, shielded, and directed away from preserved habitat to the maximum extent practicable. Vehicle traffic associated with project activities may not exceed 24 km (15 mi) per hour to prevent mortality of nocturnal wildlife species that may be moving about.

**G-CM-14** To the extent practicable, surface-disturbing components of the project will be located in previously disturbed areas or where habitat quality is poor to minimize disturbance of vegetation and soils.

**G-CM-15** Temporary construction mats may be used to minimize vegetation and soil disturbance only where deemed appropriate by the qualified biologist. The construction mats will not be left on the ground for more than three weeks. Use of construction mats will be considered a temporary impact to vegetation and will be incorporated into the Habitat Restoration Plan per conservation measure **G-CM-16.**

**G-CM-16** SDG&E will prepare and implement a Habitat Restoration Plan, approved by the CPUC, BLM, USFS, and Wildlife Agencies, for all temporarily impacted project areas. The Habitat Restoration Plan must be approved in writing by the above-listed agencies prior to the initiation of any vegetation disturbing activities. Restoration involves recontouring the land, replacing the topsoil (if it was collected), planting seed and/or container stock, and maintaining (*i.e.*, weeding, replacement planting, supplemental watering, etc.) and monitoring the restored area for a period of five years (or less if the restoration meets all success criteria). The compensation ratios listed in Table 2 will apply to impacts from emergency repairs during the construction phase. In cases where the impacts to sensitive vegetation communities occur on lands previously preserved to offset impacts from other projects, the mitigation ratios will be doubled, as is standard practice in San Diego County.

- Areas to be restored will include all areas temporarily impacted by construction, such as tower construction sites, laydown/staging areas, temporary access and spur roads, and existing tower locations where towers are removed. Restoration of some habitats in temporarily impacted areas may not be possible if those areas are subject to vegetation management to maintain proper clearance between transmission lines and

vegetation. In those instances, impacts will be considered permanent, and the compensation will consist of offsite land acquisition and preservation. Where onsite restoration is planned, SDG&E will identify a qualified habitat restoration specialist to be approved by the CPUC, BLM, USFS, and Wildlife Agencies. The habitat restoration specialist will prepare and implement the Habitat Restoration Plan. Hydroseeding, drill seeding, or an otherwise proven restoration technique will be use on all disturbed surfaces using a locally endemic native seed mix approved by the CPUC, BLM, USFS, and Wildlife Agencies to restore the area to its original condition. The Habitat Restoration Plan will incorporate the measures identified in the May 25, 2006, Memorandum of Understanding (MOU) among Edison Electric Institute, USFS, BLM, Service, National Park Service, and Environmental Protection Agency (EPA) (Edison Electric Institute *et al*. 2006), where applicable.

- For restoration of temporary impacts to desert scrub and dune habitats, a separate Habitat Restoration Plan will be developed for desert vegetation communities and incorporate Desert Bioregion Revegetation/Restoration Guidance measures. These measures generally include alleviating soil compaction, returning the surface to its original contour, pitting or imprinting the surface to allow small areas where seeds and rain water can be captured, planting seedlings that have acquired the necessary root mass to survive without watering, planting seedlings in the spring with herbivory cages, broadcasting locally collected seed immediately prior to the rainy season, and covering the seeds with mulch.

- The restoration of habitat will be maintained and monitored for five years after installation by an experienced, licensed habitat restoration contractor, or until established success criteria identified in the Restoration Plan (*e.g*., specified percent cover of native and nonnative species, species diversity, and species composition as compared with an undisturbed reference site) are met. Maintenance, monitoring, and reporting will be conducted following a prescribed schedule to assess progress and identify potential problems with the restoration. Remedial action (*e.g*., additional planting, weeding, erosion control, use of container stock, supplemental watering, etc.) will be taken by an experienced, licensed Habitat Restoration Contractor during the maintenance and monitoring period if necessary to ensure the success of the restoration. If the restoration fails to meet the established success criteria after the maintenance and monitoring period, maintenance and monitoring will extend beyond the five-year period until the criteria are met or unless otherwise approved by the CPUC, BLM, USFS and Wildlife Agencies. For areas where habitat restoration cannot meet restoration requirements, as determined by the habitat restoration specialist in coordination with the CPUC, BLM, USFS (for sections of the project with restoration on National Forest lands), and Wildlife Agencies, off-site purchase and dedication of habitat will be provided at the ratios provided in Table 2.

**G-CM-17** SDG&E will purchase/dedicate suitable habitat for preservation, at ratios identified in Table 2, to offset permanently impacted areas. A Habitat Management Plan(s) will be required for all offsite parcels and must be approved, in writing, by the CPUC, BLM, USFS, and Wildlife Agencies prior to the initiation of any vegetation clearing activities. The Habitat Management Plan(s) shall include, but will not be limited to:

- Legal descriptions of all parcels approved by the CPUC, BLM, USFS, and Wildlife Agencies;

- Management specifications including, but not limited to, regular biological surveys to compare with baseline; exotic, non-native species control; fence/sign replacement or repair, public education; trash removal; and annual reports to the CPUC, BLM, USFS, and Wildlife Agencies;

- Baseline biological data for all parcels;

- Designation of a land management entity approved by the CPUC, BLM, USFS, and Wildlife Agencies to provide in-perpetuity management;

- A Property Analysis Record (PAR) prepared by the designated land management entity that explains the amount of funding required to implement the Habitat Management Plan; and

- Designation of responsible parties and their roles (*e.g.*, provision of endowment by the applicant to fund the Habitat Management Plan and implementation of the Habitat Management Plan by the designated land management entity).

All off-site compensation parcels will be approved by the CPUC, BLM, USFS, and Wildlife Agencies and must be acquired or their acquisition must be assured through a mechanism such as a performance bond prior to ground disturbing activities. To demonstrate that such parcels will be acquired, SDG&E will submit a Habitat Acquisition Plan at least 120 days prior to any ground disturbing activities. The Plan will be submitted to the CPUC, BLM, Wildlife Agencies, and USFS for review and approval and will include, but not be limited to: legal descriptions and maps of all parcels proposed to be acquired; acquisition schedule that includes phasing relative to impacts; timing of conservation easement recording; initiation of habitat management activities relative to acquisition; and assurance mechanisms (*e.g.*, performance bonds to assure adequate funding) for any parcels not actually acquired prior to vegetation disturbing activities. SDG&E will fully fund an endowment for in-perpetuity management of all parcels acquired to off-set the permanent impacts of this project. The endowment will be based on the PAR included in the Habitat Management Plan(s) for these parcels and will be fully funded within three (3) months of the approval of the Habitat Management Plan(s).

**G-CM-18** To reduce adverse impacts from unnatural wildfire (type conversion, proliferation of exotic weed species), SDG&E will re-seed disturbed areas after a transmission line–caused fire. Should a fire occur and be determined by the CPUC's Consumer Protection and Safety Division (CPSD) or the California Department of Forestry and Fire Protection (CAL FIRE) to be caused by the SRPL Project, SDG&E will re-seed all natural areas—both public and private— that are burned as a result of the project-caused fire. Re-seeding will be required for areas that have been burned within the minimum 10-year period required for arid chaparral to establish an adequate seed bank and thereby resist vegetation type conversion. A re-seeding plan will be developed with input from Cal Fire, the USFS, BLM, CPUC and Wildlife Agencies. Seeds shall be raked into the soil to avoid seed predation, and reseeding will be carried out once to coincide with the rainy season (October 1 through April 1) to increase the likelihood of germination success. SDG&E will provide a written report documenting all re-seeding activities to the BLM, CPUC, USFS, and Wildlife Agencies. SDG&E will make a good faith effort to obtain approval to re-seed on private lands as appropriate, and documentation of this good faith effort will be submitted to the above mentioned agencies upon request. Specific re-seeding requirements stipulated in this conservation measure will be subject to approval and modification by any public landowning agency.

**G-CM-19** SDG&E will prepare and implement a Raven Control Plan, approved by the Wildlife Agencies, for portions of the SRPL Project route. The raven control plan will include the use of raven perching and nesting deterrents. The plan will identify the purpose of conducting raven control; provide training in how to identify raven nests and how to determine whether a nest belongs to a raven or a raptor species; describe the seasonal limitations on disturbing nesting raptors; describe raven control methods to be employed along the route; and describe procedures for documenting the activities on an annual basis.

**G-CM-20** SDG&E will prepare and implement a comprehensive, adaptive Weed Control Plan for pre-construction and long-term invasive weed abatement. The Weed Control Plan will be approved by the BLM, USFS, and Wildlife Agencies before implementation Where SDG&E owns the ROW property, the Weed Control Plan will include specific weed abatement methods, practices, and treatment timing developed in consultation with the San Diego County Agriculture Commissioner's Office and the California Invasive Plant Council (Cal-IPC). On the ROW easement lands administered by public agencies (BLM, USFS, and Wildlife Agencies), the Weed Control Plan will incorporate all appropriate and legal agency stipulated regulations. The Weed Control Plan will be submitted to the ROW landholding public agencies for final authorization of weed control methods, practices, and timing prior to implementation of the Weed Control Plan on public lands. ROW easements located on private lands will include adaptive provisions for the implementation of the Weed Control Plan. Prior to implementation, SDG&E will work with the landowners to obtain authorization of the weed control treatment that is required. Developed land will be excluded from weed control.

The Weed Control Plan will include the following:

- A pre-construction weed inventory will be conducted by surveying the entire ROW and areas immediately adjacent to the ROW (where access and permission can be secured), as well as at all ancillary facilities associated with the Project, for weed populations that: (1) are considered by the San Diego County Agriculture Commissioner as being a priority for control and (2) aid and promote the spread of wildfires (such as cheatgrass [*Bromus tectorum*], Saharan mustard [*Brassica tournefortii*] and medusa head [*Taeniatherum caput-medusae*]). These populations will be mapped and described according to density and area covered. These plant species will be treated (where access and permission can be secured) prior to construction or at a time when treatments will be most effective based on phenology according to control methods and practices for invasive weed populations designed in consultation with the San Diego County Agriculture Commissioner's Office and Cal-IPC, as appropriate.

- For areas directly impacted by the Project, a pre-construction weed inventory will be conducted for those weed populations rated 'High' or 'Moderate' for negative ecological impact in the California Invasive Plant Inventory Database (Cal-IPC, 2006). These weed species will be treated prior to construction or at a time when treatments will be most effective based on phenology according to control methods and practices for invasive weed populations designed in consultation with Cal- IPC.

- Weed control treatments will include all legally permitted chemical, manual, and mechanical methods applied with the authorization of the San Diego County Agriculture Commissioner and the ROW easement land-holding agencies where appropriate. The application of herbicides will be in compliance with all State and Federal laws and regulations under the prescription of a Pest Control Advisor (PCA) and implemented by a Licensed Qualified Applicator. Where manual and/or mechanical methods are used, disposal of the plant debris will follow the regulations set by the San Diego County Agriculture Commissioner. The timing of the weed control treatment will be determined for each plant species in consultation with the PCA, the San Diego County Agriculture Commissioner, and Cal-IPC with the goal of controlling populations before they start producing seeds.

- For the lifespan of the project (*i.e.*, as long as the project is physically present), long-term measures to control the introduction and spread of noxious weeds in the project area will be taken as follows:

    - The survey areas described above would be surveyed annually to monitor previously-identified and treated populations and to identify new invasive weed populations._The treatment of weeds will occur on a minimum annual

basis, unless otherwise approved by the PCA, the San Diego County Agriculture Commissioner, and Cal-IPC.

- During project construction, all seeds and straw materials will be certified weed free, and all gravel and fill material will be certified weed free by the San Diego County Agriculture Commissioner's Office.

- During project construction, vehicles and all equipment will be washed (including wheels, undercarriages, and bumpers) at an off-site washing facility (*e.g.*, a car wash or truck wash) immediately before project construction begins and prior to returning to project construction should equipment be used in a different construction area. In addition, tools such as chainsaws, hand clippers, pruners, etc. will be washed at an off-site washing facility immediately before project construction begins and prior to returning to project construction should tools be used in a different construction area. Vehicles, tools, and equipment will be washed at an off-site washing facility should these vehicles, tools, and equipment have been used in an area where invasive plants have been mapped during the pre-construction weed control inventory and as directed by the biological construction monitor, prior to entering a project area free of populations of invasive plants (as determined by the pre-construction weed control inventory). All washing will take place where rinse water is collected and disposed of in either a sanitary sewer or landfill; an effort will be made to use wash facilities that use recycled water. A written daily log will be kept for all vehicle/equipment/tool washing that states the date, time, location, type of equipment washed, methods used, and staff present. The log will include the signature of a responsible staff member. Logs will be available to the CPUC, BLM, USFS (for Project sections within National Forest lands), Wildlife Agencies, and biological monitor for inspection at any time and will be submitted to the CPUC on a monthly basis during construction.

**G-CM-21** Project construction activities will be designed and implemented to avoid or minimize new disturbance, erosion on manufactured slopes, and off-site degradation from accelerated sedimentation. Where revegetation is necessary to improve the success of erosion control, planting or seeding with native seed mix, approved by the Wildlife Agencies, will be done on slopes.

In addition to the measures above, the following erosion control procedures will be implemented:

- Vehicle and construction equipment use will be restricted to access roads and areas in the immediate vicinity of construction work sites to help reduce soil disturbance.

- In agricultural areas, topsoil will be left in roughened condition.

- When practical, construction activities will be avoided on wet soil to reduce the potential for soil compaction, rutting, and loss of soil productivity.

- Disturbed areas will be returned to their pre-construction contours and allowed to revegetate naturally, or will be reseeded with an appropriate seed mixture if necessary.

- Construction of access roads in inaccessible terrain will be reduced by using helicopters to place structures in select locations.

**G-CM-22** In areas where ground disturbance is substantial or where re-contouring is required (*e.g.*, marshaling yards, tower sites, spur roads from existing access roads), surface restoration will occur as necessary for erosion control and revegetation. The method of restoration will normally consist of returning disturbed areas back to their original contour, reseeding (if required), installing cross drains for erosion control, placing water bars in the road, and filling ditches for erosion control. Potential for erosion will be minimized on access roads and other locations primarily with water bars. The water bars will be constructed using mounds of soil shaped to direct the flow of runoff and prevent erosion. Soil spoils created during ground disturbance or recontouring will be disposed of only on previously disturbed areas, or used immediately to fill eroded areas. Cleared vegetation can be hauled off-site to a permitted disposal location, or may be chipped or shredded to an appropriate size and spread in disturbed areas of the ROW with the approval of the biological monitor.

**G-CM-23** To limit impact to existing vegetation, appropriately sized equipment (*e.g.*, bulldozers, scrapers, backhoes, bucket-loaders, etc.) will be used during all ground disturbance and re-contouring activities.

**G-CM-24** To suppress dust during Project construction, SDG&E will prepare and file with the Imperial County Air Pollution Control District, San Diego Air Pollution Control District, BLM, and CPUC, a Dust Control Plan. The Dust Control Plan will include a description of how the plan will be implemented and monitored at all locations of the project and contain the following measures:

- Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas if construction activity causes persistent visible emissions of fugitive dust beyond the work area;

- Pre-water sites for 48 hours in advance of clearing activities;

- Reduce the amount of disturbed area where possible;

- Spray all dirt stock-pole areas daily as needed;

- Cover loads in haul trucks or maintain at least 15.24 cm (six in) of free-board when traveling on public roads;

- Pre-moisten, prior to transport, import and export dirt, sand, or loose materials;

- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets or wash trucks and equipment before entering public streets;

- Plant vegetative ground cover in disturbed areas as soon as possible following construction; and

- Apply chemical soil stabilizers or apply water to form and maintain a crust on inactive construction areas (disturbed lands that are unused for four consecutive days).

In addition to the Dust Control Plan, the following dust reduction measures will be implemented:

- Prohibit construction grading on days when the wind gusts exceed 40.2 km per hour (25 mph), to the extent feasible, to control fugitive dust;

- All trucks hauling soil and other loose material will be covered or maintain at least 0.61 km (two feet) of freeboard;

- Snow fence-type windbreaks will be erected in areas identified as needed by SDG&E;

- Vehicle speeds will be limited to 24.1 km per hour (15 mph) on unpaved (no gravel or similar surfacing material) roads;

- Unpaved roads will be treated by watering as necessary;

- Soil stabilizers will be applied to inactive construction areas on an as-needed basis; and

- Exposed stockpiles of soil and other excavated materials will be contained within perimeter silt fencing, watered, treated with soil binders, or covered as necessary.

**G-CM-25** Except when not feasible due to physical or safety constraints, all project vehicle movement will be restricted to existing access roads and access roads constructed as a part of the project and determined and marked by SDG&E in advance for the contractor, contractor-acquired accesses, or public roads.

**G-CM-26** All limits of construction will be delineated with orange construction fencing. During and after construction, entrances to access roads will be gated to prevent the unauthorized use of these roads by the general public. Signs prohibiting unauthorized use of the access roads will be posted on these gates.

**G-CM-27** To the extent feasible, access roads will be built at right angles to the streambeds and washes. Where it is not feasible for access roads to cross at right angles, SDG&E will limit roads constructed parallel to streambeds or washes to a maximum length of 500 ft at any one transmission line crossing location. Such parallel roads will be constructed in a manner that minimizes potential adverse impacts on "waters of the U.S." or waters of the state. Culverts will be installed where needed for right angle crossings, but rock crossings will be utilized across most right angle drainage crossings. All construction activities will be conducted in a manner that will minimize disturbance to vegetation, drainage channels, and stream banks (e.g., structures will not be located within a stream channel, construction activities will avoid sensitive features). Up to 30 days prior to construction in streambeds and washes, SDG&E will perform a pre-activity survey(s) to determine the presence or absence of threatened or endangered riparian species. Details of protocol survey requirements are listed in the species-specific measures below.

**G-CM-28** To limit new or improved accessibility into the area, SDG&E shall coordinate with the authorized officer for the applicable Federal, State, or local land owner/administrator at least 60 days before construction in order to determine if gates shall be installed on existing and new access roads, especially trails that will be used as access roads, to prevent unauthorized vehicular access to the ROW. Gate installation shall be required at the discretion of the land management agency. On trails proposed for dual use as access roads, gates shall be wide enough to allow horses, bicycles, and pedestrians to pass through. SDG&E shall document its coordination efforts with the administering agency of the road/trail and provide this documentation to the CPUC, BLM, and all affected jurisdictions 30 days prior to construction. Signs prohibiting unauthorized use of the access roads shall be posted on these gates.

**G-CM-29** To control unauthorized use of project access roads by off-road vehicle enthusiasts, SDG&E shall provide funding to land management entities responsible for areas set aside for habitat conservation to provide for off-road vehicle enforcement patrols. The responsible land management entities will formulate what funding is reasonable to control unauthorized use of project access roads.

**G-CM-30** To limit new or improved accessibility into the area, all new access roads or spur roads constructed as part of the project that are not required as permanent access for future project maintenance and operation will be permanently closed. Where required, roads will be permanently closed, with the concurrence of the underlying landowner and the governmental agency having jurisdiction, using the most effective feasible and least

environmentally damaging methods (e.g., stockpiling and replacing topsoil or rock replacement) appropriate to that area. All permanently closed access roads and spur roads will be restored with native vegetation following closure.

**G-CM-31** Mowing shall be used when permanent access is not required since, with time, total re-vegetation is expected. If mowing is in response to a permanent access need, but the alternative of grading is undesirable because of downstream siltation potential, it should be recognized that periodic mowing will be necessary to maintain permanent access. In such instances, SDG&E will mow at least once every two years. The project biological construction monitor will conduct checks on mowing procedures to ensure that mowing for temporary or permanent access roads is limited to a 4-m-wide (14-foot-wide) area on straight portions of the road and a 5-6-m-wide (16 to 20-ft-wide) area at turns, and that the mowing height is no less than 10 cm (4 in) from finished grade.

**G-CM-32** Prior to construction activities, SDG&E will conduct on-the-ground surveys (following Service protocols where they exist) for the following listed species where such surveys had not been conducted in 2007 and 2008, or for those species for which surveys in 2007 and 2008 were not reliable due to lack of sufficient rainfall.

- San Diego Thornmint (*Acanthomintha ilicifolia*)
- San Bernardino Bluegrass (*Poa atropurpurea*)
- Willowy Monardella (*Monardella viminea)*
- Quino Checkerspot Butterfly (*Euphydryas editha quino*)
- Arroyo Toad (*Bufo californicus*)
- Southwestern Willow Flycatcher (*Empidonax traillii extimus*)
- Least Bell's Vireo (*Vireo bellii pusillus*)
- Coastal California Gnatcatcher (*Polioptila californica californica*)
- Stephen's Kangaroo Rat (*Dipodomys stephensi*)

**G-CM-33** Prior to construction, plant population boundaries designated as listed or proposed by the Wildlife Agencies and other resources designated as listed or proposed by SDG&E and other resource agencies will be clearly delineated with visible flagging or fencing, which will remain in place for the duration of construction. Flagged areas will be avoided to the extent practicable during construction activities in that area. Where these areas cannot be avoided, focused surveys for covered plant species will be performed.

Notification of presence of any covered plant species to be removed in the work area will occur within ten (10) working days prior to construction activity, during which time the Wildlife Agencies may remove such plant(s) or recommend measures to minimize or reduce the impact. If neither the Service nor CDFG has removed such plant(s) within ten (10) working days following written notice, SDG&E may proceed with work. In such cases, SDG&E will move plants to a nursery and hold them for up to one year while the Wildlife Agencies determine a specific relocation program.

**G-CM-34** To offset the loss of native trees or native tree trimming, SDG&E shall (1) acquire and preserve habitat where the trees occur and/or (2) restore (*i.e.*, planting) trees on land that will not be subject to vegetation clearing (either in SDG&E's ROW and/or on land acquired and preserved). Any land to be used for this compensation shall be approved by the CPUC, BLM, USFS (for loss of trees on National Forest lands), and Wildlife Agencies. For habitat acquisition and preservation, the compensation ratios shall follow those in Table 2.

For all trimmed native trees, the trees shall be monitored for a period of three years. If a trimmed tree declines or suffers mortality during that period, the tree shall be replaced in-kind (by species) at a 2:1 or 5:1 ratio as recommended by the CDFG (see below). If a tree does not decline or suffer mortality, no compensation shall be required.

For restoration (planting trees), these guidelines, based on recommendations from the CDFG, shall be followed:

Native trees that are removed shall be replaced in-kind (by species) as follows:

- Trees less than 12.7 cm (5 in) diameter at breast height (DBH) shall be replaced at 3:1
- Trees between 13 and 31 cm (5 and 12 in) DBH shall be replaced at 5:1
- Trees between 31 and 91cm (12 and 36 in) DBH shall be replaced at 10:1
- Trees greater than 91 cm (36 in) DBH shall be replaced at 20:1

Native trees that are trimmed shall be replaced in-kind (by species) as follows:

- Trees less than 30 cm (12 in) DBH shall be replaced at 2:1
- Trees greater than 30 (12 in) DBH shall be replaced at 5:1

All native tree restoration shall be maintained and monitored for a minimum of 10 years. The restoration shall be directed according to a Habitat Restoration Plan approved by the CPUC, BLM, USFS, and Wildlife Agencies.

**G-CM-35** Plant species identified as rare by the land managing agency will be salvaged where avoidance is not feasible. Generally, salvage may include removal and stockpiling for replanting on site; removal and transplanting out of surface disturbance area; removal and salvage by private individuals; and removal and salvage by commercial dealers; or any combination. Plant or wildlife species will not be collected except by biological monitors specifically directed by the Wildlife Agencies to do so.

**G-CM-36** No wildlife, including rattlesnakes, may be harmed except to protect life and limb. Firearms will be prohibited in all Project areas except for those used by security personnel.

**G-CM-37** Feeding of wildlife by SDG&E personnel or contractors is prohibited.

**G-CM-38** To minimize harassment or killing of wildlife and to prevent the introduction of destructive animal diseases to native wildlife populations, Project personnel are not allowed to bring pets into any project area.

**G-CM-39** All steep-walled trenches or excavations used during construction will be covered at all times except when being actively utilized. If the trenches or excavations cannot be covered, exclusion fencing (*i.e.*, silt fencing) will be installed around the trench or excavation, or it will be covered to prevent entrapment of wildlife. Open trenches, or other excavations that could entrap wildlife will be inspected by the qualified biologist a minimum of three times per day and immediately before backfilling. Should a dead or injured listed species be found in a trench or excavation or anywhere in the construction zone or along an access road, the qualified biologist will contact the CPUC, BLM, USFS, and Wildlife Agencies within 48 hours of detection. The qualified biologist will report the species found, the location of the finding, the cause of death (if known), and will submit a photograph and any other pertinent information. Construction holes left open over night will be covered. Covers will be secured in place nightly, prior to workers leaving the site, and will be strong enough to prevent livestock or wildlife from falling through and into a hole. Holes and/or trenches will be inspected prior to filling to ensure absence of mammals and reptiles. Excavations will be sloped on one end to provide an escape route for small mammals and reptiles.

**G-CM-40** Employees and contractors will look under vehicles and equipment for the presence of wildlife before movement. If wildlife is observed, no vehicles or equipment will be moved until the animal has left voluntarily or is removed by the qualified biologist.

**G-CM-41** The applicant will ensure that the following conditions are implemented during project construction:

- Disposal or temporary placement of excess fill, brush or other debris will not be allowed in waters of the United States or their banks;

- All equipment maintenance, staging, and dispensing of fuel, oil, coolant, or any other such activities will occur in designated areas outside of waters of the United States within the fenced project impact limits. These designated areas will be located in previously compacted and disturbed areas to the maximum extent practicable in such a manner as to prevent any runoff from entering waters of the United States, and will be shown on the construction plans. Fueling of equipment will take place within existing paved areas or designated fueling areas designed to contain fuel drips greater than 30.5 m (100 ft) from waters of the United States. Contractor equipment will be checked for leaks prior to operation and repaired as necessary. "No-fueling zones" will be designated on construction plans and/or within the stormwater pollution prevention plan.

**G-CM-42** A minimum of a 30.5-m (100-ft) riparian buffer will be maintained between all construction/staging areas, except where the access roads cross riparian areas.

**2. Operations and Maintenance Phase**

General Conservation Measures G-CM 2, G-CM 4, G-CM-5, G-CM-8 to G-CM-10, G-CM-12 to G-CM-16, G-CM-21, G-CM-23, G-CM-25, and G-CM-31 to G-CM-41 will also be implemented during the O&M phase of the SRPL Project.

**G-CM-43** A qualified biologist employed by SDG&E will be present during maintenance involving ROW repair requiring ground disturbance (*i.e*., grading/repair of access road and work areas and spot repair of areas subject to flooding or scouring). The qualified biologist will send annual monitoring reports of maintenance activities to the CPUC, BLM, and USFS (for sections of the project that require monitoring of maintenance activities on National Forest lands) that describe the types of maintenance that occurred, at what locations they occurred, and whether or not there were impacts that required mitigation.

**G-CM-44** The area limits of Project maintenance and survey activities will be predetermined based on the temporary and permanent disturbance areas noted on the final design engineering drawings, with activity restricted to and confined within those limits, within SDG&E's ROW. In addition, survey personnel would keep survey vehicles on existing roads. No paint or permanent discoloring agents would be applied to rocks or vegetation to indicate limits of survey or maintenance activity where any sensitive biological resources or wildlife habitats occur.

**G-CM-45** SDG&E will purchase/dedicate suitable habitat for preservation to offset areas permanently impacted by O&M activities. The preservation for O&M activities will be at the same ratios provided in Table 2 for construction activities. A Habitat Management Plan(s) will be required for all off-site parcels and must be approved in writing by the CPUC, BLM, USFS, and Wildlife Agencies. SDG&E may choose to establish conservation banks or purchase conservation credits from existing conservation banks, other than the conservation

bank established for SDG&E's Subregional Plan (SDG&E 1995), to provide an efficient process to offset the anticipated minor impacts resulting from O&M activities.

**G-CM-46** All O&M activities will be conducted in a manner that would minimize disturbance to vegetation, drainage channels, and stream banks. Up to 30 days prior to O&M activities in streambeds and washes, SDG&E would perform a pre-activity survey(s) to determine the presence or absence of threatened or endangered riparian species. Details of protocol survey requirements are listed below in the species-specific measures.

**G-CM-47** As part of the environmental training program, field crews will be trained to recognize the importance of invasive plant species control, and will be informed of the measures designed to control the spread of invasive species. Deliberate introduction of invasive plants or animals into any project site is prohibited. Heavy equipment will be inspected for invasive plant seeds or other plant material prior to entering an access road or a project site. Any plant seeds or other plant material discovered on heavy equipment will be manually removed. All seeds and straw materials used during O&M activities will be certified weed free, and all gravel and fill material would be certified weed free by the San Diego County Agriculture Commissioner's Office.

**G-CM-48** Access roads shall be maintained once every two years. If this schedule is not adhered to, loss of habitat due to maintenance of access roads will be considered a new permanent impact and compensated according to the ratios provided in Table 2.

**G-CM-49** Brush clearing around any project facilities (*e.g.*, structures, substations) for fire protection, visual inspection, or project surveying in areas that have been previously cleared or maintained within a two-year or shorter period would not require a pre-activity survey. In areas not cleared or maintained within a two-year period, brush clearing will not be conducted during the breeding season (March through August) without a pre-activity survey for vegetation containing active nests, burrows, or dens. The pre-activity survey performed by the on-site biological resource monitor will make sure that the vegetation to be cleared contains no active migratory bird nests, burrows, or active dens prior to clearing. If occupied migratory bird nests are present, fire protection or visual inspection brush clearing work will be avoided until after the nesting season, or until the nest becomes inactive. If no nests are observed, clearing may proceed. Where burrows or dens are identified in the reconnaissance-level survey, soil in the brush clearing area will be sufficiently dry before clearing activities occur to prevent mechanical damage to burrows that may be present.

**G-CM-50** Brush clearing and other construction activities will occur outside the general avian breeding season. All vegetation clearing, except tree trimming or removal, will take place between September 16 and February 14 (*i.e.*, outside of the general avian breeding season of February 15 through September 15), when feasible. Tree trimming or removal will only take place between September 16 and December 31 (*i.e.*, outside the raptor breeding season of January 1 through September 15). For brush clearing and/or other construction activities that cannot occur outside the above-listed breeding seasons, a

qualified biologist will work with a qualified acoustician to determine if a the construction activity will meet or exceed the 60 dB(A) Leq hourly noise threshold where nesting territories of the gnatcatcher and vireo occur. If the noise threshold will not be met or exceeded at the edge of their nesting territories, then brush clearing and/or other construction activities may proceed. If the noise threshold will be met or exceeded at the edge of their nesting territories, pre-construction surveys for nests of these species will be conducted by a qualified biologist (Service-approved biologist for gnatcatcher, vireo, and flycatcher) within 91 m (300 ft) of the construction area no more than seven days prior to initiation of construction that will occur between February 15 and August 31 for the gnatcatcher, March 15 and September 15 for the vireo, April 15 and September 15 for the flycatcher.

- If active nests are found, work may proceed provided that methods, determined by the qualified acoustician to be effective, are implemented to reduce noise below the threshold. These methods include, but are not limited to, turning off vehicle engines and other equipment whenever possible and/or installing a protective noise barrier between a nesting territory and maintenance activities. If the qualified acoustician determines that no methods will reduce noise to below the threshold, maintenance will be deferred until the nestlings have fledged or the nest has failed, as determined the qualified biologist. Where noise-reducing methods are employed, active nests will be monitored by the qualified biologist on a weekly basis until maintenance is complete or until the nestlings fledge or fails, whichever comes first. The qualified biologist will be responsible for documenting the results of the pre-maintenance nest surveys and the nest monitoring and for reporting these results to the CPUC, BLM, USFS, and Wildlife Agencies.

**G-CM-51** Maintenance activities will occur outside the general avian breeding season, where feasible. For other maintenance activities that cannot occur outside the above-listed breeding seasons, SDG&E will follow the requirements in G-CM-50 for noise reduction at nest sites.

**Species-Specific Conservation Measures**

**1. Project Construction Phase**

***San Diego Thornmint***

**SS-CM-1** No impacts will occur to the thornmint population at and adjacent to MP 116 or to any thornmint occurrences between MP 114 and 119. To ensure the avoidance of impacts, SDG&E will consult with the Service regarding the final design and siting of all permanent and temporary impacts (e.g., towers, pads, access roads, staging areas, pull down areas, helipads, and fuel modification zones) between MP 114 and MP 119. In other areas where suitable thornmint habitat (i.e., gabbro and calcareous soils and a slope of 0 to 25 percent) exists, the area to be impacted will be surveyed for thornmint before any impacts may occur, per G-CM-32. All permanent and temporary impact areas will be sited at least 100 feet away

from any known thornmint occurrences. SDG&E will implement the Weed Control Plan described in G-CM-20 to ensure that intact thornmint populations are not impacted by non-natives that could be introduced by this project.

**SS-CM-2** Impacts to San Diego thornmint will first be avoided where feasible, and where not feasible due to physical or safety constraints, impacts will be compensated through salvage and relocation via a restoration program, at a 1:1 ratio, and/or off-site acquisition and preservation of habitat, at a 2:1 ratio, containing the plant. The CPUC, BLM, USFS and Wildlife Agencies will decide whether the applicant can restore San Diego thornmint populations or will acquire habitat with San Diego thornmint (locations to be approved by the CPUC, BLM, USFS and Wildlife Agencies). A qualified biologist will prepare a Restoration Plan that will indicate where restoration will take place. The restoration plan will identify the goals of the restoration, responsible parties, methods of restoration implementation, maintenance and monitoring requirements, final success criteria, and contingency measures. The applicant will work with the CPUC, BLM, Wildlife Agencies, and USFS until a plan is approved by all parties.

***Quino Checkerspot Butterfly***

**SS-CM-3** A biologist permitted by the Service will delineate suitable/occupied habitat areas that will be impacted by project construction. Suitable habitat is defined as areas containing the primary constituent elements (PCEs) as outlined in the January 17, 2008, proposed revision to critical habitat (73 FR 3328) (see the "Status of the Species/Critical Habitat" section below for a discussion of the PCEs for Quino). Occupied Quino habitat is defined as contiguous suitable habitat containing the PCEs within 2 kilometers of a known Quino occurrence ("habitat-based population distribution") (73 FR 3328). Delineated suitable/ occupied habitat and the results of the Quino protocol presence/absence surveys will be submitted to the Service for review and approval before an incidental take permit may be issued for this species. Impacts to Quino habitat will be determined by the amount of suitable/unoccupied habitat and/or occupied habitat that is proposed to be impacted indirectly and directly.

**SS-CM-4** A pre-construction, Service protocol presence/absence survey for the adult Quino will be conducted within the delineated suitable/occupied habitat in the construction zone. Any surveys will be conducted in a year where Quino is readily observed at Service Quino-monitored reference sites to determine what areas are occupied by Quino (*i.e.*, any suitable habitat within 1 km (0.6 mi) of a current Quino sighting is considered occupied) and what areas are not occupied. The biologist will record the precise locations of Quino larval host plants and nectar sources within the construction zone (and 10 meters beyond) using GPS technology.

- If the protocol pre-construction Quino survey is determined by the Service to be conclusive, then areas found to be unoccupied by Quino will not require species-specific compensation.

- If the Service determines that the protocol pre-construction survey is not conclusive for determining Quino absence (due to limited detectability per the 2002 protocol, for example), then all suitable habitat areas will be considered potentially occupied. SDG&E will avoid siting any permanent or temporary impacts within 1 km (1 mi) of any known or newly discovered Quino occurrences. If the SDG&E believes that impacts to Quino are unavoidable, it will provide evidence to such an effect to the Service for review and approval. Any approved impacts to Quino occupied or Quino suitable habitat will require compensation as follows. If construction occurs outside the larvae and adult activity season (June 1 through October 15), stays at least 10 m (33 ft) away from all host plant locations, and does not impact suitable habitat then no compensation is required (Service 2007a). If construction occurs between October 16 and May 31, is within 10 m (33 ft) of host plant locations, or removes suitable habitat then, (1) temporary impacts to the habitat will be mitigated at 2:1 through 1:1 on-site restoration of temporarily disturbed areas and 1:1 offsite acquisition and preservation of an equal sized, contiguous area of Quino-occupied habitat, and (2) permanent impacts will be compensated through 3:1 off-site acquisition and preservation of Quino-occupied habitat (or Quino-designated critical habitat for impacts to designated critical habitat). Any acquired habitat will be approved by the CPUC, BLM, USFS, and Wildlife Agencies. A Service approved biologist will be present during all construction activities in potentially occupied habitat to monitor and assist the construction crews to ensure impacts occur only as allowed. This same compensation will apply where the protocol pre-construction survey was conclusive for determining that the Quino is present and where construction will occur in designated critical habitat. Impacts to Quino critical habitat must be off-set within the same Critical Habitat Unit where the impacts occur.

- If host plant mapping is not possible during the pre-construction survey (*e.g.*, drought prevents plant germination), then all suitable habitat (*i.e.*, non-excluded habitat per the 2002 protocol) will be considered occupied by the Quino and compensated under the assumption that Quino is present.

**SS-CM-5** Any Service-approved restoration of impacted habitat will be conducted in areas with appropriate topographical and biological features to be determined by the Service, BLM, USFS and SDG&E. The details of the restoration shall be based on Appendix II of the Recovery Plan for the Quino Checkerspot Butterfly (Service 2003a) and described in a plan to be reviewed and approved by the Service. The restoration plan shall include, but not be limited to: (1) larval host plants (local stock, if possible) to be planted; (2) nectar resources; (3) irrigation needs and/or other establishment procedures; (4) timeline for implementation; (5) success criteria; (6) contingency measures for success criteria that are not met; (7) weed control measures; (8) monitoring program; and (9) implementation schedule. The restoration plan will be prepared and submitted to the Service prior to commencement of ground disturbance associated with the proposed project. The proposed project will not commence until the restoration begins. The restoration plan actions will be completed no later than

completion of project construction. Success criteria will be modeled on undisturbed native plant communities in the vicinity of the proposed project and sites within the area known to be occupied by Quino.

**SS-CM-6** Due the extreme importance of the Quino population located in the Jacumba Unit of Quino critical habitat, SDG&E will consult with the Service regarding the final design and siting of all permanent and temporary impacts (*e.g.*, towers, pads, access roads, staging areas, pull down areas, helipads, and fuel modification zones) within Quino critical habitat. SDG&E will work with the Service to ensure that no larvae or adults within critical habitat will be impacted by this project.

**SS-CM-7** No new construction will occur during the Quino flight season within 1 km (1 mi) of any known or newly discovered Quino occurrence. If it is not feasible to construct outside of the flight season in these instances, SDG&E must obtain written consent from the Service to proceed with construction.

***Arroyo Toad***

**SS-CM-8** A pre-construction, Service protocol, survey will be conducted for the arroyo toad by a biologist approved by the Service to handle the toad) in all areas of the project located within suitable arroyo toad breeding habitat.

- The removal of toad riparian breeding habitat will occur from October through December to minimize potential impacts to breeding adults (including potential sedimentation impacts to toad eggs) and dispersing juveniles.

**SS-CM-9** SDG&E will develop an arroyo toad translocation monitoring program to be implemented during all construction activities that have the potential to adversely affect the arroyo toad. This program will be coordinated with the Service, USFS, and BLM and finalized prior to initiation of construction activities. The program will include the following requirements:

- Prior to clearing, grubbing, and construction activities, Service-permitted biologists will monitor arroyo toad breeding activity in those project areas containing or adjacent to breeding habitat. The biologists will determine when egg clutches or larvae are no longer present in the waterway (generally late May at lower elevation, June at higher elevation). When sign of breeding is no longer evident, an exclusionary fence will be installed and clearance surveys initiated.

- Prior to clearing, grubbing, and grading activities, arroyo toad temporary exclusionary fence will be constructed along the perimeter of the project footprint within or immediately adjacent to arroyo toad habitat (breeding and aestivation). The intent of the fence is to fully contain the area(s) to be impacted and to remove and exclude arroyo toads. Exclusionary fence in aestivation habitat will not be installed

prior to May 1. The Service-permitted biologist will be present during the exclusionary fence installation, reconfigurations, breach repairs, and weekly during the breeding season. The fence will consist of fabric or plastic at least 0.6 m (2 ft) high, staked firmly to the ground with the lower 0.3 m (1 ft) of material stretching outward along the ground and secured with a continuous line of gravel bags. No digging or vegetation removal will be associated with the installation of the fence and all materials shall be removed when the Project is complete. The removal of some vegetation, without disturbing the soil, within the project footprint to aid in the observance and collection of arroyo toads is acceptable. All fencing materials (*i.e.*, mesh, stakes, etc.) will be removed following construction. Ingress and egress of construction equipment and personnel will be kept to a minimum, but when necessary, equipment and personnel will use a single access point to the site. This access point will be as narrow as possible and will be closed off by exclusionary fencing when personnel are not on the project site.

- Prior to clearing, grubbing, and grading activities, but after exclusionary fencing has been installed, Service-approved biologists will perform a minimum of three nighttime surveys inside the exclusionary fence and remove all arroyo toads found within its perimeter. The approved biologist will continue until there have been two consecutive nights without arroyo toads inside the fencing. Any breach in the exclusionary fence during times when arroyo toads area active above ground, will result in repeating the 3-day minimum clearance surveys for that particular area.

- If conditions do not occur that result in sufficient arroyo toad emergence and movement, a Service-approved biologist will attempt to elicit a response from the arroyo toads during nights late in the known breeding season, with temperatures above 50$^{o}$F, by spraying the area inside the exclusionary fence with water to a depth of approximately 2 to 5 cm (1 to 2 in) to simulate a rain event.

- Whether or not a simulated precipitation event is done, arroyo toads found within the project footprint will be captured and translocated by Service-approved biologists to the closest area of suitable habitat. The Service-approved biologist will coordinate with the appropriate property owner(s) and the Service on where the arroyo toads will be placed.

- Service-approved biologists will maintain a complete record of all arroyo toads encountered and moved from harms way during translocation efforts. The date and time of capture, sex, physical dimensions, and coordinates/specific location of capture will be recorded and provided to the Service, within 30 days of the completion of translocation. In addition to reporting on the translocation effort, monthly reports (including photographs of impact areas) will be submitted to the Service during construction activities within areas demarcated by arroyo toad exclusion fencing. The monthly reports will document general compliance with all applicable conditions

and report all incidents not in compliance with this biological opinion. The reports will also outline the duration of arroyo toad monitoring, the location of construction activities, the type of construction that occurred, and equipment used. These reports will specify numbers, locations, sex, observed behavior, and remedial measures employed to avoid, minimize, and mitigate impacts to arroyo toads. All field notes and other documentation generated by the Service-approved biologist will be made available upon request to the Service.

- To avoid transferring disease or pathogens between aquatic habitats during surveys and handling of arroyo toads, the approved biologists will follow the Declining Amphibian Population Task Force's Code of Practice (DAPTF, 1991) or newer version when available.

- After the clearance surveys outlined above have been completed, daily surveys will be conducted each morning prior to the continuation of construction activity. Any toads found will be relocated per the translocation plan.

- The applicant will submit, in writing, the names, any permit numbers, résumés, and at least three references (of people who are familiar with the relevant qualifications of the proposed biologist), of all biologists who might need to handle, move, or monitor arroyo toads for the proposed project. This information will be submitted to the Service for approval at least 15 days prior to the initiation of any arroyo toad surveys. Proposed activities will not begin until an authorized biologist has been approved by the Service.

**SS-CM-10** To offset the loss of occupied and suitable arroyo toad habitat within the project area, and to offset indirect effects of the project on arroyo habitat, SDG&E will develop and implement an arroyo toad predator control program on USFS lands. The scope and methods for this program will be developed in consultation with the Service and USFS.

**SS-CM-11** Compensation for the loss of arroyo toad-occupied habitat will be implemented as follows. Permanent impacts to occupied arroyo toad breeding habitat will include 3:1 off-site acquisition and preservation of occupied arroyo toad breeding habitat. Permanent impacts to occupied upland burrowing habitat will include 2:1 off-site acquisition and preservation of occupied upland burrowing habitat. Temporary impacts to occupied breeding habitat will include 1:1 on-site restoration and 2:1 off-site acquisition and preservation of occupied breeding habitat. Temporary impacts to occupied upland burrowing habitat will include 1:1 on-site restoration and 1:1 off-site acquisition and preservation of occupied upland burrowing habitat. Any acquired habitat will be approved by the CPUC, BLM, USFS, and Wildlife Agencies.

**SS-CM-12** To avoid and minimize impacts to arroyo toads, access road construction and use, with the exception of emergency situations, will occur during daylight hours (from 2 hours after sunrise to 2 hours before sunset) when amphibian movement is less frequent.

**SS-CM-13** No construction activities will take place during the arroyo toad breeding season (March 15-July 31) within suitable arroyo toad breeding habitat.

**SS-CM-14** To avoid long-term impacts to wildlife movement, including, but not limited to arroyo toad movement on the project site, all temporary arroyo toad exclusion fencing and temporary construction fencing will be removed at the conclusion of construction activities.

**SS-CM-15** Towers, pads, pull stations, access roads, staging areas, and fly yards will not be located within suitable/potential arroyo toad upland aestivation and riparian breeding habitat to the extent feasible. In cases where the applicant determines it is not feasible to fully avoid suitable/potential arroyo toad habitat, the applicant will consult with the Service to identify a site for the above-listed features that would avoid and minimize impacts to suitable/potential arroyo toad upland aestivation and riparian breeding habitat to the maximum extent.

***Least Bell's Vireo***

**SS-CM-16** During construction, all grading or brushing taking place within riparian habitats occupied by the vireo will be conducted outside the vireo breeding season (defined as March 15 through September 15). When conducting all other construction activities during the breeding season within 152 m (500 ft) (Service 2007b) of occupied or suitable habitat, a biologist approved by the Service will survey for vireos within 10 days prior to initiating activities in an area. The results of the survey will be submitted to the Wildlife Agencies for review and approval prior to initiating any construction activities.

- During construction, if vireos are present, a Service-approved biologist will survey daily for nesting vireos within 152 m (500 ft) of the construction area, for the duration of the activity in that area during the breeding season. If an active nest is located, a 91-m (300-ft) no-construction buffer zone will be established around each nest site; however, there may be a reduction of this buffer zone depending on site-specific conditions or the existing ambient level of activity. SDG&E will contact the Wildlife Agencies to determine the appropriate buffer zone. No construction will take place within this buffer zone until the nest has fledged or is no longer active. If construction must take place within the buffer, a qualified acoustician will monitor noise as construction approaches the edge of the occupied vireo habitat as directed by the permitted biologist. If the noise meets or exceeds the 60 dB(A) Leq threshold, or if the biologist determines that construction activities are disturbing nesting activities, the biologist will have the authority to halt construction and will consult with the Wildlife Agencies, BLM and USFS, to devise methods to reduce the noise and/or disturbance. This may include methods such as, but not limited to, turning off vehicle engines and other equipment whenever possible to reduce noise, installing a protective noise barrier between the nesting birds and the activities, and working in other areas until the young have fledged. The Service-approved biologist will monitor the nest daily until activities are no longer within 91-m (300 ft) of the nest, or the fledglings become independent of their nest or the nest has failed.

- Impacts to aquatic resources under the jurisdiction of the Corps of Engineers, Regional Water Boards, State Water Board, and CDFG will be avoided to the extent feasible. The avoidance of these resources will further minimize impacts to vireo.

**SS-CM-17** To avoid impacts to vireo, towers, pads, pull stations, access roads, staging areas, and fly yards will be located outside of riparian vegetation, including occupied vireo habitat, where feasible. If avoidance is not feasible, compensation for the loss of suitable vireo habitat will be implemented as follows. Permanent impacts to suitable habitat will include 3:1 offsite acquisition and preservation of occupied habitat. Temporary impacts to occupied habitat will include 1:1 on-site restoration and 2:1 offsite acquisition and preservation of occupied habitat. Any acquired habitat will be approved by the CPUC, BLM, USFS, and Wildlife Agencies.

**SS-CM-18** To minimize adverse impacts from loss of occupied habitat in the Cleveland National Forest, and to minimize predation and parasitism, SDG&E will develop and implement a brown-headed cowbird (*Molothrus ater*) trapping program, in consultation with the USFS.

***California Gnatcatcher***

**SS-CM-19** All brushing or grading taking place within occupied habitat of the gnatcatcher (defined as within 152 m (500 ft) of any gnatcatcher sightings (Service 2007b)) during construction will be conducted outside of the gnatcatcher breeding season (February 15 through August 31). When conducting all other construction activities during the gnatcatcher breeding season, within occupied habitat, the following avoidance measures will apply.

- Vegetation clearing outside of the breeding season (October 1 through February 14) will take place in the presence of a biological monitor approved by the Service. The monitor will walk ahead of vegetation removal equipment and ensure that gnatcatchers are not killed or injured as a direct result of vegetation removal activities. The monitor will have the authority to halt/suspend all activities until appropriate corrective measures have been completed. The monitor will also be required to report violations immediately to the Service and CDFG. This measure is required for construction activities only.

- A Service-approved biologist will survey for gnatcatchers within 10 days prior to initiating activities in an area. The results of the survey will be submitted to the Wildlife Agencies for review and approval prior to initiating any construction activities. If gnatcatchers are present, a Service-approved biologist will survey for nesting activity approximately once per week within 152 m (500 ft) of the construction area for the duration of the activity.

- If an active nest is located, a 91-m (300-ft) no-construction buffer (Service 2007b) will be established around each nest site; however, there may be a reduction of this

buffer zone depending on site-specific conditions or the existing ambient level of activity. The applicant will contact the Wildlife Agencies to determine the appropriate buffer zone. To the extent feasible, no construction will take place within this buffer zone until the nest is no longer active. However, if construction must take place within the 91-m (300-ft) buffer, a qualified acoustician will monitor noise as construction approaches the edge of the occupied gnatcatcher habitat as directed by the permitted biologist. If the noise meets or exceeds the 60 dB(A) Leq threshold, or if the biologist determines that the activities in general are disturbing the nesting activities, the biologist will have the authority to halt construction and will consult with the Wildlife Agencies to devise methods to reduce the noise and/or disturbance in the vicinity. This may include methods such as, but not limited to, turning off vehicle engines and other equipment whenever possible to reduce noise, installing a protective noise barrier between the nesting gnatcatchers and the activities, and working in other areas until the young have fledged.

**SS-CM-20** Compensation for the loss of occupied gnatcatcher habitat will be implemented as follows. Permanent impacts to occupied habitat will include 2:1 offsite acquisition and preservation of occupied habitat. Temporary impacts to occupied habitat will include 1:1 onsite restoration and 1:1 off-site acquisition and preservation of occupied habitat. Impacts to occupied gnatcatcher designated critical habitat must be compensated within the same Critical Habitat Unit where the impacts occurred. Any acquired habitat will be approved by the CPUC, BLM, USFS, and Wildlife Agencies.

**SS-CM-21** Compensation for the loss of unoccupied designated critical habitat for the gnatcatcher will be implemented as follows. Permanent impacts to unoccupied designated critical habitat will include 2:1 offsite acquisition and preservation of designated critical habitat. Temporary impacts to unoccupied designated critical habitat will include 1:1 onsite restoration. Any acquired habitat will be approved by the CPUC, BLM, USFS, and Wildlife Agencies.

***Peninsular Bighorn Sheep***

**SS-CM-22** Construction activities (including the use of helicopters) in bighorn sheep designated critical habitat will be limited to outside the lambing season (January 1 through June 30) and the period of greatest water need (June 1 through September 30) as defined in the Recovery Plan. Construction activities in designated critical habitat may occur during the lambing season and/or period of greatest water need if prior approval is obtained from the Wildlife Agencies.

**SS-CM-23** Compensation for the loss of occupied bighorn sheep habitat will be implemented as follows. Permanent impacts to designated critical habitat will include 5:1 offsite acquisition and preservation of critical habitat. Temporary impacts to designated

critical habitat will include 1:1 on-site restoration and 2:1 offsite acquisition and preservation of critical habitat. Any acquired habitat will be approved by the CPUC, BLM, and Wildlife Agencies.

**SS-CM-24** A biological consultant approved by the Wildlife Agencies will be retained by SDG&E to collect data on bighorn sheep movements in the area during the construction phase. Prior to construction the biologist shall submit a bighorn sheep monitoring plan that meets the approval of the Wildlife Agencies. Helicopters shall follow regular flight corridors coinciding with the ROW to the maximum extent possible and avoid low-flying "short-cuts" or sight-seeing trips away from the project site. Helicopters shall avoid flying within 0.6 mi (1 km) of bighorn sheep water sources. Helicopter landing areas, vehicle parking sites, and fly yards shall be cited at least 0.6 mi (1 km) from bighorn sheep water sources and other key resource areas identified by the biologist. When bighorn sheep are detected within the I-8 Island, construction operations shall cease until bighorns leave the area as verified by the biologist.

**SS-CM-25** To help reconnect desert bighorn sheep subpopulations and at least partially offset impacts to the overall population caused by the project, SDG&E will:

- Fund the design and construction of an overpass or underpass (for sheep), or tunnel (for vehicles) to facilitate desert bighorn sheep movement across a highway at a location determined by the Service (in coordination with CDFG). Tunnel or overpass design must be approved by the Wildlife Agencies, and construction of the facility will be completed prior to connecting and energizing the proposed project to the grid.
- Fund, design, and construct a system of fences to prevent bighorn sheep from crossing on the surface of westbound Interstate 8. The fencing shall be designed in consultation with Caltrans and the Wildlife Agencies to facilitate bighorn sheep movement through/across the island using structures currently present, such as the bridges spanning Devil's Canyon, and the culverts/low bridge along eastbound Interstate 8.
- Fund removal of tamarisk, fountain grass, other invasive species, and hazardous fences for the life of the project in the action area, and install and maintain water sources per direction and at locations specified by the Wildlife Agencies for the life of the project.
- Fund a minimum 10-year-long program to monitor the effects of the project on bighorn sheep behavior, movements, and dispersal in the area from Carrizo Gorge south to the international boundary (10 years is needed to measure the influence of the project while factoring in rainfall cycles, vegetative productivity, and drought). This program will be designed and implemented by the Wildlife Agencies following construction. Funding for the project will be provided prior to completion of project construction and is estimated to cost $150,000 per year in 2008 dollars.

- The project proponent will provide sufficient funds to CDFG, or a third party designated by CDFG, to ensure five complete biennial aerial surveys from Carrizo Gorge to the international boundary, for the 10-year period beginning with the scheduled 2010 CDFG survey.

- Water used for operation and maintenance purposes will not be obtained from water sources used by bighorn sheep or other wildlife.

**2. Operations and Maintenance Phase**

Species-Specific Conservation Measures SS-CM-1 to SS-CM-23 will also be implemented during the O&M phase of the SRPL Project.

***Quino Checkerspot Butterfly***

**SS-CM-26** If access roads in Quino-occupied or suitable habitat are maintained (*i.e.*, regraded) and vegetation around structures is cleared at least once every two years, then no additional compensation will be required for this ongoing maintenance. If more than two years pass without re-grading or clearing, then the maintenance will be considered a new impact to Quino and would be compensated based on SS-CM-2.

**SS-CM-27** Some O&M activities associated with the project may need to be conducted on emergency basis. Under these circumstances, no pre-activity survey will be conducted and no Quino adult surveys will be conducted. SDG&E may take action immediately and must contact the Service within 24 hours after undertaking the activity to provide information on the location and emergency nature of the activity. Unavoidable impacts that occurred during emergency O&M activities will be mitigated at a 2:1 ratio.

## GENERAL ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 Federal Register §402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of State and private actions that are contemporaneous with the consultation in progress.

*Action Area*

The Sunrise Powerlink traverses a wide range of vegetation communities from the eastern edge of the City of San Diego, in San Diego County, to the Imperial County desert west of El Centro. The "action area" is defined (according to 50 CFR. § 402.02, and pursuant to section 7 of the Act) as all areas directly or indirectly affected by the Federal action and not merely the

immediate area involved in the action. For this consultation, the action area encompasses approximately 1,685 ha (4,165 ac) and is defined as the three segments, described below, that make up the approximately 193-km (120-mi) Environmentally Superior Southern Route (ESSR) in southern San Diego and Imperial counties (Figure 1).

The action area consists of the transmission line ROW and the area within 91 m (300 ft) of the center line of the ROW. This distance is consistent with other section 7 consultations in our geographic area of jurisdiction in Southern California as a distance within which indirect effects (*e.g.*, noise) may affect listed species, especially birds. In addition, because PBS are large wide-ranging mammals that use the landscape at a much larger scale than other listed species occurring in the project area, the action area was enlarged to account for the expanded scale at which PBS perceive their environment.

To address PBS, the action area was delineated on an aerial photo by following ridgelines that encompass the basin containing the project area. The action area includes portions of both In-Ko-Pah Gorge and Devil's Canyon. It was assumed that helicopters will be visible and in proximity to bighorn sheep present within the area delineated. Animals crossing over ridgelines or already located outside the action area should feel secure due to being out of the direct line-of-sight and having a greater distance between them and the project area (Light and Weaver 1973).

The action area also includes new access roads, temporary work areas, pull and tension sites, fly yards, and staging areas that are beyond or located outside 91 m (300 ft) of the ROW (Figure 1). Finally, the action area will encompass any specific conservation areas protected to offset impacts to listed species as a result of and during the course of implementing this biological and conference opinion. The conservation areas are expected to have only beneficial effects to the six species addressed in this consultation, and their descriptions will be appended to this opinion once specific locations are known.

Most of the action area is located within Federal lands managed by the BLM (approximately 42 percent) and USFS (approximately 16 percent); however, a small amount (approximately 2 percent) of the transmission line is within lands owned by the Department of Defense (DoD). Private lands encompass the remaining 40 percent of the action area (Figure 1).

Desert South Link

The Desert South Link (Figure 1) will consist of a 500 kilovolt (kV) transmission line, with a 61 m (200 ft) ROW, that would be located adjacent to the existing 500 kV Southwest Powerlink (SWPL) transmission line, separated by an average of 122 m (400 ft) between ROW centerlines. This segment would generally parallel Interstate 8 (I-8), passing through BLM and private land, for approximately 48 km (30 mi). The route would begin at the Imperial Valley Substation, 6 km (4 mi) southwest of El Centro, cross I-8 at MP 22.8, passing adjacent to the BLM's Jacumba Federal Wilderness Area, paralleling the SWPL to a point where it crosses the San Diego/Imperial County line. The Desert South Link would be located in the Colorado Desert

bioregion consisting primarily of desert scrub habitats. The total length of this link would be approximately 48 km (30 mi).

Cleveland National Forest South Link

The CNF South Link (Figure 1) continues to parallel the SWPL from the San Diego/Imperial County line. Approximately 0.8 km (0.5 mi) from the County line, the line turns due west to follow along the south side of I-8. The line would continue west on private land for another mile, pass through approximately 2.4 km (1.5 mi) of BLM land, and re-enter private land for another approximately 5 km (3 mi) before turning southwest for approximately 2.4 km (1.5 mi). The line then turns northwest, crossing the I-8 freeway just west of the BLM Carrizo Gorge Wilderness Area and 2 km (1 mi) east of the community of Boulevard. It follows the western edge of the Carrizo Gorge Wilderness for approximately 16.9 km (10.5 mi) where it turns due west.

At approximately MP 52, the line enters the Cleveland National Forest turning south-southwest and continues to traverse USFS land in the mountainous area of south eastern San Diego County for approximately 21 km (13 mi). The line turns to run east-west through the Potrero area between BLM's Hauser Mountain Wilderness area and the CNF's Hauser Wilderness. Most of this route segment follows an existing 69 kV line to the west, in remote and rugged terrain just south of the CNF's southern boundary. The line then turns north, passing the existing Barrett Substation and enters the CNF where it continues for approximately 23 km (14 mi) and connects with the proposed MRD Substation. In this link, the SRPL alignment would be 61-m-wide (200-ft-wide) and contain a single circuit 500 kV transmission line. The vegetation along this link is dominated by chaparral communities.

Inland Valley South Link

The Inland Valley South Link (Figure 1) consists of a proposed double circuit 230 kV line that will be contained within a 91-m-wide (300-ft-wide) easement (except at underground portions) until MP 114 where it transitions to 31 m (100 ft) and will be located in an existing SDG&E ROW. At MP 94, the line will transition to underground and traverse along Star Valley Road to Alpine Boulevard. The route will then continue west underground within the Alpine Boulevard ROW. It will remain underground and cross under I-8 at Peutz Valley until MP 100 where the route will transition to overhead.

West of the underground section, the line will continue northerly through private and San Diego County land for 2 mi. At MP 102, the route would turn northwest and run along the downstream edge of the El Capitan Reservoir in the CNF. At MP 104 the route would turn west, passing through private and BLM land, for approximately 5.6 km (3.5 mi), cross Wildcat Canyon Road, and turn northwest through private land at MP 109. It would continue through private lands and lands owned by the City of San Diego, San Diego County Water Authority, and San Diego County for approximately 8 km (5 mi), generally paralleling Highway 67 near the San Vicente Reservoir.

From the area near San Vicente Reservoir, the line then heads west, transitioning from a 91-m (300-ft) easement to an existing 31-m-wide (100-ft-wide) easement, traversing the northern side of the Sycamore-Goodan Open Space Preserve. It then heads southwest for approximately 2.4 km (1.5 mi), turns west again at the MCAS Miramar boundary where it terminates at the existing Sycamore Canyon Substation. The vegetation along this link is dominated by chaparral and coastal sage scrub communities; portions of the vegetation burned in the 2007 Witch Wildfire (between MP 104 and MP 105) and 2003 Cedar Wildfire (between MP 98 and MP 119). The total length of this segment would be approximately 45 km (28 mi).

*Other Consultations in the Action Area*

BLM

On September 30, 2008, the Service provided the BLM with a programmatic non-jeopardy biological and conference opinion on the Eastern San Diego County Resource Management Plan (FWS-SDG-08B0465-08F0507; ESDRMP). The consultation addressed the effects of BLM's proposed updates to the ESDRMP, originally approved in 1981, on Quino, vireo, and PBS. The consultation addressed the BLM's land use plan for 41,630 ha (102,869 ac) of public land in eastern San Diego County within portions of the Desert South Link and the CNF Link of the action area. The ESDRMP is used by the BLM to guide land use planning decisions, including the identification of allowable extractive, commercial, passive, and recreational uses for approximately the next fifteen years. The ESDRMP provides programmatic guidance regarding future project-specific actions, their effects on listed species, and compliance with the Act. Although the ESDRMP provides direction for future uses, specific projects are not authorized. Therefore, most future project-specific actions will require additional review under the Act by the Service.

USFS

USFS section 7 consultations within the action area include the 2005 programmatic non-jeopardy biological and conference opinions (FWS-773.9) that addressed the Revised Land Management Plans for the CNF within the action area, and three other national forests in Southern California. The 2005 biological and conference opinions analyzed the effects of the Revised Land Management Plans on multiple species, including the six species addressed in this consultation. These plans provided descriptive management direction to guide and limit project design and impacts to federally-listed, proposed, and candidate species; however, they did not specify what management actions would be carried out, or when and where actions would occur. Therefore, we did not provide exemption for incidental take as provided for in section 7(o)(2) of the Act. In addition, non-jeopardy biological and conference opinions (1-6-00-F-773.2) were issued in 2001 that addressed continued implementation of Land and Resource Management Plans for the four southern California national forests, including the CNF, as modified by new interim management direction and conservation measures, and for some ongoing activities. The consultation analyzed effects to all six of the species addressed in this consultation. Incidental

take was authorized for 1 individual gnatcatcher/year, no incidental take was authorized for PBS or Quino; and no additional incidental take of arroyo toad and vireo was authorized, beyond that authorized in the Riparian Obligates biological opinion (1-6-99-F-21), discussed below. Primary activities addressed in the 2001 opinions included road and trail use and maintenance, some existing recreation sites and facilities, existing administration facilities, fuel breaks, dispersed recreation, non-commercial collection of forest products.

Also in 2001, we issued a livestock grazing non-jeopardy opinion (1-6-01-F-1694) that addressed the impacts of livestock grazing on the CNF on the California gnatcatcher, Quino, arroyo toad, vireo, and other species. The livestock grazing biological opinion did not anticipate direct injury or mortality of gnatcatchers and did not anticipate any incidental take of Quino. The exact number of arroyo toads that could be incidentally taken was unknown; however, the incidental take statement included a threshold whereby take would be exceeded if two arroyo toad egg masses were destroyed by cattle activity in breeding pools. Similarly, the incidental take statement included a threshold whereby take of vireo would be exceeded if, in any one year, more than two vireo nests were parasitized by brown-headed cowbirds (*Molothrus ater*) and the nests hatched or fledged cowbird young.

The Riparian Obligates non-jeopardy biological opinion (1-6-99-F-21), issued in 2000, addressed the effects of most ongoing USFS activities on the vireo, arroyo toad, and other riparian species in the CNF. No direct mortality of vireo was authorized. However, incidental take of 11 adult arroyo toads, 160 metamorphs and tadpoles, and 8 egg masses was authorized.

*Habitat Conservation Plans within the action area*

Within the Inland Valley South Link, the transmission line will cross lands within the existing and proposed Multiple Species Conservation Program (MSCP) preserve. These lands, located within the existing County and City of San Diego MSCP subareas, address potential impacts and conservation for 85 listed and sensitive species, including all of the species addressed in this consultation, except Quino and PBS. The housing, commercial, and infrastructure development addressed by these habitat conservation plans (HCPs) and evaluated within the biological opinions for the County and City of San Diego's incidental take permits, along with the habitat conservation and management measures included in the HCPs, are considered part of the environmental baseline for this and future section 7 consultations.

The biological opinion for the County of San Diego's HCP anticipated the loss of up to 11,733 ha (28,993 ac) of gnatcatcher habitat within the County of San Diego's HCP and all gnatcatchers within that area; however, approximately 29,947 ha (74, 000 ac) of gnatcatcher habitat was anticipated to be conserved within the MSCP subregion. No incidental take was anticipated for vireos; however, it was anticipated that 456 ha (1,128 ac) would be conserved and managed in the County of San Diego's Multiple Habitat Planning Area (*i.e.*, the preserve; MHPA). In addition, it was anticipated that no arroyo toads would be incidentally taken through implementation of the HCP; however, 553 ha (1,366 ac) of arroyo toad breeding habitat was

anticipated to be conserved and managed in the County of San Diego's MHPA.
The biological opinion for the City of San Diego's HCP anticipated the loss of up to 2503 ha (6,185 ac) of gnatcatcher habitat and all gnatcatchers within that area; however, approximately 29,947 ha (74,000 ac) of gnatcatcher habitat was anticipated to be conserved within the MSCP subregion. No incidental take was authorized for vireos; however, it was anticipated that 1,590 ha (3,930 ac) would be conserved and managed in the City of San Diego's MHPA. In addition, it was anticipated that an unquantifiable number of arroyo toads would be lost through implementation of the HCP; however, an estimated 1,684 ha (4,162 ac) of arroyo toad breeding habitat was anticipated to be conserved and managed in the City of San Diego's MHPA.

Access road and tower pad construction for the project will permanently impact 27 ha (66.1 ac) of MSCP preserve lands, including lands within both the City and County of San Diego. In addition, 21.9 ha (54.2 ac) of temporary impacts are anticipated within the MSCP preserve from staging and fly yards, pull sites, and tower pads. However, utility lines and roads are considered compatible uses with the biological objectives of the MSCP and are conditionally allowed in the MSCP preserve. Within the MSCP preserve, SDG&E will follow the siting guidelines outlined in the County and City of San Diego's HCPs.

The CNF South and Inland Valley South Links are also included within the plan area for SDG&E's Subregional Natural Community Conservation Plan\HCP and their Low-effect Quino HCP, which address potential impacts from SDG&E's O&M activities and new construction on 111 federally listed and other sensitive species, including all of the species addressed in this consultation, except PBS. The SRPL Project is outside the scope of SDG&E's existing HCP. Up to 162 ha (400 ac) of habitat for covered species was expected to be lost over a 55-year period as a result of implementation of the HCP; however, 101 ha (250 ac) of habitat for covered species was conserved that contributed toward regional conservation planning goals.

Some of the area within the Inland Valley South Link and much of the area within the CNF South Link is located within the proposed East County MSCP HCP. This habitat conservation planning effort will guide development and provide for the conservation of over 150 species and is expected to be conducted over the next two years. Permit processing for this HCP will undergo separate section 7 consultation; thus, this HCP planning effort is not considered part of the Environmental Baseline for the proposed action.

## GENERAL EFFECTS OF THE ACTION

Habitat loss and fragmentation, alteration of the quality of adjacent habitats, an increase in the potential for wildfires, and type conversion of native habitat from increased fire frequency and/or invasive plants are general effects associated with the initial construction and long-term O&M of the SRPL Project that will likely result in direct mortality and/or relocation of federally listed flora and fauna from the area of the transmission line and related facilities. To offset and minimize these impacts to listed species and their designated and critical habitats, SDG&E will conduct endangered and threatened species surveys along the final selected ROW and implement

specific avoidance and minimization measures to reduce impacts to listed species. For example, selected tower sites may be aligned to avoid listed plant populations or minimize impacts to listed animal feeding, breeding, and sheltering sites. SDG&E has also committed to replace suitable endangered and threatened species habitats, including designated critical habitat, at specific ratios as identified in Table 2. These and other conservation measures are described in the project description and fully considered in the species-specific effects analyses of this biological and conference opinion.

Habitat Loss

Construction of the project will result in loss of approximately 862 ha (1,729 ac) of habitat including 240 ha (489 ac) of permanent impacts and 622 ha (1,240 ac) of temporary impacts (Table 3). Of these total habitat losses, we have determined that 70 ha (173 ac) of the permanent impacts and 220 ha (543 ac) of the temporary impacts support or are likely to support endangered and threatened species (Table 2). Permanent impacts to listed species habitat will result from construction of towers, tower pads, access roads, spur roads, and a new substation. Temporary impacts will result from construction of pull sites, fly yards, and staging areas. Road maintenance could cause loss of plants and habitat that are on or immediately adjacent to the road; this can occur when heavy equipment is used to re-grade the road or clear debris off the roadway, create drainage leadouts, or clear culverts. O&M activities including access and spur road repair and maintenance and fuel clearing around towers and other structures are anticipated to include only minor impacts to listed species and do not include additional habitat losses beyond those identified for project construction. However, if O&M activities that result in additional habitat losses are identified, SDG&E has committed offset these losses at the same ratios as those identified in Table 2.

Habitat Fragmentation

Habitat fragmentation as a result of transmission line construction is expected, especially where new access roads and spur roads are needed. In southern California the effects of fragmentation have been shown to decrease the number of resident bird species, decrease the diversity of small rodents, and decrease the diversity and cover of native plant species (Soulé *et al.* 1988, Bolger *et al.* 1991, Alberts *et al.* 1993, Bolger *et al.* 1997a). Fragmentation can result in landscapes with many small habitat patches rather than few large patches. Small habitat patches tend to have altered species composition, reduced

Table 2. Summary of Construction Impacts and Associated Offsetting Measures

| Impacts to Listed Species and Required Mitigation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PERMANENT | | | TEMPORARY | | | | Total Offsite Mitigation (Acres) |
| Listed Species | Impact (Acres) | Ratio | Offsite Mitigation (Acres) | Impact (Acres) | Ratio | Onsite Restoration (Acres) | Offsite Mitigation (Acres) | |
| **San Diego Thornmint** | | | | | | | | |
| *Suitable Thornmint Habitat* | **17.90** | 2:1 | **35.80** | **32.10** | 1:1 | **32.10** | 0.00 | **35.80** |
| **Arroyo Toad** | | | | | | | | |
| *Assumed Occupied Breeding Habitat* | 0.20 | 3:1 | 0.60 | 0.00 | 2:1 | 0.00 | 0.00 | 0.60 |
| *USFS Suitable Upland Habitat* | 20.21 | 2:1 | 40.42 | 108.00 | 1:1 | 108.00 | 108.00 | 148.42 |
| *USFS Occupied Upland Habitat* | 5.48 | 2:1 | 10.96 | 74.78 | 1:1 | 74.78 | 74.78 | 85.74 |
| *Total* | **25.89** | | **51.98** | **182.78** | | **182.78** | **182.78** | **234.76** |
| **California Gnatcatcher** | | | | | | | | |
| *Designated Critical Habitat* | 11.33 | 2:1 | 22.66 | 18.74 | 2:1 | 18.74 | 18.74 | 41.40 |
| *USFS Suitable Habitat* | 23.39 | 2:1 | 46.78 | 62.52 | 2:1 | 62.52 | 62.52 | 109.30 |
| *USFS Occupied Habitat* | 0.00 | 2:1 | 0.00 | 0.00 | 2:1 | 0.00 | 0.00 | 0.00 |
| *USFWS Occupied Habitat* | 8.30 | 2:1 | 16.60 | 12.70 | 2:1 | 12.70 | 12.70 | 29.30 |
| *CNDDB Habitat* | 10.56 | 2:1 | 21.12 | 12.23 | 2:1 | 12.23 | 12.23 | 33.35 |
| *Total* | **53.58** | | **107.16** | **106.19** | | **106.19** | **106.19** | **213.35** |
| **Least Bell's Vireo** | | | | | | | | |
| *USFS Suitable Habitat* | 7.39 | 3:1 | 22.17 | 12.28 | 3:1 | 12.28 | 24.56 | 46.73 |
| *USFS Occupied Habitat* | 0.94 | 3:1 | 2.82 | 0.00 | 3:1 | 0.00 | 0.00 | 2.82 |
| *Total* | **8.33** | | **24.99** | **12.28** | | **12.28** | **24.56** | **49.55** |
| **Quino Checkerspot Butterfly** | | | | | | | | |
| *Existing Designated Critical Habitat* or | 15.60 | 3:1 | 46.80 | 39.69 | 2:1 | 39.69 | 39.69 | 86.49 |
| *Proposed Designated Critical Habitat* | 8.45 | 3:1 | 25.35 | 6.64 | 2:1 | 6.64 | 6.64 | 31.99 |
| *Occupied Habitat* | 24.67 | 3:1 | 74.01 | 53.94 | 2:1 | 53.94 | 53.94 | 127.95 |
| *Total* [1] | **40.27** | | **120.81** | **93.63** | | **93.63** | **93.63** | **214.44** |
| **Desert Bighorn Sheep** | | | | | | | | |
| [2] *Bighorn Sheep Habitat/Critical Habitat* | **27.34** | 5:1 | **136.70** | **116.05** | 3:1 | **116.05** | **232.10** | **368.80** |
| ***Grand Total*** | **173.31** | | **477.44** | **543.03** | | **543.03** | **639.26** | **1,116.70** |

[1] This total is for existing designated critical habitat (CH); the numbers will be lower if Proposed CH is designated as final CH

[2] While impact acres were assessed based on 2001 designated critical habitat, we acknowledge that proposed critical habitat, if designated as final CH, could be lower. For purposes of the effects analysis for bighorn sheep, we have assumed 368.80 acres of bighorn sheep habitat will be conserved.

Table 3. Vegetation Community Construction Impacts

| | PERMANENT | | | TEMPORARY | | | | Total Offsite Mitigation |
|---|---|---|---|---|---|---|---|---|
| **Vegetation Communities** | **Impact** | **Ratio** | **Offsite Mitigation** | **Impact** | **Ratio** | **Onsite Restoration** | **Offsite Mitigation** | |
| **Non-Native Vegetation, Developed Areas, and Disturbed Habitat** | | | | | | | | |
| Developed | 5.24 | 0.00 | 0.00 | 25.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| General agriculture | 0.00 | 0.00 | 0.00 | 17.34 | 0.00 | 0.00 | 0.00 | 0.00 |
| Extensive agriculture – field/pasture, row crops | 1.00 | 0.00 | 0.00 | 57.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| Intensive agriculture – dairies, nurseries, chicken ranches | 0.00 | 0.00 | 0.00 | 13.91 | 0.00 | 0.00 | 0.00 | 0.00 |
| Unvegetated habitat - badlands | 13.16 | 0.00 | 0.00 | 25.61 | 0.00 | 0.00 | 0.00 | 0.00 |
| Unvegetated habitat - desert pavement | 8.01 | 0.00 | 0.00 | 39.47 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Subtotal** | **27.40** | **0.00** | **0.00** | **178.48** | **0.00** | **0.00** | **0.00** | **0.00** |
| **Desert Scrub and Dune Habitats** | | | | | | | | |
| Desert saltbush scrub | 0.23 | 2:1 | 0.46 | 0.00 | 2:1 | 0.00 | 0.00 | 0.46 |
| Flat-topped buckwheat scrub | 1.54 | 2:1 | 3.08 | 2.72 | 2:1 | 2.72 | 2.72 | 5.80 |
| Sagebrush scrub | 0.49 | 2:1 | 0.98 | 2.47 | 2:1 | 2.47 | 2.47 | 3.45 |
| Sonoran creosote bush scrub | 31.40 | 2:1 | 62.80 | 196.37 | 2:1 | 196.37 | 196.37 | 259.17 |
| Sonoran desert mixed scrub | 5.09 | 2:1 | 10.19 | 33.71 | 2:1 | 33.71 | 33.71 | 43.90 |
| Sonoran desert scrub | 0.56 | 2:1 | 1.12 | 5.00 | 2:1 | 5.00 | 5.00 | 6.12 |
| Sonoran mixed woody and succulent scrub | 4.57 | 2:1 | 9.14 | 32.50 | 2:1 | 32.50 | 32.50 | 41.65 |
| Sonoran mixed woody scrub | 6.05 | 2:1 | 12.11 | 9.28 | 2:1 | 9.28 | 9.28 | 21.38 |
| Sonoran wash scrub | 1.02 | 2:1 | 2.03 | 4.93 | 2:1 | 4.93 | 4.93 | 6.96 |
| **Subtotal** | **50.95** | | **101.91** | **286.99** | | **286.99** | **286.99** | **388.89** |
| **Coastal and Montane Scrub Habitats** | | | | | | | | |
| Big sagebrush scrub | 1.61 | 1.5:1 | 2.42 | 40.26 | 1:1 | 40.26 | 0.00 | 2.42 |
| Coastal sage-chaparral scrub | 10.82 | 1.5:1 | 16.23 | 18.08 | 1:1 | 18.08 | 0.00 | 16.23 |
| Diegan coastal sage scrub | 53.30 | 1.5:1 | 79.95 | 29.93 | 1:1 | 29.93 | 0.00 | 79.95 |
| Diegan coastal sage scrub – Inland form | 8.75 | 1.5:1 | 13.13 | 61.73 | 1:1 | 61.73 | 0.00 | 13.13 |
| **Subtotal** | **74.49** | | **111.73** | **150.01** | | **150.01** | **0.00** | **111.73** |
| **Grasslands and Meadows** | | | | | | | | |
| Non-native grassland | 11.09 | 1:1 | 11.09 | 225.35 | 1:1 | 225.35 | 0.00 | 11.09 |
| Valley needlegrass grassland | 1.15 | 2:1 | 2.30 | 0.17 | 1:1 | 0.17 | 0.00 | 2.30 |
| **Subtotal** | **12.24** | | **13.39** | **225.53** | | **225.53** | **0.00** | **13.39** |
| **Chaparrals** | | | | | | | | |
| Chamise chaparral | 51.40 | 1:1 | 51.40 | 68.21 | 1:1 | 68.21 | 0.00 | 51.40 |
| Northern mixed chaparral | 124.76 | 1:1 | 124.76 | 110.18 | 1:1 | 110.18 | 0.00 | 124.76 |
| Red shank chaparral | 4.80 | 1:1 | 4.80 | 2.48 | 1:1 | 2.48 | 0.00 | 4.80 |
| Scrub oak chaparral | 4.11 | 1:1 | 4.11 | 3.67 | 1:1 | 3.67 | 0.00 | 4.11 |
| Semi-desert chaparral | 33.14 | 1:1 | 33.14 | 98.31 | 1:1 | 98.31 | 0.00 | 33.14 |
| Southern mixed chaparral | 97.64 | 1:1 | 97.64 | 69.83 | 1:1 | 69.83 | 0.00 | 97.64 |
| **Subtotal** | **315.86** | | **315.86** | **352.69** | | **352.69** | **0.00** | **315.86** |
| **Woodlands and Forests** | | | | | | | | |
| Coast live oak woodland | 6.51 | 3:1 | 19.53 | 30.50 | 2:1 | 30.50 | 30.50 | 50.03 |
| Englemann oak woodland | 0.34 | 3:1 | 1.01 | 2.69 | 2:1 | 2.69 | 2.69 | 3.70 |
| Peninsular juniper woodland and scrub | 0.46 | 2:1 | 0.93 | 0.44 | 2:1 | 0.44 | 0.44 | 1.36 |
| **Subtotal** | **7.31** | | **21.47** | **33.62** | | **33.62** | **33.62** | **55.09** |
| **Herbaceous Wetlands, Freshwater, and Streams** | | | | | | | | |
| Freshwater seep | 0.03 | 3:1 | 0.08 | 6.22 | 2:1 | 6.22 | 6.22 | 6.30 |
| Non-vegetated channel | 0.12 | 3:1 | 0.36 | 5.28 | 2:1 | 5.28 | 5.28 | 5.64 |
| **Subtotal** | **0.14** | | **0.43** | **11.50** | | **11.50** | **11.50** | **11.94** |
| **Riparian Scrubs** | | | | | | | | |
| Southern willow scrub | 0.00 | 3:1 | 0.00 | 0.73 | 2:1 | 0.73 | 0.73 | 0.73 |
| **Subtotal** | **0.00** | | **0.00** | **0.73** | | **0.73** | **0.73** | **0.73** |
| **Riparian Forests and Woodlands** | | | | | | | | |
| Riparian woodland | 0.14 | 3:1 | 0.41 | 0.00 | 2:1 | 0.00 | 0.00 | 0.41 |
| Southern coast live oak riparian forest | 0.27 | 3:1 | 0.81 | 0.24 | 2:1 | 0.24 | 0.24 | 1.05 |
| Southern riparian forest | 0.11 | 3:1 | 0.32 | 0.00 | 2:1 | 0.00 | 0.00 | 0.32 |
| Southern cottonwood-willow riparian forest | 0.11 | 3:1 | 0.33 | 0.00 | 2:1 | 0.00 | 0.00 | 0.33 |
| **Subtotal** | **0.62** | | **1.87** | **0.24** | | **0.24** | **0.24** | **2.10** |
| **GRAND TOTAL** | **489.02** | | **566.65** | **1239.78** | | **1061.30** | **333.08** | **899.73** |

community diversity, and smaller population sizes for individual species. Species with greater susceptibility to the effects of reduced habitat patch size are more likely to be extirpated from these small patches.

Reduced community diversity and altered species composition can change natural ecological functions, which can result in unpredictable effects given the complexity of community dynamics. Smaller populations are more susceptible to extirpation due to random fluctuations in population dynamics or catastrophic events (Ewens *et al.* 1987, Shaffer 1987). Small habitat patches also have high perimeter to area ratios, which increases edge effects that can result in even smaller populations. If small populations are isolated from nearby populations, they will be susceptible to deleterious genetic effects of inbreeding depression (Lande and Barrowclough 1987), and extirpated populations may not be replaced by dispersing individuals from other populations (Gilpin 1987).

Fragmentation studies by Soulé *et al.* (1988) and Crooks and Soulé (1999) concluded that the decline of top predators in fragmented landscapes could lead to the release of smaller predators that, in turn, strongly limit populations of prey species. This phenomenon, known as mesopredator release, has been implicated in the decline and extinction of prey species worldwide (Willis and Eisenmann 1979, Matthiae and Stearns 1981, Whitcomb *et al.* 1981, Wilcove *et al.* 1986, Soulé *et al.* 1988, Terborgh 1988, Sovoda *et al.* 1995, Crooks and Soulé 1999, Haas and Crooks 1999).

Alteration of Adjacent Habitats

Construction and maintenance of the project could result in degradation of habitats adjacent to the project through erosion, dust, pollution, sedimentation, light, and noise. Changes in water runoff patterns could result from road construction and maintenance (*i.e.*, repeated road grading) and lead to erosion. For example, roads that run straight up hillsides can promote soil erosion and the development of rills and gullies. In addition, roads that run parallel to elevation contours can also alter runoff patterns because berms on the edge of the road can redirect water along the road edge to low points, after which water continues on down slope in a more concentrated stream than otherwise would have occurred. This process concentrates channels at higher slope positions (Montgomery 1994), resulting in more elongated first-order drainage basins, and accelerated rates of soil erosion (Forman and Alexander 1998).

Roads with dirt surfaces can be a significant source of dust. Dust generated by motorized vehicles can cover plants and interfere with physiological functions ultimately affecting plant vigor, reproduction, and survival. Dust is likely to be generated from project construction (*e.g.*, during access and spur road construction and during tower construction) and during O&M activities, particularly during road re-grading activities and patrols.

Road maintenance could also affect threatened and endangered species and their designated and proposed critical habitats through the deposition of oil, fuel, or other toxic substances into

waterways, which could result in mortality of amphibian eggs and young. In addition, runoff from project construction and road maintenance could cause stream and waterway sedimentation adjacent to the project area. The effect of this sedimentation would vary depending on the amount of sediment introduced into the stream, the amount of stream flow, gradient and several other instream factors.

Project construction could result in increased noise and light if construction is conducted at night within or adjacent to the ROW. Noise could affect wildlife species, particularly birds, by reducing their ability to communicate. For example, Reijnen *et al.* (1995) documented a reduced ability of male willow warblers close to highways to attract and keep mates possibly due to the distortion of the song by traffic noise. Helicopter activity, in particular, has been shown to have a detrimental effect on sheep. Night lighting could increase predation in areas adjacent to the ROW by making individuals more visible, and thus more vulnerable to predators. In addition, night lighting could cause animals (*e.g.*, arroyo toads) to become disoriented and thus more vulnerable to depredation.

Fire

Fire frequency is expected to increase as a result of the operation of the SRPL Project. Electrical transmission lines have been shown to be the ignition source for large catastrophic wildfires. For example, in October of 2007, the Witch Fire in San Diego County, California, was ignited by arcing electrical transmission lines (California Department of Forestry and Fire Protection Investigation Report, dated July 1, 2008; Case No. 07-CDF-570). In addition to sparks generated from arcing wires during high winds, transmission lines can ignite fires through the following:

- Vegetation contact with conductors
- Exploding hardware such as transformers and capacitors
- Floating or wind-blown debris contact with conductors or insulators
- Conductor-to-conductor contact
- Wood support poles being blown down in high winds
- Dust or dirt on insulators
- Bullet, airplane, and helicopter contact with conductors or support structures
- Other third-party contact, such as Mylar balloons, kites, and wildlife.

According to the final EIR for the project, SDG&E indicates that from 2004-2007, no fires were associated with 500 kV lines. Although the majority of the fires during this period were associated with electrical distribution systems, 14 percent (15 ignitions) were associated with transmission lines. In addition, the majority of the proposed project will be located in a remote area, making access, patrol, fire detection, and response more difficult.

Some species are dependent on fire and experience population increases immediately following fires, but for most species, fire causes at least a temporary degradation in habitat quality. Depending on the frequency of fires in a particular environment and how fire-adapted the species and habitats in the fire footprint are, fire-related impacts can last from a few years to many years. If fires are too frequent, plant communities can be "permanently" converted from a stable native vegetation community, such as coastal sage scrub or chaparral, to non-native annual grassland (Keeley *et al.* 2005).

Type Conversion\Invasive Species

A change in vegetation community is called "type conversion" and can occur to any native vegetation community. When burned too frequently, vegetation communities are often taken over by highly flammable, weedy, non-native plant species that burn even more often and provides minimal habitat value for native plant and animal species, especially those of special status. Invasion of grasses may also alter fire frequency by rapid production of highly flammable fuel, thus leading to more frequent fires and potentially to conversion of shrub lands to grasslands (D'Antonio and Vitousek 1992).

Type conversion occurs when multiple disturbances allow the colonization of non-native plant species into a landscape previously dominated by native vegetation. When multiple disturbances, such as wildfires, occur at an intensity and frequency outside of the natural range of variability of a native ecosystem, these conditions tend to suppress regrowth of native vegetation and favor long-term dominance of non-native, early-successional plants. Because chaparral is typically dominated by nonsprouting obligate seeding species and requires a minimum time to develop an adequate seed bank for regeneration, this sensitive vegetation type is vulnerable to fires at intervals of less than 10 years.

Construction and O&M of the project could result in an increase in invasive plant species, such as non-native grasses. Access and spur road construction, road maintenance, and road use could introduce and promote invasive plants. Vehicular routes are a primary pathway for plant invasions into arid and semi-arid ecosystems (Johnson *et al*. 1975, Amor and Stephens 1976, Brooks and Pyke 2001, Gelbard and Belnap 2003). Vehicles serve as dispersal vectors for alien plant propagules (Clifford 1959, Schmidt 1989, Lonsdale and Lane 1994), and disturbances within vehicular route corridors facilitate establishment of invading ruderal plants (Greenberg *et al*. 1997). In addition, fuel break construction and maintenance could promote the dispersal and expansion of exotic species into adjoining habitat through frequent disturbance to roadside habitats associated with maintenance of fuel breaks and the function of vehicles as vectors for seed dispersal (Forman and Alexander 1998).

## CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. About 60 percent of the SRPL Project crosses Federal lands (BLM, USFS, DoD), and a majority of the remaining line crosses lands under the jurisdiction of the County and City of San Diego's existing and proposed MSCP. The housing, commercial, and infrastructure development addressed by authorized HCPs have already undergone section 7 consultation during section 10(a)(1)(B) permit processing under the Act. Any future actions under the control of the BLM, USFS, and the DoD will require separate section 7 consultations. Thus, we are unaware of any non-Federal actions affecting listed species that are reasonably certain to occur in the action area considered by this biological and conference opinions.

## SPECIES BY SPECIES EVALUATIONS AND CONCLUSIONS

### Threatened Species

**San Diego Thornmint** (*Acanthomintha ilicifolia*)

Status of the Species

*Listing Status*

San Diego thornmint was federally listed as threatened on October 13, 1998 (63 FR 54938). Critical habitat was designated for this species on August 26, 2008 (73 FR 50454). A recovery plan has not been prepared for the San Diego thornmint.

*Species Description*

San Diego thornmint is an annual member of the mint family. It is a low annual, with stems branching from the base. This plant ranges in height from 5 to 15 cm (2 to 6 in) and has white, two-lipped, tubular flowers with rose-colored markings on the lower lip (Jokerst 1993). Members of this genus have paired leaves and several sharp, spiny bracts (modified leaves) below whorled flowers. San Diego thornmint can be distinguished from other members of its genus by its flower, which has hairless anthers and style. The tubular, two-lipped corollas (petals) are white with rose markings on the lower lip. The only other *Acanthomintha* species occurring in southern California (*A. obovata*) has four fertile, woolly, or pubescent anthers and is known from north Ventura County (Bittman 1991).

Within the geographical area known to be occupied by San Diego thornmint, one primary constituent element was identified in the final critical habitat rule (73 FR 50454):
clay lenses that provide substrate for seedling establishment and space for growth and development of San Diego thornmint that are:

1) Within chaparral, grassland, and coastal sage scrub;

2) On gentle slopes ranging from 0 to 25 degrees;

3) Derived from gabbro and soft calcareous sandstone substrates with a loose, crumbly structure and deep fissures approximately 30 to 60 cm (1 to 2 ft); and

4) Characterized by a low density of forbs and geophytes, and a low density or absence of shrubs.

All areas designated as critical habitat for San Diego thornmint are occupied, occur within the species' historic geographic range, and contain the primary constituent element required to support at least one life history function of the thornmint (73 FR 50454).

*Distribution*

San Diego thornmint is a clay soil endemic (Beauchamp 1986, Bittman 1991) found only in San Diego County, California south to San Telmo in northern Baja California, Mexico. In San Diego County, the species is known from Carlsbad and San Marcos south to Sweetwater and Otay Mesa, and east to Alpine (Beauchamp 1986, Service 1998b). Bittman (1991) reported the elevational range for this species as 8 to 1,067 m (25 to 3,500 ft); however, J.D. Jokerst (1993) reported that it occurred below 900 m (2,953 ft).

Populations of this species range from just a few individual to several thousand plants. The majority of the known populations range from 50 to 2,000 plants. Yet, there are four populations that stand out as the largest, each having greater than 25,000 plants. These large populations are vital for the conservation of this species and occur within large blocks of open space that are less likely to be impacted by edge effects associated with the smaller populations in highly urbanized areas. Therefore, the conservation of these large populations will increase the persistence of the species across its range and the overall recovery of this species. The four largest populations and the estimated population at each location are: Sycamore Canyon, 31,000 plants; Slaughterhouse Canyon, 60,000 plants; Viejas and Poser Mountains, 29,650 plants; and Hollenbeck Canyon, 100,000 plants. These four populations represent approximately 75 percent of the total known plants of this species. Populations of this species are also known from the southeast portion of the City of Carlsbad; the Manchester Avenue Mitigation Bank; Los Peñasquitos Canyon; Sabre Springs; McGinty Mountain San Marcos; Poway; the Lake Hodges area; El Capitan; and Jamul (Service Geographic Information system (GIS) database).

*Abundance*

Approximately 40 percent of the 52 historic populations in the United States have been extirpated (Service 1998b). Reports indicate there are approximately 150,000 to 170,000 individuals in 32 populations in the United States, ranging from Carlsbad and San Marcos east to Alpine and south to Otay Mesa in San Diego County (Bittman 1991, Reiser 1996, Service 1998b). This species occupies an estimated 162 ha (400 ac), with approximately 75 percent of the reported individuals concentrated in four populations (Sycamore Canyon, Slaughterhouse Canyon, and two populations on Viejas Mountain). At least nine sites in Baja California are known to have recently supported San Diego thornmint; however, the current status of the species in Mexico is uncertain.

*Habitat Affinity*

San Diego thornmint is generally associated with vernal pools, grassland habitats, and widely scattered, discrete open patches in coastal sage scrub and chaparral. San Diego thornmint occurs on heavy, vertisol clay substrates, which are often derived from metavolcanic substrates (Munz 1974, Bittman 1991, Service 1998a).

San Diego thornmint usually occurs on heavy clay soils in open areas surrounded by shrubby vegetation. These openings are generally found within coastal sage scrub, chaparral, and native grassland of coastal San Diego County and south to San Telmo in northern Baja California, Mexico (Beauchamp 1986, Reiser 1996). San Diego thornmint is frequently associated with gabbro soils, which are derived from igneous rock, and gray calcareous clays derived from soft calcareous sandstone (Oberbauer and Vanderwier 1991). The soils derived from gabbro substrates are red to dark brown clay soils, and those derived from soft calcareous sandstone are gray clay soils. San Diego thornmint occurs on isolated patches of these clay soils known as "clay lenses."

In San Diego County, California, and northern Baja California, Mexico, clay lenses are known to support a variety of narrow endemic (restricted to a specific geographic area) plants. Clay lenses tend to have an open or unpopulated look because many common species cannot tolerate living on these clay soils. Clay lenses are typically devoid of woody, perennial shrubs (Oberbauer and Vanderwier 1991. Due to the absence of most common native vegetation from clay lenses, the areas where San Diego thornmint occurs appear as open areas surrounded by areas populated by denser vegetation.

In addition to the characteristics discussed above, the texture and structure of the clay lenses are essential for supporting the seedling establishment and growth of San Diego thornmint. This soil provides many small pockets and deeper fissures where seeds from San Diego thornmint become lodged as they fall from decomposing plants (Bauder and Sakrison 1999). The seeds stay in the soils until the temperatures become cooler in the winter months and the soil becomes saturated with the winter rains (Bauder and Sakrison 1997). The seedlings then germinate and grow to

mature plants. These plants do best when they are not crowded or shaded by other plants (Bauder and Sakrison 1999). The loose, crumbly texture of the soil provides the proper substrate to hold the seed bank and allow for root growth.

Clay lenses are generally inhabited by a specific flora that consists of forbs, native grasses, and geophytes (perennial plants propagated by buds on underground bulbs, tubers, or corms, such as lilies, iris, and onions) (Oberbauer and Vanderwier 1991), which are better adapted to the harsh conditions mentioned above. Native plant species that characterize the vegetation found with San Diego thornmint on clay lenses include *Hesperevax sparsiflora* var. *sparsiflora* (erect evax), *Harpagonella palmeri* (Palmer's grappling-hook), *Convolvulus simulans* (bindweed), *Apiastrum angustifolium* (mock parsley), and *Microseris douglasii* ssp. *platycarpha* (small flowered microseris) (Bauder *et al*. 1994, McMillan 2006, Vinje 2006a).

Clay lenses generally form on gentle slopes. An analysis of 20 sites where San Diego thornmint was observed found that the slopes range from 0 to 25 degrees, with the majority of the sites having slopes below 20 degrees (Bauder *et al*. 1994). This study found that many thriving, natural populations were on slopes that faced southeast, south, southwest, and west (Bauder *et al*. 1994). The known populations of San Diego thornmint range in elevation from sea level to 914 m (3,000 ft). San Diego thornmint occurs on soils mapped as Las Posas, Olivenhain, Redding, Huerhuero, Altamont, Cieneba, and Linne (Service GIS database; soils described by Bowman 1973).

*Life History*

San Diego thornmint flowers from April to May (Munz 1974, Bittman 1991) and remains erect and retains its distinct shape well into the dry season (Reiser 1996). San Diego thornmint is an outcrosser that is insect pollinated (Wyatt 1983) and may rely on animal vectors, in part, for seed dispersal. While this annual can be raised from seed, suitable friable clay microhabitats are uncommon and place strict limitations on the establishment of new populations (Reiser 1996).

The breeding system of San Diego thornmint has not been studied, but it has been determined that other members of the genus *Acanthomintha* are self-compatible (Steek 1995). A 1996 study (Bauder and Sakrison 1997) found that several insect species visited the flowers and moved from plant to plant. These insects represented possible pollinators of San Diego thornmint; however, none were thought to represent species-specific pollinators (Bauder and Sakrison 1997).

*Threats*

Threats to San Diego thornmint include urbanization, the presence of exotic plant species, off-road vehicles (ORVs), mining, trampling and grazing.

Urban development near San Diego thornmint populations may alter the habitat characteristics required by this species. The destruction of habitat can change the slope and aspect of a site,

making it uninhabitable for San Diego thornmint. The proximity of development to populations of San Diego thornmint may affect other aspects of the site. For example, increased water runoff from developments may erode the clay lense and change the topography of the site (Bauder *et al*. 1994).

The introduction of exotic plant species, such as Maltese star-thistle (*Centaurea melitensis)*, can drastically change the species present in, and eliminate the open character of, the clay lense habitat. *C. melitensis* has been shown, in field and greenhouse experiments, to negatively effect the biomass (growth) and seed production (reproduction) of San Diego thornmint (Bauder and Sakrison 1999). Populations of San Diego thornmint that are close to urbanized areas or in areas that are heavily grazed generally have a high density of exotic plant species. In disturbed soils, *C. melitensis* is a common weed. When this and other exotic plant species become established, they can out-compete San Diego thornmint for light, water, nutrients, and space. San Diego thornmint often grows larger and at a higher density when competition with exotic weeds is reduced (Bauder and Sakrison 1999, Vinje 2007).
In recent years, the impacts associated with the use of mountain bikes have been documented to cause similar impacts (Vinje 2006b). Trampling, off-road vehicle activity, and mountain bike use in San Diego thornmint habitat can compact the loose, crumbly soils. Repeated travel over a trail or track degrades the habitat of San Diego thornmint by: (1) displacing soil and (2) compacting soil. These activities, in turn, can destroy individual plants and can reduce the amount of water that can percolate into the soil, thus reducing the plant's ability to grow and reproduce.

Mining is documented as a threat at three sites (*i.e*., the middle of McGinty Mountain, eastern Tierrasanta, Slaughterhouse Canyon) known to support San Diego thornmint (63 FR 54938, Bauder *et al*. 1994, 72 FR 11955). Mining can alter many aspects of San Diego thornmint habitat. Heavy machinery can compact or remove clay lenses or alter the slope of an area. The grading of large areas adjacent to San Diego thornmint habitat can make those areas vulnerable to invasion by exotic plant species and lead to the subsequent crowding and shading of San Diego thornmint habitat. These impacts may in turn lead to the disruption of the growth and reproduction of San Diego thornmint.

The protection of habitat for San Diego thornmint from development is the first measure of protection needed for populations of this species. The control of exotic plant species, the maintenance and enhancement of clay lense habitat, the control of incompatible and often illegal activities, such as OHV use and other unauthorized recreational impacts, and careful oversight of adjacent activities, such as mining, will help to ensure the long-term conservation for San Diego thornmint and its habitat.

*Rangewide Conservation Needs*

This species is protected from immediate extinction because of the conservation of several populations on public and private land following the State and Federal listing of this species.

Despite the protection from most direct impacts related with development, San Diego thornmint is now threatened by competition from non-native plants throughout its range. This species is also threatened by the increasing impacts caused by recreational users of conserved lands. The following priority actions are needed.

1) Establish a range-wide working group for San Diego thornmint to coordinate conservation efforts. Some goals for this working group would be to:

    a) Census all accessible populations annually over a number of years, using a standard methodology to assess the variation in population footprint sizes and location throughout the range.

    b) Work with land mangers to set up threats-based management objectives for each conserved population of San Diego thornmint.

    c) Develop a list of BMPs for managing non-native weeds and recreational use in preserved areas based on research and the experiences of land managers.

2) Report all data to CNDDB, including annual reports from preserved occurrences. Make sure all responsible jurisdictions have access to this information.

3) Rank the conservation value of as yet non-conserved sites and prioritize these sites for possible acquisition and preservation.

4) List, evaluate, and prioritize research needs for this species. Work to obtain funding for the highest priority research needs.

Environmental Baseline

This species was not observed within the proposed ROW or other potential impact areas of the SRPL Project during SDG&E's focused rare plant surveys in 2007 or 2008. However, not all suitable habitat within the proposed impact areas was surveyed due to project redesign after the 2008 rare plant surveys had been conducted. In the absence of complete survey data, we relied on the species data provided in the BA, the CNDDB, soil maps for San Diego County, and the Service's knowledge of the species to identify potential San Diego thornmint habitat in the action area.

Following information on soil types published in the final critical habitat rule and elsewhere (73 FR 50466, Oberbauer and Vanderwier 1991), we calculated the acreage of all gabbro and calcareous soils with a 0 to 30 percent[3] slope that fall within the action area to determine the extent of suitable habitat. Based on our GIS analysis, approximately 52.0 ha (128.4 ac) of

[3] In our GIS analysis, we used a 30 percent slope variable in lieu of 25 percent due to the constraints of the GIS soil layer.

suitable San Diego thornmint habitat exist within the SRPL Project footprint in the CNF South Link and the Inland Valley South Link at MP 75, between MP 79-81 and 88-89, east of MP 91, between MP 94-97, south of MP 103, between MP 105-107, and from MP 115 to the Sycamore Canyon Substation (Figure 2).

Given that gabbro and calcareous soils will not always support a San Diego thornmint population, we believe this is the maximum amount of suitable San Diego thornmint habitat in the action area and SRPL Project footprint. Within this suitable habitat, some areas will have a higher or lower likelihood of supporting San Diego thornmint and/or greater or lesser importance to the species as a whole. The following paragraphs describe the likelihood and importance of San Diego thornmint in four segments of the action area.

*Segment 1: MP 78 to MP 91 (CNF South Link)*

The BA notes specifically that several areas within the CNF South Link at MP 78.6; between MPs 80.65 and 81.75; between MPs 82.45 and 83.2; between MPs 84.1 and 84.9, all of which support gabbro soils of the Las Posas series, were not surveyed. However, in 2008 near this segment of the SRPL Project, rare plant surveys were conducted along the MRD Alternative as proposed within the Draft EIR/EIS. Although these surveys did not observe San Diego thornmint, the action area deviates from the MRD Alternative in several areas by several hundred feet. Thus, the BA concludes that there is the potential for San Diego thornmint to occur in this unsurveyed portion of the action area.

Although suitable San Diego thornmint habitat is based on the presence of appropriate gabbro soils, this portion of the action area is several miles east of the eastern-most known location (Hollenbeck Canyon) of the San Diego thornmint in this portion of San Diego County. For these reasons, the potential for occurrence in this unsurveyed portion of the action area is considered to be low.

*Segment 2: MP 91 to MP 102 (CNF South Link and the Inland Valley South Link)*

Populations of San Diego thornmint are known to occur in the vicinity of the action area on USFS lands and the Viejas Reservation between MP 91 and MP 102 (near Viejas and Poser mountains). Within the USFS lands near the action area, there are four occurrences of San Diego thornmint on Viejas Mountain and two occurrences on Poser Mountain, all within the Descanso Ranger District (Service GIS database). These occurrences represent the known eastern peripheral extension of the species' range. All four of these occurrences are located within designated San Diego thornmint critical habitat (Subunits 3b-f). The action area lies approximately 0.05 km (0.3 mi) to the south of Subunits 3b and 3c. Subunits 3d-f are located approximately 2.4 km to 4.8 km (1.5 mi to 3 mi) to the northwest of MP 94 (73 FR 50454). The known locations of San Diego thornmint in these subunits are interspersed in clay patches in a mosaic of relatively undisturbed habitat. Due to the proximity of these occurrences and the fact that the habitat is not fragmented by any manmade barriers, the individuals in these subunits are

considered to be a single population of San Diego thornmint. This population is estimated to have greater than 30,000 plants (72 FR 11956). The action area in the vicinity of this population traverses developed land with no populations or suitable habitat present and a buffer of urban development between the action area and San Diego thornmint critical habitat.

*Segment 3: MP 102 to MP 112 (Inland Valley South Link)*

Between MP 102 and MP 112, suitable habitat has not been surveyed extensively due to problems with accessibility. However, this segment of the action area lies within the species range and contains suitable gabbro soils and conditions that could support San Diego thornmint.

*Segment 4: MP 112 to MP 117 (Inland Valley South Link)*

One known occurrence of San Diego thornmint exists within the action area. The occurrence intersects the action area approximately 0.05 km (0.03 mi) to the southwest of MP 116. This occurrence was not identified in the BA, and little is known about the size or status of the occurrence. However, we believe that it is likely still extant based on CNDDB records and because of its proximity to two other significant occurrences described below.

On approximately 124 ha (306 ac) of public and private lands in and adjacent to the Goodan Ranch and Sycamore Canyon Open Space County Park, an occurrence is approximately 372 m (1,200 ft) east of the action area, slightly to the north of MP 116 and suitable habitat is known to occur less than 18.3 m (60 ft) from the center line of the SRPL footprint. This occurrence is one of the largest recorded populations of San Diego thornmint. The population was estimated at 31,000 plants in 1994. The location of this occurrence is covered under the County's MSCP Subarea Plan and is within an area designated as a hardline conservation area under the plan.

The second San Diego thornmint population adjacent to the action area is located on 31 ha (77 ac) of private lands in Slaughterhouse Canyon, approximately 1,595 m (1 mi) to the west of MP 111. With an estimated 60,000 plants in 1993, this occurrence is one of the largest recorded populations of San Diego thornmint. Threats to this occurrence include exotic plant species and recreational activities (72 FR 11955). The occurrence is on land designated as open space adjacent to a sand and gravel mining operation and is covered under the County's MSCP Subarea Plan as a hardlined preserve area.

Effects of the Action

For the purpose of this biological opinion, we addressed potential impacts to San Diego thornmint in the action area where appropriate gabbro soils are present with a slope between 0 and 30 percent. Potential effects during construction of the SRPL Project and from long-term O&M activities are included in our analysis. Conservation Measures CM-1 and SS-CM-2 are particularly relevant to SDG&E's commitment to avoid, minimize, and offset direct impacts to the San Diego thornmint are repeated here for ease of reference.

**SS-CM-1** No impacts will occur to the thornmint population at and adjacent to MP 116 or to any thornmint occurrences between MP 114 and 119. To ensure the avoidance of impacts, SDG&E will consult with the Service regarding the final design and siting of all permanent and temporary impacts (*e.g.*, towers, pads, access roads, staging areas, pull down areas, helipads, and fuel modification zones) between MP 114 and MP 119. In other areas where suitable thornmint habitat (*i.e.*, gabbro and calcareous soils and a slope of 0 to 25 percent) exists, the area to be impacted will be surveyed for thornmint before any impacts may occur, per G-CM-32. All permanent and temporary impact areas will be sited at least 100 ft away from any known thornmint occurrences. SDG&E will implement the Weed Control Plan described in G-CM-20 to ensure that intact thornmint populations are not impacted by non-natives that could be introduced by this project.

**SS-CM-2** Impacts to San Diego thornmint will first be avoided where feasible, and where not feasible due to physical or safety constraints, impacts will be compensated through salvage and relocation via a restoration program, at a 1:1 ratio, and/or off-site acquisition and preservation of habitat, at a 2:1 ratio, containing the plant. The CPUC, BLM, USFS and Wildlife Agencies will decide whether the applicant can restore San Diego thornmint populations or will acquire habitat with San Diego thornmint (locations to be approved by the CPUC, BLM, USFS and Wildlife Agencies). A qualified biologist will prepare a Restoration Plan that will indicate where restoration will take place. The restoration plan will identify the goals of the restoration, responsible parties, methods of restoration implementation, maintenance and monitoring requirements, final success criteria, and contingency measures. The applicant will work with the CPUC, BLM, Wildlife Agencies, and USFS until a plan is approved by all parties.

1. Construction Activities

*Direct Effects*

Construction of the transmission line and associated facilities such as towers, pads, access roads, staging areas, pull down areas, and helipads will result in the loss of suitable thornmint habitat including no more than 7.2 ha (17.9 ac) of permanent impacts and 13.0 ha (32.1 ac) of temporary impacts.

Between MP 78 to MP 91 in the CNF South Link project area, suitable San Diego thornmint habitat is identified based on the presence of appropriate gabbro soils; however, because this portion of the ROW is several miles east of any known San Diego thornmint occurrences, the potential for new occurrences to be identified and impacted by the SRPL Project is considered to be low.

Between MP 91 and MP 102 in the CNF South Link and the Inland Valley South Link project area, one of the largest populations of San Diego thornmint occurs on USFS lands just outside the action area. No impacts to this population are anticipated from the SRPL Project. Moreover, the action area in the vicinity of this population traverses developed land with no populations or

suitable habitat present and a buffer of urban development between the action area and the large population located on USFS lands. Thus, the likelihood of San Diego thornmint occurrences between MP91 and MP 102 is remote.

Suitable habitat for the thornmint occurs between MP 102 and MP 112 in the Inland Valley South Link area, and within this part of the action area, surveys have been limited due to accessibility issues. Thus, new occurrences of San Diego thornmint may be identified through preconstruction surveys in this part of the action area. Suitable habitat for the thornmint also occurs between MP 114 and MP 119 also in the Inland Valley South Link project area, and the ROW intersects one known occurrence at MP 116.

For the known occurrence at MP 116 and in areas where thornmint is identified by pre-construction surveys, SDG&E will attempt to avoid losses of individual plants by relocating required structures in consultation with the Service. If avoidance is not feasible, losses will be minimized or offset through a relocation/restoration program at a 1:1 conservation to impact ratio for temporary impacts or through protection of occupied habitat at a 2:1 conservation to impact ratio for permanent impacts, consistent with SS-CM-2.

*Indirect Effects*

Within or adjacent to the action area, San Diego thornmint occurrences and suitable habitat may be indirectly affected by construction activities that increase invasive species, siltation, erosion, fugitive dust, and human disturbance (*e.g.*, trampling). These effects are discussed under the General Effects of the Action section above. Because of the relatively small amount of habitat destruction to new permanent features, the location of these permanent features adjacent to an existing transmission line, and the relative porous nature of transmission lines (act as more a filter than a hard barrier), indirect impacts from habitat fragmentation and isolation are not anticipated.

SDG&E will implement several General Conservation Measures to minimize these impacts including, G-CM-20, which addresses weed control; G-CM-24 which identifies dust reduction procedures; G-CM-2 and 22, which identify erosion control measures and BMPs; and G-CM-4, G-CM-9, and G-CM-35 - G-CM-38, which address human disturbance (*e.g.*, personnel training, prohibition on littering, collecting of plants, and harming wildlife).

2. Operations and Maintenance Activities

Adverse effects to San Diego thornmint occurrences could occur from vegetation management and ROW repair. ROW repairs include grading or repair of existing maintenance access roads and work areas, and spot repair of sites subject to flooding or scouring. Activities related to ROW repair are usually conducted after the rainy season, when water has caused erosion damage. San Diego thornmint individuals immediately adjacent to structures and access roads could be affected by vegetation management activities (*e.g.*, mowing) and ROW repair. SDG&E will implement General Conservation Measures G-CM-21, G-CM-31, and G-CM-43 to minimize these impacts.

Temporary indirect impacts to San Diego thornmint could arise from insulator washing and fugitive dust from operational and maintenance activities that occur within the action area. However, insulator washing is not expected more than twice a year and would require only 300 gallons of water per structure and 3,000 gallons of water per day. Much of the water dissipates and evaporates as water vapor and does not reach the soil surface, thus not posing a threat of erosion and siltation. Thus, insulator washing is not anticipated to adversely affect individuals near the structures. Likewise it is anticipated that the limited additional vehicular traffic from the operation and maintenance activities would not substantially increase the amount of fugitive dust above current levels.

Conclusion

After reviewing the current status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the San Diego thornmint. We based this conclusion on the following:

1) Four populations of San Diego thornmint represent 75 percent of the total known individuals of this species; the SRPL Project is not anticipated to impact any of these populations or designated critical habitat for the species;

2) Loss of suitable San Diego thornmint habitat will include no more than 7.2 ha (17.9 ac) of permanent impacts and 13.0 ha (32.1 ac) of temporary impacts, which likely represents only a small portion of the species occupied habitat, which is currently estimated at 162 ha (400 ac);

3) SDG&E will avoid or minimize impacts to known and any newly identified occurrences of the San Diego thornmint and offset unavoidable impacts to the species; and surveys for San Diego thornmint in the action area and any actions to avoid, minimize and provide for the long-term conservation of occupied habitat will add to our knowledge of
4) San Diego thornmint's distribution and contribute to the range-wide conservation (recovery) of this species.

**California Gnatcatcher (*Polioptila californica californica*)**

Status of the Species

*Listing Status*

The Service listed the coastal California gnatcatcher as threatened on March 30, 1993 (58 FR 16742). Habitat loss and fragmentation resulting from urban and agricultural development as well as fire, invasive plants, and predation all contributed to the listing decision. Additionally, the Service issued a special rule, in conjunction with the listing decision pursuant to section 4(d) of the Act, defining the conditions under which take of the gnatcatcher would not be a violation of section 9 (58 FR 65088). This special rule recognized the State's Natural Community Conservation Planning (NCCP) Program, and several local governments' ongoing multi-species conservation planning efforts (*e.g.*, the MSCP] that intend to apply the Act standards to activities affecting the gnatcatcher.

*Critical Habitat*

A final revised critical habitat designation for the gnatcatcher was published on December 19, 2007. This final designation included 78,227 ha (197,303 ac) of Federal, State, local, and private land in Los Angeles, Orange, Riverside, San Bernardino, Ventura, and San Diego Counties, California (72 FR 72010). This revised final designation constitutes a reduction of 120,795 ha (298,492 ac) from the 2003 revised proposed rule.

A total of 13 critical habitat units are identified in the final rule, although Unit 4 was exempted from the revised final designation under section 4(a)(3)(B) of the Act, and all lands in Unit 11 were removed. Several qualitative criteria were used in the selection of specific areas or units, including focusing on areas (1) throughout the geographical and elevational range of the species; (2) within various occupied plant communities, such as Venturan coastal sage scrub, Diegan coastal sage scrub, Riversidean sage scrub, maritime succulent scrub, Riversidean alluvial fan scrub, southern coastal bluff scrub, and coastal sage-chaparral scrub; and, (3) in documented areas of large, contiguous blocks of occupied habitat, or in areas that link essential populations areas (*i.e.,* linkage areas) (72 FR 72036).

The proposed Project occurs within Unit 1 and Unit 2 of designated critical habitat for the gnatcatcher. Unit 1, South San Diego County, encompasses approximately 6,029 ha (14,898 ac) within the MSCP planning area of which about half is under Federal ownership (San Diego National Wildlife Refuge and BLM) and the other half is under private ownership. Lands essential to the conservation of the gnatcatcher within the cities of El Cajon, and Santee; major amendment areas within the San Diego County MSCP Subarea Plan; and water district lands owned by Sweetwater Authority, Helix Water District, Otay Water District, the San Diego National Wildlife Refuge, and BLM lands on Otay Mountain are included in this unit. Populations in this unit occur in high-quality coastal sage scrub and persist in high densities.

Unit 2, Upper San Diego River and El Capitan Linkage, encompasses approximately 5,871 ha (14,508 ac) of which the majority are under Federal (USFS) and private ownership within the MSCP planning area in southwestern San Diego County. Unit 2 includes an essential population of gnatcatchers on the Cleveland National Forest south of State Route 78 near the upper reaches of the San Diego River, as well as canyons and corridors that provide linkages to MSCP Multiple Habitat Preserve Area (MHPA) lands adjacent to this unit. Additionally, this unit provides for connectivity and genetic interchange among core populations and contains large blocks of high-quality habitat capable of supporting persistent populations of gnatcatchers. The population within this Unit is the easternmost within the species' range and occurs at one of the highest elevations known. Individuals within this population likely contain unique genetic or behavioral adaptations that allow them to persist, which is essential to the species survival and recovery as environmental conditions change through time.

*Species Description*

The gnatcatcher is a small (length: 11 cm (4.33 in); weight: 6 g (0.28 oz)), long-tailed member of the old-world warbler and gnatcatcher family Sylviidae (AOU 1998). The bird's plumage is dark blue-gray above and grayish-white below. The tail is mostly black above and below. The male has a distinctive black cap which is absent during the winter. Both sexes have a distinctive white eye-ring.

The gnatcatcher is one of three subspecies of the California gnatcatcher (*Polioptila californica*) (Atwood 1991). Prior to 1989, the California gnatcatcher was classified as a subspecies of the black-tailed gnatcatcher (*Polioptila melanura*). Atwood (1980, 1988) concluded that the species was distinct from *P. melanura*, based on differences in ecology and behavior.

*Habitat Affinity*

Gnatcatchers typically occur in or near coastal sage scrub habitat. Coastal sage scrub is patchily distributed throughout the range of the gnatcatcher, and the gnatcatcher is not uniformly distributed within the structurally and floristically variable coastal sage scrub vegetation community. Rather, the subspecies tends to occur most frequently within California sagebrush (*Artemisia californica*), dominated stands on mesas, gently sloping areas, and along the lower slopes of the coast ranges (Atwood 1990). An analysis of the percent gap in shrub canopy supports the hypothesis that gnatcatchers prefer relatively open stands of coastal sage scrub (Weaver 1998). Gnatcatchers occur in high frequencies and densities in scrub with an open or broken canopy, and are typically absent from scrub dominated by tall shrubs; they occur in low frequencies and densities in short scrub with a closed canopy (Weaver 1998). Territory size increases as vegetation density decreases and with distance from the coast, probably due to food resource availability.

Gnatcatchers also use chaparral, grassland, and riparian habitats where theses habitats occur adjacent to sage scrub (Campbell *et al.* 1998). The use of these habitats appears to be most

frequent during late summer, autumn, and winter, with smaller numbers of birds using such areas during the breeding season. These non-sage scrub habitats are used for dispersal, although data on dispersal use are largely anecdotal (Campbell *et al.* 1998). Probable dispersing gnatcatchers have been documented in vegetation dominated by such species as wild mustard (*Brassica* spp.), annual grasses, Russian thistle (*Salsola tragus*), mule fat (*Baccharis salicifolia*), willow (*Salix* spp.), and salt cedar (*Tamarix* spp.) (Campbell *et al.* 1998). Famolaro and Newman (1998) suggest that habitat along linear features such as highways and power-line corridors may be of significant value in linking populations of the gnatcatchers. Although existing quantitative data may reveal relatively little about gnatcatcher use of chaparral, grassland, and riparian habitats, these areas may be critical during periods of drought for dispersal and foraging opportunities (Campbell *et al.* 1998). Breeding territories have also been documented in non-sage scrub habitat. Campbell *et al.* (1998) discuss likely scenarios explaining why habitats other than coastal sage scrub are used by gnatcatchers including food source availability, dispersal areas for juveniles, temperature extremes, fire avoidance, and lowered predation rate for fledglings.

*Life History*

The gnatcatcher is primarily insectivorous, non-migratory, and exhibits strong site tenacity (Atwood 1990). Fecal sample analyses reveal a diet composed predominantly of leaf- and plant-hoppers and spiders (Burger *et al.* 1999). True bugs, wasps, bees, and ants are minor components of the diet (Burger *et al.* 1999). Gnatcatcher adults selected prey to feed their young that is larger than expected given the distribution of arthropods available in their environment. Both adults and young consume more sessile than active prey items (Burger *et al.* 1999).

The gnatcatcher becomes highly territorial by late February or early March each year, generally when males become more vocal (Mock *et al.* 1990). In southwestern San Diego County the mean breeding season territory size ranged from 4.9 to 10.9 ha (12 to 27 ac) per pair and non-breeding season territory size ranged from 4.9 to 17.0 ha (12 to 42 ac) per pair (Preston *et al.* 1998). During the non-breeding season, gnatcatchers have been observed to wander in adjacent territories and unoccupied habitat increasing their home range size to approximately 78 percent larger than their breeding territory (Preston *et al.* 1998).

The breeding season of the gnatcatcher extends from mid-February through the end of August, with peak nesting activity occurring from mid-March through mid-May. The gnatcatcher's nest is a small, cup-shaped basket usually found 0.3 to 0.9 m (1 to 3 ft) above the ground in a small shrub or cactus. Clutch size ranges between 3 and 5 eggs. Juvenile birds associate with their parents for several weeks (sometimes months) after fledging (Atwood 1990). Nest building begins in mid-March with the earliest recorded egg date of March 20 (Mock *et al.* 1990). Post-breeding dispersal of fledglings occurs between late May and late November. Gnatcatchers are persistent nest builders and often attempt multiple broods, which suggest high reproductive potential. However, this is typically offset by high rates of nest predation and brood parasitism (Atwood 1990; Grishaver *et al.* 1998).

Gnatcatchers typically live for 2-3 years, although ages of up to 5 years have been recorded for some banded birds (Dudek and Associates 2000). Observations indicate that gnatcatchers are highly vulnerable to extreme cold, wet weather (Mock *et al.* 1990). Predation is greater in the upper and lower third of the nest shrub, and lower in nests with full clutch sizes (Sockman 1997).

Natal dispersal for a non-migratory bird (such as the gnatcatcher) is an important aspect of the biology of the species (Galvin 1998). The mean dispersal distance of gnatcatchers banded in San Diego County is reported at less than 3 km (1.9 mi), although this dispersal distance appears relatively low and birds were also documented moving up to 9.7 km (6 mi) from their natal territory (Bailey and Mock 1998). Additionally, dispersal of juveniles is difficult to observe and to document without extensive banding studies. Therefore, it is likely the few recent studies underestimate the gnatcatcher's typical dispersal capacity (Bailey and Mock 1998). Juvenile gnatcatchers are apparently able to traverse highly man-modified landscapes for at least short distances (Bailey and Mock 1998). Typically, however, the dispersal of juveniles requires a corridor of native vegetation that provides foraging and cover opportunities to link larger patches of appropriate sage scrub vegetation (Soulé 1991). These dispersal corridors may facilitate the exchange of genetic material and provide a path for recolonization of areas from which the species has been extirpated (Soulé 1991, Galvin 1998).

*Distribution*

The gnatcatcher occurs on coastal slopes in southern California, from southern Ventura southward through the Palos Verdes Peninsula in Los Angeles County through Orange, Riverside, San Bernardino, and San Diego counties to El Rosario in Baja California, Mexico, at approximately 30 degrees north latitude (Atwood 1991). Atwood (1990) reported that 99 percent of all gnatcatcher locality records occurred at or below an elevation of 300 m (984 ft). Atwood and Bolsinger (1992) reported that of 324 sites of recent occurrence, 272 (84 percent) were located below 250 m (820 ft) in elevation, 315 (97 percent) were below 500 m (1,640 ft), and 324 (100 percent) were below 750 m (2,460 ft). Since that time, additional data collected at higher elevations shows this species may occur as high as 914.4 m (3,000 ft) and that more than 99 percent of the known gnatcatcher locations occurred below 762 m (2,500 ft) (68 FR 20228).

*Population Trend*

The gnatcatcher was considered locally common in the mid-1940's, but by the 1960's this subspecies had declined substantially in the United States owing to widespread destruction of its habitat (Atwood 1990). Atwood (1980) estimated that no more than 1,000 to 1,500 pairs remained in the United States by 1980. In 1993 when the gnatcatcher was listed as threatened, the Service estimated that approximately 2,562 pairs of gnatcatchers occurred in the United States. Of these, 1,514 pairs (or 59 percent) occurred in San Diego County (58 FR 65088). In 1999, the total number of gnatcatchers in the United States was estimated at 4,966 pairs, after subtracting out all gnatcatcher pairs authorized for take under Habitat Loss Permits, approved Natural Community Conservation Plans, Habitat Conservation Plans, and section 7 consultations

(Winchell and Doherty 2006). These population estimates were intended to represent a coarse approximation of the number of gnatcatchers in southern California. Confidence intervals have not been calculated for these estimates and therefore, the precision is unknown.

Limited quantitative data exist on gnatcatcher abundance and distribution. Winchell and Doherty (2008) have implemented a long term study to expand on previous research and preliminary results suggest that slope, temperature, and precipitation variables associated with habitat models were stronger influences on occupancy than patch size. This suggests that coastal sage scrub patches are worth preserving regardless of size. As this study continues, more quantitative information about gnatcatcher population size and distribution would be developed.

*Threats*

Habitat Loss (including fires and invasive plants)

The loss, fragmentation, and adverse modification of habitat are the principal reasons for the gnatcatcher's federally threatened status (58 FR 16742). Coastal sage scrub habitat was developed rapidly from the 1940s to 1990s for agriculture, grazing, or urban areas. Habitat loss continues to remain the greatest threat due to the subspecies preferred habitat type (i.e., coastal, low-elevation, shallowly sloped or level lands) coinciding with coastal southern California's highest real estate value land areas.

The amount of coastal sage scrub available to gnatcatchers has continued to decrease during the period after the listing of the species. It is estimated that up to 90 percent of coastal sage scrub vegetation has been lost as a result of development and land conversion (Westman 1981a-b; Barbour and Major 1977), and coastal sage scrub is considered to be one of the most depleted habitat-types in the United States (Kirkpatrick and Hutchinson 1977, O'Leary 1990). The elimination of nearby habitat may artificially increase populations in adjacent preserved habitat; however, these population surpluses may be lost in subsequent years due to crowding and lack of resources (Scott 1993). In addition, agricultural use, such as grazing and field crops, urbanization, air pollution, and the introduction of non-native plants have all had an adverse impact on extant sage scrub habitat. A consequence of urbanization that is contributing to the loss, degradation, and fragmentation of coastal sage scrub is an increase in wildfires due to anthropogenic ignitions. High fire frequencies and the lag period associated with recovery of the vegetation may significantly reduce the viability of affected gnatcatcher subpopulations (Dudek and Associates 2000).

Atwood *et al.* (1998a, 1998b) and Bontrager *et al.* (1995) found that extensive wildfires result in adverse impacts to gnatcatcher populations within unburned areas, as well as within the burn area, due to increased mortality resulting from excessive competitive interactions between resident birds within unburned areas and birds displaced by the fires. Studies conducted after the 1993 Laguna Fire in Orange County (Wirtz *et al.* 1995, Bontrager *et al.* 1995, Beyers and Wirtz 1995, Atwood *et al.* 1998b) suggest that post-fire gnatcatcher population recovery is likely

dependant on the amount of suitable vegetation remaining within the burned area, as well as the presence of gnatcatcher source populations in close proximity to areas affected by the fire.

In October 2003, severe wildfires throughout southern California affected 4 percent of known gnatcatcher occurrences, 16 percent of designated critical habitat acreage, and 28 percent of the Service's modeled habitat for the gnatcatcher (Bond and Bradley 2004). In October of 2007, severe wildfires burned throughout San Diego County, California. Based on GIS data generated by overlaying burned areas with land defined as high quality and very high quality habitat (using Technology Associates International Corporation [TAIC] models), the 2007 fires burned approximately 36 percent of high quality habitat in San Diego County. Also, an estimated 25 percent of very high quality habitat was lost in 2007 in San Diego County. Of these areas burned in 2007, about 9.5 percent of high and very high quality habitat were previously burned in the 2003 fires.

Increased fire frequency would limit regeneration of sage scrub ecosystems. Beyers and Wirtz (1995) found that following a fire, recovering coastal sage scrub would not be recolonized by gnatcatchers until total shrub cover approaches 50 percent, which is expected to take a minimum of 4 to 5 years. Due to the scope and intensity of the recent Southern California fires, the areas affected are expected to take several years to fully recover; therefore, any remaining gnatcatcher source populations, and remaining gnatcatcher habitat, are important to the survival and recovery of the species.

Furthermore, invasive plants tend to replace native coastal sage scrub vegetation after fires. Invasive plants (primarily non-native grass and annual forbs) are also more likely to dry out earlier in the summer and contribute to increased wildfire frequencies (Bunn *et al.* 2007). Fire frequency and burn size should be kept low where these exotic plants are well-established and where irreversible conversion of shrublands to grasslands is likely.

An important corollary of habitat fragmentation is reduction of opportunity for successful natal dispersal. Dispersal of gnatcatchers is critical for sustaining a robust demographic and genetic soundness of the population, and to the persistence of gnatcatchers in the fragmented habitat characteristic of coastal southern California. Landscape connectivity enhances population viability for many species, and, until recently, most species lived in well-connected landscapes (Beier and Noss 1998). Well-designed studies offer strong evidence that corridors provide sufficient connectivity to improve the viability of populations in habitats connected by corridors (Beier and Noss 1998). For relatively sedentary bird species such as gnatcatchers, connectivity of habitat patches is probably the most important landscape feature for maintaining species diversity of native biota (Soule *et al.* 1988). Corridors counteract the effects of fragmentation, and should eliminate or minimize the attrition of species over time by facilitating dispersal and recolonization (Willis 1974, Diamond 1975,Brown and Kodric-Brown 1977, Frankel and Soule 1981, Soule and Simberloff 1986, Noss and Harris 1986, Forman and Godron 1986,

Diamond *et al.* 1987; Noss 1987). Linkages that support resident populations of animals are more likely to function effectively as long-distance dispersal conduits for those species (Bennett 1990).

Predation and Brood Parasitism

Brood parasitism by the brown-headed cowbird and nest predation threaten the recovery of the gnatcatcher (Atwood 1980, Unitt 1984). Predation is the most common cause of gnatcatcher nest failure (Unitt 2004). Potential nest predators are numerous, including snakes, raccoons, and corvids (Grishaver *et al.* 1998). Parasitism by brown-headed cowbirds is also a current and increasing threat throughout the gnatcatchers range. Cowbirds thrive in human-altered habitats especially in agricultural and grazing areas because they are attracted to livestock droppings and feed (Bunn *et al.* 2007). Nest parasitism appears to decrease gnatcatcher nest success by increasing nest abandonment (Braden *et al.* 1997). Nest parasitism apparently has resulted in earlier nesting dates of the gnatcatcher which may help compensate for the negative effect of parasitism (Patten and Campbell 1998). However, the gains in nest success from decreased nest parasitism appear to be negated by increased nest abandonment due to predation before cowbirds migrate into the area (Braden *et al.* 1997).

*Rangewide Conservation Needs*

Based on the threats analysis above, the gnatcatcher has the following needs to survive and recover:

1) Functional habitat should be maintained in large, interconnected blocks sufficient to support viable, interconnected populations. In some cases, such areas may require enhancement or creation of new habitat.
2) Gnatcatcher habitat should be protected from changes in natural fire regimes as a result of fire suppression or increased fire frequency due to anthropogenic ignitions. Habitat should be managed to adequately mitigate those effects, should they occur.
3) The quality of gnatcatcher habitat should be maintained at high levels to include management of exotic plant and animal species (*e.g.*, brown-headed cowbirds, feral cats, etc.).

Environmental Baseline

*Status of the Species within the Action Area*

In the action area, the gnatcatcher occurs in the CNF South Link and Inland Valley Link from MP 75 to MP 120 within sage scrub patches dominated by California sagebrush (*Artemisia californica*), interspersed with sage scrub-grassland interface, below 762 m ( 2,500 ft) in elevation (Unit 2004, 68 FR 20228 ). Gnatcatcher suitable habitat in the action area occurs on

both public and private lands. Private lands in the action area are within the planning area of the either the MSCP or draft East County Multiple Species Conservation Program (ECMSCP). Focused protocol surveys were conducted for portions of the proposed project within the Inland Valley Link from MP 114 to MP 119 in the spring of 2007. Based on those surveys, two pairs of gnatcatchers were detected at the southern end of the Sycamore-Elliot Reconductor 69 kV line (Jones and Stokes 2008).

Additional focused protocol surveys were conducted in the CNF South Link and Inland Valley Link between MP 96 and MP 119 in spring 2007, but not all areas were surveyed where access was limited, and some surveys did not meet standard Service protocols for determining gnatcatcher presence or absence. However, historical and other survey records (CNDDB, Service database, Unit 2004) indicate gnatcatchers occupy suitable habitat at various locations along the alignment from MP 75 to MP 120 (Figure 3). A large population was detected between MP 109 and MP 111 during surveys conducted in 1997. Based on the survey report, the area supported 9 to 12 pairs of gnatcatchers (Affinis 1997).

The proposed route also falls within areas modeled as moderate, high, and very high quality gnatcatcher habitat (TAIC 2002). Additionally, suitable habitat exists for the gnatcatcher within the Cleveland National Forest based on habitat models developed for the forest. Small portions of the proposed project route fall within Unit 1 and Unit 2 of designated critical habitat for the gnatcatcher.

*Factors Affecting the Species within the Action Area*

Ongoing and potential threats to gnatcatcher populations and their habitat include urbanization, military training activities, cowbird parasitism, predation, habitat degradation, and fire (Service 1993, GWB 1997). Fire and the invasion of exotic vegetation, especially grasses and annual forbs, interact to threaten the gnatcatcher's habitat within the action area. The 2003 Cedar Fire burned gnatcatcher suitable habitat along the alignment from MP 98 to MP 120, the 2007 Harris Fire burned suitable habitat along the alignment from MP 75 to MP 82; and the 2007 Witch fire burned a small portion of gnatcatcher suitable habitat along the alignment near MP 104. Gnatcatcher detectability when the aforementioned surveys were conducted in 2007 may have been decreased because of drought conditions and recent wildfires that degraded suitable habitat potentially resulting in a temporary reduction in the number of gnatcatchers in the action area.

Effects of the Action

For the purpose of this process-oriented biological and conference opinion, we addressed potential impacts to gnatcatcher in the action area in the CNF South Link and Inland Valley Link from MP 75 to MP 120 within sage scrub patches dominated by California sagebrush, interspersed with sage scrub-grassland interface, below 762 m ( 2,500 ft) in elevation. Potential effects during construction of the SRPL Project and from long-term O&M activities are included in our analysis. Conservation Measures SS-CM-15 through SS-CM-19 are particularly relevant

to SDG&E's commitment to avoid, minimize, and offset impacts to the gnatcatcher and are repeated here for ease of reference.

**SS-CM-19** All brushing or grading taking place within occupied habitat of the gnatcatcher (defined as within 152 m (500 ft) of any gnatcatcher sightings (Service 2007b)) during construction will be conducted outside of the gnatcatcher breeding season (February 15 through August 31). When conducting all other construction activities during the gnatcatcher breeding season, within occupied habitat, the following avoidance measures will apply.

- Vegetation clearing outside of the breeding season (October 1 through February 14) will take place in the presence of a biological monitor approved by the Service. The monitor will walk ahead of vegetation removal equipment and ensure that gnatcatchers are not killed or injured as a direct result of vegetation removal activities. The monitor will have the authority to halt/suspend all activities until appropriate corrective measures have been completed. The monitor will also be required to report violations immediately to the Service and CDFG.
- A Service-approved biologist will survey for gnatcatchers within 10 days prior to initiating activities in an area. The results of the survey will be submitted to the Wildlife Agencies for review and approval prior to initiating any construction activities. If gnatcatchers are present, a Service-approved biologist will survey for nesting activity approximately once per week within 152 m (500 ft) of the construction area for the duration of the activity.
- If an active nest is located, a 91-m (300-ft) no-construction buffer (Service 2007b) will be established around each nest site; however, there may be a reduction of this buffer zone depending on site-specific conditions or the existing ambient level of activity. The applicant will contact the Wildlife Agencies to determine the appropriate buffer zone. To the extent feasible, no construction will take place within this buffer zone until the nest is no longer active. However, if construction must take place within the 91-m (300-ft) buffer, a qualified acoustician will monitor noise as construction approaches the edge of the occupied gnatcatcher habitat as directed by the permitted biologist. If the noise meets or exceeds the 60 dB(A) Leq threshold, or if the biologist determines that the activities in general are disturbing the nesting activities, the biologist will have the authority to halt construction and will consult with the Wildlife Agencies to devise methods to reduce the noise and/or disturbance in the vicinity. This may include methods such as, but not limited to, turning off vehicle engines and other equipment whenever possible to reduce noise, installing a protective noise barrier between the nesting gnatcatchers and the activities, and working in other areas until the young have fledged.

**SS-CM-20** Compensation for the loss of occupied gnatcatcher habitat will be implemented as follows. Permanent impacts to occupied habitat will include 2:1 offsite acquisition and preservation of occupied habitat. Temporary impacts to occupied habitat will include 1:1 onsite

restoration and 1:1 off-site acquisition and preservation of occupied habitat. Impacts to occupied gnatcatcher designated critical habitat must be compensated within the same Critical Habitat Unit where the impacts occurred. Any acquired habitat will be approved by the CPUC, BLM, USFS, and Wildlife Agencies.

**SS-CM-21** Compensation for the loss of unoccupied designated critical habitat for the gnatcatcher will be implemented as follows. Permanent impacts to unoccupied designated critical habitat will include 2:1 offsite acquisition and preservation of designated critical habitat. Temporary impacts to unoccupied designated critical habitat will include 1:1 onsite restoration. Any acquired habitat will be approved by the CPUC, BLM, USFS, and Wildlife Agencies.

1. Construction Activities

*Direct Effects*

Suitable habitat that has been surveyed, mapped or modeled between MP 75 and 120 (approximately 72.4 km (45 mi) in length) is likely to support gnatcatchers based on previous survey records. We anticipate no more than 21.7 ha (53.6 ac) of suitable habitat would be permanently impacted and 43.0 ha (106.2 ac) would be temporarily impacted. The total impact area of 64.7 ha (159.8 ac) includes 12.2 ha (30.0 ac) of designated critical habitat of which 4.6 ha (11.3 ac) are permanent impacts and 7.6 ha (18.7 ac) are temporary impacts (Table 2).

Habitat loss will occur during the installation of new tower pads and work areas; new road segments; and new staging and fly yards occurring intermittently along the route in small patches. The construction and placement of these facilities over such a long narrow area will likely affect small portions of many gnatcatcher territories. Construction activities that completely remove habitat will reduce availability of breeding, feeding, and sheltering sites for gnatcatchers in these areas and may lead to injury (*e.g*. reduced reproduction) or death of gnatcatchers depending on the quality and quantity of any remaining suitable habitat and the density of gnatcatchers in the area.

We do not anticipate that adult or juvenile gnatcatchers will be directly killed or injured during habitat removal since biological monitors will be present to locate and flush any gnatcatchers out of harms way from vegetation clearing or grubbing activities. We also do not expect any eggs or nestlings to be killed or injured during habitat removal since vegetation clearing will occur outside of the gnatcatcher breeding season. If habitat removal must occur within the gnatcatcher breeding season, biological monitors will survey the area for gnatcatcher nesting activity. If nesting activity is detected, the area will be avoided until the nest has either failed or the nestlings have fledged (SS-CM-19).

SDG&E will minimize the permanent loss of up to 21.7 ha (53.6 ac) of occupied gnatcatcher habitat through off-site acquisition and preservation of occupied gnatcatcher habitat at a 2:1 ratio; thus, compensation will consist of up to 43.4 ha (107.2 ac) of occupied gnatcatcher habitat.

Temporary impacts to up to 43.0 ha (106.2 ac) of occupied gnatcatcher habitat will be offset at a 2:1 ratio and will include 1:1 on-site restoration and 1:1 off-site acquisition and preservation of occupied gnatcatcher habitat. Compensation for the temporary loss of occupied gnatcatcher habitat will consist of up to 43.0 ha (106.2 ac) of onsite restoration and 43.0 ha (106.2 ac) of offsite acquisition and preservation of occupied gnatcatcher habitat. Therefore, total offsite acquisition and preservation of occupied gnatcatcher habitat will be 86.3 ha (213.3 ac) (Table 2).

*Critical Habitat*

The proposed project will cause permanent impacts of up to 4.6 ha (11.3 ac) of gnatcatcher designated critical habitat and temporary impacts of up to 7.6 ha (18.7 ac) of gnatcatcher designated critical habitat in Units 1 and 2. (Table 2). In Unit 1, project construction will affect up to 6.2 ha (15.3 ac) of gnatcatcher critical habitat in small patches along a 0.55-km (0.34-mi) long, narrow band of habitat within the action area and include 0.90 ha (2.2 ac) of permanent impacts and 5.3 ha (13.1 ac) of temporary impacts. These impacts represent less than one percent of the 6,029 ha (14,898 ac) of designated critical habitat within Unit 1.

Similarly, in Unit 2, project construction will remove up to 6.0 ha (14.8 ac) of gnatcatcher critical habitat in small patches along a 3.6-km (2.2-mi) long, narrow band of habitat within the action area, and include 3.7 ha (9.1 ac) of permanent and 2.3 ha (5.7 ac) of temporary impacts. These impacts represent approximately one percent of the 5,871 ha (14,508 ac) of designated critical habitat within Unit 2.

SDG&E will minimize the permanent loss of up to 4.6 ha (11.3 ac) of gnatcatcher designated critical habitat through off-site acquisition and preservation of 9.2 ha (22.3 ac) of designated critical habitat (SS-CM-16). Temporary impacts of up to 7.6 ha (18.7 ac) of gnatcatcher designated critical habitat will be offset at a 2:1 ratio and will include 1:1 on-site restoration and 1:1 off-site acquisition and preservation of gnatcatcher designated critical habitat. Compensation for the temporary loss of gnatcatcher designated critical habitat will include up to 7.6 ha (18.7 ac) of onsite restoration and up to 7.6 ha (18.7 ac) of offsite acquisition and preservation of gnatcatcher designated critical habitat. The amount of designated critical habitat proposed for offsite acquisition and onsite restoration are included in the overall offsite and onsite conservation acreages specified above in the direct effects section.

The biological function of Unit 1 and Unit 2 to support persistent populations of gnatcatchers is expected to be maintained during and after project construction because of the relatively small amount of permanent impacts, the restoration of temporary impacts, and the habitat conservation measures described above.

*Indirect Effects*

1. Construction Activities

Construction activities that can cause potential short term impacts to gnatcatchers during the breeding season are activities such as surveying on foot, brush clearing for foot paths, and stringing of new wire and reconductoring, which may require dragging the conductor through habitat, and off road vehicle activities in occupied habitat. To eliminate or minimize indirect impacts by these types of construction activities, G-CM-8 requires confirmation from the biological monitor that gnatcatchers are not in harms way before these activities can occur in gnatcatcher habitat.

*Noise from Construction Activities*
Gnatcatchers in the action area may be subject to increased noise and disturbance levels associated with SRPL construction that may impair communication or other essential behaviors that reduce reproductive capacity. Noise-related effects are expected to occur while the transmission line is being constructed, a period of approximately 33 months. The measures discussed in SS-CM-19 are expected to effectively reduce potential effects from noise to nesting gnatcatchers.

*Predation*
Transmission lines and support structures provide potential perching opportunities for predatory groups of birds such as raptors and corvids in gnatcatcher-occupied habitat. Perch sites on pole or tower support structures may also attract brown-headed cowbirds. In areas where current perching sites are few or rare, the construction of a new transmission line increases the potential for raptor, corvid, and cowbird perching and hence, predation and nest parasitism opportunities in the project area (APLIC 2006, Jalkotzy *et al*. 1997). To minimize potential impacts by ravens and cowbirds, G-CM-19 requires the preparation and implementation of a raven control plan and SS-CM-18 requires the preparation and implementation of a cowbird control plan.

Personnel associated with the construction activities often leave food, trash and debris in the work area which can attract a higher concentration of predators to the area leading to increased predation. Predators such as common ravens, western scrub jays, and coyote can all be attracted to the work area by the above activities and have the potential to prey on gnatcatcher eggs and nestlings. To eliminate or minimize predator attraction to construction areas, SDG&E will prohibit littering of any food or waste in the project area and remove biodegradable or non-biodegradable debris from the ROW following completion of construction (G-CM-9).

*Human Disturbance*
Impacts from human disturbance during the gnatcatcher breeding season can include temporarily changing gnatcatcher breeding and nesting behavior, which can affect their ability to mate, build nests, and care for young. Many of the measures already mentioned in this section can eliminate or minimize disturbance to breeding or nesting gnatcatchers by project personnel. For human

disturbance from non-project personnel, G-CM-26 requires that entrances to access roads will be gated during and after construction to prevent the unauthorized use of these roads by the general public. Additionally, signs will be posted on the gates prohibiting unauthorized use of the access roads. G-CM-30 requires the permanent closure of access road not needed for maintenance and that closed roads be monitored and maintained to assure that unauthorized access by the public is not occurring.

*Invasive Weeds*

Gnatcatcher habitat would be protected from an increased risk of the spread of invasive weeds by the development and implementation of an Invasive Weed Control Plan (G-CM-20).

2. Operations and Maintenance

Standard O&M activities, such as road maintenance (grading), tree trimming, and structure replacement and repairs and increased human disturbance could potentially affect gnatcatcher behaviors. SDG&E will implement applicable conservation measures to ensure that potential adverse effects to the species are avoided and minimized.

These measures include, but are not limited to, the following:

- Conduct pre-activity surveys to determine presences/absence of gnatcatchers
- Minimize impacts
- Conduct activities outside the breeding season
- Employ an onsite biological monitor
- Fence or flag work space limits
- Restore onsite habitat
- Preserve off-site habitat

Measure SS-CM-19 will also help to minimize potential impacts from maintenance activities to gnatcatchers. This measure requires that SDG&E train all maintenance personnel on the sensitive resources associated with the project and the necessity to avoid and minimize impacts to them. The measure requires all vegetation clearing to occur outside of the bird breeding season if the vegetation has not been cleared in the last two years. All other maintenance activities are to occur outside of the bird breeding season if feasible. If it is not feasible to schedule maintenance activities outside of the bird breeding season, then a qualified biologist working with an acoustician would determine if a maintenance activity would meet or exceed the 60 db(A) Leq hourly noise threshold where nesting territories of gnatcatchers are detected. If

noise levels are below this threshold, then the maintenance activity can proceed, if not, then a survey to locate gnatcatcher nests would be conducted. If an active nest is found, then all necessary impact avoidance and minimization methods would be employed, such as a biological monitor on site, continued noise monitoring, and noise reduction methods, or waiting until the young has fledged from the nest.

Conclusion

After reviewing the current status of the gnatcatcher, the environmental baseline, effects of the proposed action, and cumulative effects, it is our opinion that the proposed action will not jeopardize the continued existence of the gnatcatcher or adversely modify its designated critical habitat. We reached this conclusion by considering the following:

1) Loss of gnatcatcher habitat will occur outside of the breeding season and adult gnatcatchers outside of the breeding season will be flushed from vegetation clearing and grubbing activities; therefore, we do not anticipate that gnatcatcher adults, eggs or nestlings will be killed or injured during habitat clearing or grading activities;

2) The permanent loss of up to 21.7 ha (53.6 ac) of gnatcatcher habitat, including designated critical habitat, is spread over 79 km (49 mi) and will occur in small isolated patches measured in square feet, thus minimizing effects to individual gnatcatcher territories and connectivity across the project area;

3) The temporary loss of up to 43.0 ha (106.2 ac) of gnatcatcher habitat, including designated critical habitat, is spread over 79 km (49 mi) and will occur in small isolated patches measured in square feet and will be restored to its original condition or better, thus minimizing effects to individual gnatcatcher territories, the loss of habitat, and connectivity across the project area;

4) The permanent loss of 4.6 ha (11.3 ac) of gnatcatcher designated critical habitat represents a small proportion of designated critical habitat within Units 1 and 2; thus, the ecological function and values of gnatcatcher designated critical habitat will be maintained in these units and within the overall designation;

5) Direct and indirect impacts to gnatcatchers will be avoided and minimized through the implementation of the conservation measures; and

6) The long-term conservation of gnatcatcher habitat, including designated critical habitat, to offset the impacts of the proposed action will support the range-wide conservation (recovery) of the species.

## Endangered Species

**Least Bell's Vireo** ( *Vireo bellii pusillus*)

Status of the Species

*Listing Status*

In response to the dramatic decline of the vireo population and widespread loss of its riparian habitat, the vireo was listed as endangered on May 2, 1986 (51 FR 16474). Critical habitat was designated for the vireo on February 2, 1994 (59 FR 4845), and encompasses about 15,379 ac (38,000 ac) at 10 locations in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego counties. No critical habitat is within the proposed project's action area. Primary constituent elements that support feeding, nesting, and sheltering are essential to the conservation of the least Bell's vireo and include riparian woodland vegetation that generally contains both canopy and shrub layers and some associated upland habitats (Service 1994a). A draft recovery plan was published in March 1998 (Service 1998c); no final plan has been published. We completed a five-year review for vireo in September 2006 in which we indicated that, due to new information on the species and an improved understanding of ongoing recovery actions to reduce threats, the recovery goals and strategies should be modified and refined. In addition, we recommended that the vireo should be downlisted from endangered status to threatened status because of a ten-fold increase in population size since its listing in 1986, expansion of locations with breeding vireo throughout southern California, and conservation and management of suitable breeding habitat throughout its range (Service 2006).

*Species Description*

The least Bell's vireo is a small migratory songbird that is olive-gray above and mostly white on its underparts, with a tinge of gray on the upper breast and yellow on the flanks (Coues 1866, Service 1998c). The vireo has indistinct white spectacles and two faint wing bars, with males and females having identical plumage. Male vireos are easily distinguished by their song, a rapid series of harsh, slurred notes that increase in intensity as the song progresses (Grinnell and Storer 1924, Pitelka and Koestner 1942, Barlow 1962, Beck 1996). Phrases of the vireo song are alternatively slurred upward and downward and exhibit a "question-and-answer" quality (Grinnell and Storer 1924, Beck 1996). The least Bell's vireo is in the family Vireonidae and is one of four subspecies of Bell's vireo (*Vireo bellii*) that have been recognized (AOU 1957), with each subspecies isolated from one another throughout the year (Hamilton 1962, Service 1998c).

*Habitat Affinity*

Vireos are obligate riparian breeders, typically inhabiting structurally diverse woodlands along watercourses that feature dense cover within 0.9-1.8 m (3-6 ft) of the ground and a dense, stratified canopy (Goldwasser 1981, Salata 1983, Gray and Greaves 1984, Service 1998c). The

understory within this riparian habitat is typically dominated by mulefat, California wild rose (*Rosa californica*), poison oak (*Toxicodendron diversiloba*), sandbar willow (*Salix hindsiana*), young individuals of other willow species, and several perennial species (Service 1998c). Important canopy species include mature arroyo willows (*S. lasiolepis*) and black willows (*S. gooddingii*), and occasional cottonwoods (*Populus* spp.), western sycamore, or coast live oak (*Quercus agrifolia*). Vireos primarily forage and nest in riparian habitat, but they may also use adjoining upland scrub habitat (Salata 1983, Kus and Miner 1989).

*Distribution*

The vireo historically occupied willow riparian habitats from Tehama County, in northern California, southward to northwestern Baja California, Mexico, and as far east as Owens Valley, Death Valley, and the Mojave River (Grinnell and Miller 1944, Service 1998c). Although originally considered to be abundant locally, regional declines of this subspecies were noticeable by the 1940s (Grinnell and Miller 1944), and the vireo was believed to have been extirpated from California's Central Valley by the early 1980s (Franzreb 1989). Except for a few outlying pairs, the vireo is currently restricted to southern California south of the Tehachapi Mountains and northwestern Baja California (Wilbur 1980, Garrett and Dunn 1981, Franzreb 1989, U. S. Geological Survey (USGS) 2002). The largest current concentrations of vireos are in San Diego County along the Santa Margarita River on the Base and in Riverside County at the Prado flood control basin (Service 2006).

Historically, the San Joaquin and Sacramento Valleys were considered to be the center of the vireo's breeding range (60 to 80 percent of the historic population; 51 FR 16474), but the vireo has not yet meaningfully re-colonized those areas. In 2005 and 2006, the first breeding pair of vireos detected in the San Joaquin Valley since the listing of the vireo successfully bred at the San Joaquin National Wildlife Refuge in Stanislaus County (Service 2006). There have been no sightings of vireos in the Sacramento Valley since prior to the listing, and it is unlikely that any breeding vireos have occurred within recent years in the Sacramento Valley (Service 2006).

Greater than 99 percent of the remaining vireos were concentrated in southern California (Santa Barbara County and southward) at the time of the listing in 1986 (51 FR 16474), with San Diego County containing 77 percent of the population. Greater than 99 percent still remain in southern California, although the populations are now more evenly distributed in southern California with 54 percent of the total population occurring in San Diego County and 30 percent of the population occurring in Riverside County (Service 2006); however, there has been only a slight shift northward in the species' overall distribution. Thus, despite a significant increase in overall population numbers, the population remains restricted to the southern portion of its historic range (Service 2006).

*Abundance*

The vireo population in the U. S. has increased 10-fold since its listing in 1986, from 291 to 2,968 known territories (Service 2006). The population has grown during each 5-year period since the original listing, although the rate of increase has slowed over the last 10 years. Population growth has been greatest in San Diego County and Riverside County, with lesser but significant increases in Orange County, Ventura County, San Bernardino County, and Los Angeles County. The population in Santa Barbara County has declined since the listing in 1986, although it is uncertain whether this population was historically significant. Kern, Monterey, San Benito, and Stanislaus counties have had a few isolated individuals and/or breeding pairs since the original listing, but these counties have not supported any sustained populations (Service 2006).

*Life History*

Vireos primarily feed on invertebrates, especially lepidopteran larvae, within willow stands or associated riparian vegetation (Miner 1989, Brown 1993). Vireos occasionally forage in nonriparian vegetation such as coastal sage scrub, chaparral, and oak woodlands, although foraging in these other habitats usually occurs within 30.5 m (100 ft) of the edge of riparian vegetation (Salata 1983, Gray and Greaves 1984, Kus and Miner 1989). Vireo feeding behavior largely consists of gleaning prey from leaves or woody surfaces while perched or hovering, and less frequently by capturing prey by aerial pursuit (Salata 1983, Miner 1989). Vireos concentrate most of their foraging between 0 to 6.1 m (0 to 20 ft) above ground level (Salata 1983, Miner 1989).

Vireos generally arrive in southern California breeding areas by mid-March to early April, with males arriving before females and older birds arriving before first-year breeders (Service 1998c). Vireos generally remain on the breeding grounds until late September, although some post-breeding migration may begin as early as late July (Service 1998c). Male vireos establish and defend breeding territories through singing and physically chasing intruders (Barlow 1962; Beck 1996,Service 1998c). Although territories typically range in size from 0.2 to 3.0 ha (0.5 to 7.5 ac) (Service 1998c), no relationship appears to exist between territory size and various measures of territory quality (Newman 1992).

Nest building commences a few days after pair formation, with the female selecting a nest-site location and both sexes constructing the nest (Pitelka and Koestner 1942, Barlow 1962, Service 1998c). Nests are typically suspended in forked branches within 0.9 m (3 ft) above the ground with no clear preference for any particular plant species as the nest host (Nolan 1960, Barlow 1962, Gray and Greaves 1984, Service 1998c). Typically 3 or 4 eggs are laid on successive days shortly after nest construction (Service 1998c). The eggs are incubated by both parents for about 14 days with the young remaining in the nest for another 10-12 days (Pitelka and Koestner 1942, Nolan 1960, Barlow 1962). Each nest appears to be used only once with new nests constructed for each nesting attempt (Greaves 1987). Vireos may attempt up to five

nests within a breeding season, but they are typically limited to one or two successful nests within a given breeding season (Service 1998c).

Multiple long-term monitoring studies indicate that approximately 59 percent of nests successfully produce fledglings, although on average only 1.8 chicks fledge per nest (Service 1998c). Although vireo nests appear to be more accessible to terrestrial predators because of their relatively low placement (Franzreb 1989), western scrub-jays (*Aphelocoma californica*) have been documented to account for the majority of documented depredation events (Peterson 2002, Peterson *et al.* 2004); depredation by jays and other avian predators may have selected for relatively low nest placement (Ferree 2002). Predation rates can exceed 60 percent of the vireo nests in a given area within a year (Kus 1999), but typical nest predation rates average around 30 percent (Franzreb 1989), which is comparable to predation rates for other North American passerines (Martin and Clobert 1996, Grishaver *et al.* 1998, Ferree 2002).

Nest parasitism by cowbirds is another major source of failure for vireo nests (Franzreb 1989, Service 1998c, Kus 1999, 2002, Griffith and Griffith 2000, Sharp 2002); nests that are parasitized are either abandoned or fledge cowbird chicks rather than vireos. It is believed that cowbirds did not historically occur within the vireo's range, and therefore vireos have not evolved adequate defenses to avoid loss of productivity due to parasitism (Franzreb 1989, Kus 2002). Parasitism of vireo nests may exceed 42 percent in some locations (Kus 1999), but extensive cowbird trapping and focused nest monitoring can substantially reduce parasitism or its effects (Franzreb 1989, Service 1998c, Griffith and Griffith 2000, Kus 2002).

Some individual vireos have been documented to live at least 7 years (Brown 1993, Service 1998c), but the average lifespan for this species is substantially lower. First year survivorship has been estimated to average approximately 25 percent (Greaves and Labinger 1997, Service 1998c), typical for small passerines, with annual survivorship in subsequent years estimated to be approximately 47 percent (Service 1998c). Annual survival of females appears to be slightly lower than that for males, presumably due to the higher energetic costs of egg production by females (Service 1998c).

Fledgling vireos expand their dispersal distances from about 10.7 m (35 ft) the first day to about 70.0 m (200 ft) several weeks after fledging (Hensley 1950, Nolan 1960). This distance has been shown to increase to at least 1.6 km (1 mi) prior to their first fall migration (Gray and Greaves 1984). Banding records indicate that while most first-year breeding vireos return to their natal drainage after winter migration, some disperse considerable distances to other breeding locations (Greaves and Labinger 1997, Service 1998c, Kus and Beck 1998). Movement by vireos between drainages within San Diego County is not uncommon (Kus and Beck 1998). Additionally, several vireos banded as nestlings in San Diego County have been resighted as breeding adults in Ventura County, and the opposite movement from Ventura to San Diego has also been observed (Greaves and Labinger 1997). The maximum dispersal distance currently documented is approximately 209.2 km (130 mi) (Service 1998c), but this is probably an underestimate due to the limited number of vireos that are banded and insufficient re-sighting efforts. Although

movement between sites by older birds may occur, site fidelity by vireos after the first breeding season is generally high, and most dispersal between sites occurs between the time that vireos fledge from their nest and their first breeding season (Service 1998c).

*Population Dynamics*

Causes for decline of the least Bell's vireo included destruction or degradation of habitat, river channelization, water diversions, lowered water tables, gravel mining, agricultural development, and cowbird parasitism (Service 1986, 1994a, 1998c). Habitat losses had fragmented most remaining populations into small, disjunct, widely dispersed subpopulations (Franzreb 1989). Habitat fragmentation negatively affects abundance and distribution of neotropical migratory songbirds, in part by increasing incidence of nest predation and parasitism (Whitcomb *et al.* 1981, Small and Hunter 1988, Yahner and DeLong 1992, Sharp 2002, Peterson 2002). Vireos nesting in areas containing a high proportion of degraded habitat have lower productivity (*e.g.,* hatching success) than those in areas of high quality riparian woodland (Pike and Hays 1992).

*Threats and Conservation Needs*

At the time of the listing, loss of habitat due to agricultural practices, urbanization, and exotic plant invasion was identified as a major threat to vireo populations. Since the listing of the vireo, destruction and modification of riparian habitat within its current range has been curtailed significantly, primarily as a consequence of protections provided by the original listing in 1986 (51 FR 16474), the subsequent designation of critical habitat in 1994 (59 FR 4845), and other Federal and State regulatory processes. Other efforts not driven by regulatory processes have also promoted increased conservation and restoration of riparian habitat since the listing of the vireo in 1986 (Service 2006).

Agriculture and grazing continue to threaten riparian habitat within the larger historic range, particularly the Salinas, San Joaquin, and Sacramento valleys (Service 1998c). Urbanization appears to have displaced former agriculture and grazing operations in many areas within southern California, thereby indirectly reducing riparian habitat degradation caused by these activities. On the other hand, occupied vireo habitat that is adjacent to highly urbanized areas or within major river systems continues to be impacted by flood control and water impoundment projects and may be subject to ongoing and future habitat loss or degradation (Service 2006).

Several large, regional Habitat Conservation Plans in southern California have addressed the effects of urban development on this species. These plans are expected to provide long-term protection of core occurrences of vireos in western Riverside, Orange, and San Diego counties. For example, for the San Diego MSCP and MHCP and Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), between 85-100 percent of vireo locations were expected to be conserved; also for these plans and Central/Coastal Orange County HCP, 67-100 percent of vireo habitat acres were expected to be conserved. Compliance-driven and voluntary riparian restoration activities throughout the historic range may have contributed to an increase

in riparian habitat since the listing of the vireo (Service 2006), although this cannot be established without a thorough evaluation of riparian habitat within California. Starting in 2007, the Riparian Habitat Joint Venture ("RHJV"; a cooperative association of Federal, State, and private organizations) began systematically mapping existing riparian habitat in California starting (RHJV 2006), which should provide a more objective measure of ongoing changes to riparian habitat in California.

Within the past decade, control of giant reed and other exotic plants has been and continues to be systematically conducted on both the Santa Ana River and on the Base. Giant reed removal has also been initiated within several other watersheds within southern California (Natural Resources Conservation Service 2006, Service 2006). In general, giant reed removal has been effective but will require continued annual efforts to achieve local eradications and address new invasions. Although control of giant reed has made great progress since the original listing of the vireo, invasions by other exotic plants (*e.g.*, *Tamarix* species, perennial pepperweed (*Lepidium latifolium*)) continue to degrade existing riparian habitat (Kus and Beck 1998; Hoffman and Zembal 2006).

The 1986 listing rule identified brood parasitism by cowbirds as a substantial threat to the vireo, and it remains the most significant threat to the recovery of the vireo (Service 2006). Cowbird trapping has proven a successful tool to halt vireo population declines over the short term within a limited area, but Kus and Whitfield (2005) have argued that trapping may not be the best method for long-term recovery of the vireo because maintaining cowbird populations at low levels may not allow the vireo to evolve resistance to cowbird parasitism. It remains unclear as to the best way to manage this threat over the long term, and additional research is needed to determine whether there are any alternatives to the intensive cowbird trapping programs currently being implemented (Service 2006).

Environmental Baseline

Vireos were observed within the proposed ROW or potential impact areas of the SRPL Project during SDG&E's vireo surveys conducted by HELIX in 2007 for the then described Alternatives Portion of the proposed project (HELIX 2008b). However, not all suitable habitat was surveyed within the proposed impact areas due to the large size of the action area, the preponderance of private lands within the action area, access issues, treacherous site conditions, and changes to the selected route following completion of the surveys. Additionally, some of the 38 areas that were surveyed for vireo are no longer part of the action area for the SRPL Project.

In the absence of comprehensive survey data, we relied on the species data provided in the BA from the HELIX surveys, the CNDDB, a USFS habitat model for vireo, and the Service's knowledge of the species to identify the extent of suitable vireo habitat in the action area and whether these areas are likely occupied. Based on this information suitable habitat for vireo exists only in the Inland Valley South Link and in the CNF South Link portions of the project area (Figure 4).

HELIX's 2007 protocol survey locations and point data were analyzed in conjunction with the USFS modeled habitat data. These two data sets noted locations of potential vireo habitat at MP 69, 71.75, 72.5, 76, 78, 82, 83.5, 90, 92.75, 94-96, 101, and 103. Based on this survey information, there are approximately 34 ha (83 ac) of suitable vireo habitat, 29 ha (72 ac) of which fall within the USFS Modeled Habitat areas. Of the 38 areas surveyed by HELIX, vireos were found at 6 of these areas, but only 2 of the areas remain in the action area of the proposed project. In addition, vireos are known to occur within the action area around one of the SRPL Project's proposed helipads and may also occur near MP 99. The following paragraphs describe the likelihood and importance of vireo within these four segments of the action area.

*Segment 1: Hauser Creek – MP 69 to MP 76 (CNF South Link)*

In June 2007, vireos were observed along Hauser Creek within the ROW at MP 69 as Hauser Creek traverses the action area (HELIX 2008b). In addition, the CNDDB documents vireo along several portions of Hauser Creek, where it roughly parallels the action area to the north. Along this section of Hauser Creek, the occurrences are located approximately 4 km (3 mi) north of MPs 75 and 76 and approximately 0.8 to 4.0 km (0.5 mi to 2.5 mi) north of MP 70 through 72. Because site fidelity by vireos after the first breeding season is generally high (Service 1998c), there is a high likelihood that vireo will continue to occupy areas within and adjacent to the proposed ROW both where it crosses and parallels Hauser Creek.

*Segment 2: Cottonwood Creek – MP 78 (CNF South Link)*

Within the action area, vireos have been observed along Cottonwood Creek at MP 78 (Service GIS database). South of MP 78, vireos have been documented along a large stretch of Cottonwood Creek approximately 0.8 km (0.5 mi) south of Barrett Lake and north of Barrett Junction. Thus, presence of vireo in this portion of the action area is known and occupancy is likely to continue.

*Segment 3: Alpine Creek - MP 99 (Inland Valley South Link)*

The survey area at Alpine Creek (MP 98) contained suitable vireo habitat, but surveys in this area were started too late in the year to detect vireo. The USFS mapped suitable habitat within 1.4 km (0.9 mi) of this survey area, but the closest occurrence of vireo was located east of Harbison Canyon in the San Diego River and Sweetwater River areas approximately 4 km (3 mi) from MP 99. Thus, while suitable is present near MP 98, the presence of vireo is not confirmed in this area.

*Segment 4: San Diego River – MP 108 (Inland Valley South Link)*

Within the action area, vireos have been observed along the San Diego River adjacent to a proposed helipad approximately 4 km (3 mi) south of MP 108. This vireo location was observed within 91 m (300 ft) of this proposed helipad. Additional vireo occurrences are known west of

this helipad, along the San Diego River. Thus, presence of vireo in this portion of the action area is known, and occupancy is likely to continue.

Effects of the Action

For the purposes of this biological opinion, we addressed potential impacts to vireo in the action area based on suitable habitat (occupied habitat and suitable habitat modeled by the USFS) which includes: 1) permanent impacts to no more than 8.3 ac and temporary impacts to no more than 12.3 ac (Table 2). Potential effects during construction of the SRPL Project and from long-term O&M activities are included in our analysis.

Conservation Measures G-CM-5, G-CM-13, G-CM 24,G-CM-32, G-CM-46, G-CM-49, G-CM-50, G-CM-51, SS-CM-16, SS-CM-17, and SS-CM-18 are particularly relevant to SDG&E's commitment to avoid, minimize, and offset direct impacts to the vireo. The Species-Specific Conservation Measures are repeated here for ease of reference.

**SS-CM-16** During construction, all grading or brushing taking place within riparian habitats occupied by the vireo will be conducted outside the vireo breeding season (defined as March 15 through September 15). When conducting all other construction activities during the breeding season within 152 m (500 ft) (Service 2007b) of occupied or suitable habitat, a biologist approved by the Service will survey for vireos within 10 days prior to initiating activities in an area. The results of the survey will be submitted to the Wildlife Agencies for review and approval prior to initiating any construction activities.

- During construction, if vireos are present, a Service-approved biologist will survey daily for nesting vireos within 152 m (500 ft) of the construction area, for the duration of the activity in that area during the breeding season. If an active nest is located, a 91-m (300-ft) no-construction buffer zone will be established around each nest site; however, there may be a reduction of this buffer zone depending on site-specific conditions or the existing ambient level of activity. SDG&E will contact the Wildlife Agencies to determine the appropriate buffer zone. No construction will take place within this buffer zone until the nest has fledged or is no longer active. If construction must take place within the buffer, a qualified acoustician will monitor noise as construction approaches the edge of the occupied vireo habitat as directed by the permitted biologist. If the noise meets or exceeds the 60 dB(A) Leq threshold, or if the biologist determines that construction activities are disturbing nesting activities, the biologist will have the authority to halt construction and will consult with the Wildlife Agencies, BLM and USFS, to devise methods to reduce the noise and/or disturbance. This may include methods such as, but not limited to, turning off vehicle engines and other equipment whenever possible to reduce noise, installing a protective noise barrier between the nesting birds and the activities, and working in other areas until the young have fledged. The Service-approved biologist will

monitor the nest daily until activities are no longer within 91-m (300 ft) of the nest, or the fledglings become independent of their nest or the nest has failed.

- Impacts to aquatic resources under the jurisdiction of the Corps of Engineers, Regional Water Boards, State Water Board, and CDFG will be avoided to the extent feasible. The avoidance of these resources will further minimize impacts to vireo.

**SS-CM-17** To avoid impacts to vireo, towers, pads, pull stations, access roads, staging areas, and fly yards will be located outside of riparian vegetation, including occupied vireo habitat, where feasible. If avoidance is not feasible, compensation for the loss of suitable vireo habitat will be implemented as follows. Permanent impacts to suitable habitat will include 3:1 offsite acquisition and preservation of occupied habitat. Temporary impacts to occupied habitat will include 1:1 on-site restoration and 2:1 offsite acquisition and preservation of occupied habitat. Any acquired habitat will be approved by the CPUC, BLM, USFS, and Wildlife Agencies.

**SS-CM-18** To minimize adverse impacts from loss of occupied habitat in the Cleveland National Forest, SDG&E will develop and implement a cowbird trapping program, in consultation with the USFS.

1. Construction Activities

*Direct Effects*

Construction of the transmission line and associated facilities, such as towers, pads, access roads, staging areas, pull down areas, and helipads will result in the permanent loss of no more than 3.4 ha (8.3 ac) of permanent impacts and 4.8 ha (12.3 ac) of temporary impacts to vireo habitat. Because construction-related grading and brushing will be conducted outside of the vireo breeding season, no impacts are anticipated to occur to breeding vireos, vireo eggs, and/or vireo nests. The permanent loss of up to 3.4 ha (8.3 ac) of suitable vireo habitat will be offset with the acquisition of up to 10 ha (25.0 ac) of suitable vireo habitat (Table 2). In addition, temporary impacts to suitable vireo habitat will be offset through on site restoration of 5 ha (12.3 ac) of suitable vireo habitat and the acquisition of 9.9 ha (24.6 ac) of suitable vireo habitat (Table 2).

*Indirect Effects*

Within or adjacent to the action area, vireos may be indirectly affected by degradation of vireo habitat through an increase in human activities, noise, dust, night lighting, and cowbird parasitism. Because of the small amount of habitat destruction from towers, tower pads, and other permanent features; the location of these permanent features adjacent to an existing transmission line; and the relative porous nature of transmission lines (*i.e.*, they act as more a filter than a hard barrier), indirect impacts from habitat fragmentation and isolation are not anticipated.

Human disturbance from noise and human activity could occur through construction activities during the breeding season such brush clearing for foot paths and reconductoring (*e.g.*, dragging the conductor through habitat). This impact will be minimized by establishing a buffer around vireo nests and restricting construction activity within the buffer and implementing noise attenuation measures, when appropriate (SS-CM-16).

Dust and night lighting could also impact vireos adjacent to construction activities. Dust generated from construction activities could decrease plant vigor within in adjacent vireo habitat. Dust will be minimized through implementating dust control measures, as described in the project description (G-CM-24.). In addition, lights will be of the lowest illumination allowed for human safety, selectively placed, shielded, and directed away from habitat (G-CM-13).

Nest parasitism by brown-headed cowbirds could also impact vireos, as described in the vireo Status of the Species section above. To minimize adverse impacts to vireo from brown-headed cowbirds, SDG&E will develop and implement a cowbird trapping program, in consultation with the USFS Cleveland National Forest (SS-CM-18).

2. Operations and Maintenance Activities

Road maintenance, tree trimming, and structure replacement and repair could generate noise that could affect vireo, if the activities are conducted during the breeding season. However, these activities will occur outside of the breeding season, when feasible, which will minimize impacts to vireos. If these activities cannot occur outside the breeding season, noise attenuation measures will be implemented (SS-G-CM-16).

Conclusion

After reviewing the current status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the vireo. We based this conclusion on the following:

1) Loss of suitable vireo habitat will include no more than 3.4 ha (8.3 ac) of permanent impacts and 5 ha (12.3 ac) of temporary impacts;

2) Loss of occupied vireo habitat will include no more than 0.4 ha (0.9 ac) of permanent impacts.

3) SDG&E will avoid or minimize impacts to known and any newly identified occurrences of the vireo and offset unavoidable impacts to the species;

4) Surveys for vireo in the action area and any actions to avoid, minimize, and provide for the long-term conservation of occupied habitat will add to our knowledge of vireo distribution and contribute to the range-wide conservation (recovery) of this species;

5) Temporary impacts to vireo habitat will be offset through acquisition of 10.1 ha (25 ac) and on site restoration of 5 ha (12.3 ac) of suitable vireo habitat.

6) With implementation of the conservation measures, the impacts associated with the construction, operation, and maintenance of the proposed project are not expected to appreciably reduce the numbers, reproduction, or distribution of the vireo in the action area or throughout the species' range. The vireo populations in the drainages affected by the proposed project are anticipated to remain viable for the foreseeable future following project implementation.

**Quino Checkerspot Butterfly (*Euphydryas editha quino*)**

Status of the Species

*Listing Status*

On August 4, 1994, the Service published a petition finding in the Federal Register (59 FR 39868) with a proposed rule to list the Quino as endangered. We published the final rule listing the species on January 16, 1997 (62 FR 2313). Critical habitat for the Quino was designated on April 15, 2002 (67 FR 18356). The Recovery Plan for this species was issued in August 2003.

*Species Description*

Quino is a recognized subspecies of Edith's checkerspot (*E. editha*), and is a member of the Nymphalidae family, the brush-footed butterflies, and the Melitaeinae subfamily, checkerspots and fritillaries. Quino differs from the other Edith's checkerspot subspecies in size, wing coloration, and larval and pupal phenotypes (Mattoni *et al.* 1997). Among the other subspecies of Edith's checkerspot, Quino is moderate in size with a wingspan of approximately 4 cm (1.5 in). The dorsal (top) side of its wings is covered with a red, black, and cream colored checkered pattern, the ventral (bottom) side is mottled with tan and gold. Its abdomen generally has bright red stripes across the top. Quino larvae are black and have a row of nine, orange-colored tubercles (fleshy/hairy extensions) on their back. Pupae are extremely cryptic and are mottled black and blue-gray.

*Critical Habitat*

Critical habitat for Quino is designated throughout the species' current range in the United States (*i.e.*, Riverside and San Diego counties, California). A total of approximately 69,446 ha (171,605 ac) in Riverside and San Diego Counties, California, are designated as critical habitat

for the Quino. In March 2005, the Homebuilders Association of Northern California, *et al.*, filed suit against the Service challenging the merits of final critical habitat designations for several species, including Quino. In March 2006, a settlement was reached that required the Service to re-evaluate five critical habitat designations, including critical habitat designated for Quino. A proposed revised designation of critical habitat for Quino was published on January 17, 2008 (73 FR 3327). The Service is currently finalizing the final rule to revise Quino critical habitat. The revisions are anticipated to be published in the *Federal Register* in June 2009. Until such time, critical habitat as it was designated in 2002 remains in effect.

Primary constituent elements for Quino are those habitat features that are essential for the primary biological needs of larval diapause, feeding, and pupation; adult oviposition, nectaring, roosting, basking, and dispersal; genetic exchange; and shelter. These habitat features include, but are not limited to: space for individual and population growth and for normal behavior; food, water, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, and rearing of offspring; and habitats that are protected from disturbance or are representative of the historic and geographical and ecological distributions of Quino. The primary constituent elements to the conservation of Quino include, but are not limited to the following:

1) Open areas within scrublands at least 2.0 square meters ($m^2$) (21.5 square feet[$ft^2$]) in size that:

    a) Contain no woody canopy cover; and

    b) Contain one or more of the host plants *Plantago erecta*, *Plantago patagonica*, or *Antirrhinum coulterianum*; or

    c) Contain one or more of the host plants *Cordylanthus rigidus* or *Castilleja exserta* that are within 100 m (328 ft) of the host plants *Plantago erecta*, *Plantago patagonica*, or *Antirrhinum coulterianum*; or

    d) Contain flowering plants with a corolla tube less than or equal to 1.1 cm (0.43 in) used for Quino checkerspot butterfly growth, reproduction, and feeding;

2) Open scrubland areas and vegetation within 200 m (656 ft) of the open canopy areas used for movement and basking; and

3) Hilltops or ridges within scrublands, linked by open areas and natural vegetation to open canopy areas containing an open, woody-canopy area at least 2.0 $m^2$ (21.5 $ft^2$) in size used for Quino checkerspot butterfly mating (hilltopping behavior).

A total of four units are identified in the critical habitat rule. The areas designated as critical habitat are designed to provide sufficient habitat to maintain self-sustaining populations of Quino throughout its range and provide those habitat components essential for the conservation of the

species. The critical habitat units are configured to provide room for metapopulation dynamics, including dispersal corridors, which are essential for the conservation of the species.

The SRPL project passes through the Jacumba Unit of critical habitat, which encompasses 2,820 ha (6,968 ac) of land in southeastern San Diego County south of Interstate 8 in the vicinity of the town of Jacumba. This critical habitat unit supports the Jacumba occurrence complex, identified as important to recovery in the Quino Recovery Plan. The Jacumba occurrence complex occurs within the Southeast San Diego Recovery Unit described in the Recovery Plan (Service 2003a). This apparently isolated population center occurs in a unique high-desert region of juniper woodlands, which provides a vital element of habitat heterogeneity in the species' range. The metapopulation distribution likely extends south across the international border. In this area, seven locations have been documented, six of which are concentrated to the northwest of the community of Jacumba in Anza Borrego Desert State Park and private lands. All seven locations occur within the currently designated critical habitat. One occurrence is located approximately 2.7 km (1.7 mi) to the southwest of the Action Area at MP 36. Three occurrences are located immediately adjacent to and up to 274.3 m (900 ft) south of MP 35. The remaining three occurrences are located 0.8 to 1.6 km (0.5 to 1 mi) north of MP 35. A proposed revision to critical habitat published in early 2008 would decrease the acreage included in the Jacumba Unit to 1,017 ha (2,512 ac) (73 FR3327). Five of the Quino locations described above occur within the proposed revised critical habitat (Service GIS database), two to the north and three to the south of MP 35. Occupancy has also been documented approximately 6.0 km (3.7 mi) to the south in El Condor (Baja California, Mexico), and the U.S. occurrence complex may belong to the same metapopulation.

The Jacumba Unit contains all of the features essential to the conservation of Quino: Dwarf plantain and woolly plantain host plants; nectar sources; open, woody-canopy scrublands; and hilltops (Service 2003a, pp. 52, 54; Service GIS database). Although this occurrence complex was described in the Recovery Plan as non-core, based on new occurrence information, we now consider this to be a core occurrence complex, which could be essential to conserve for the survival of the species (73 FR 3333). Habitat in this Unit is threatened by invasion of non-native annuals; Border Patrol activity; habitat destruction, degradation and fragmentation associated with development; and off-road vehicle use, foot traffic, and other recreational uses (Service 2003a, p. 84). The species in this unit may require special management considerations or protection to minimize impacts resulting from these threats (73 FR 3343).

Critical habitat has also been proposed immediately east of the route between MP 64 and 64. The La Posta/Campo Core Occurrence Complex (Unit 9) contains approximately 3,397 ha (8,393 ac) of Quino suitable habitat and is determined to be essential to the conservation of the subspecies because it is likely to contain a resilient source population (73 FR 3343).

*Distribution*

Multiple observations of Quino checkerspot butterflies have been reported across a wide elevation range, from approximately 152.4 m (500 ft) in elevation to over 1,524 m (5,000 ft) (Service 2003a). Quino was historically distributed throughout the coastal slope of southern California, including Los Angeles, Orange, Riverside, San Diego, and San Bernardino counties, and northern Baja California, Mexico (Mattoni *et al.* 1997, Service database). That distribution included the westernmost slopes of the Santa Monica Mountains, the Los Angeles plain and Transverse Ranges to the edge of the upper Anza-Borrego desert, and south to El Rosario in Baja California, Mexico (Emmel and Emmel 1973, Mattoni *et al.* 1997, Service database). Although historical collection records allow for an estimate of a species' range, such records usually underestimate the number of historical sites and extent of local distributions. Collectors tended to frequent well-known sites, and no systematic or comprehensive surveys for Quino have ever been conducted (Mattoni *et al.* 1997).

As recently as the 1950's, collectors described Quino as occurring on every coastal bluff, inland mesa top, and lower mountain slope in San Diego County and coastal northern Baja California. These observations indicate that Quino was historically widespread throughout the southern California landscape, and occurred in a variety of vegetation types, including coastal sage scrub, open chaparral, juniper woodland, forblands, and grasslands.

*Status and Population Trend*

Quino may have once been one of the most abundant butterflies in coastal southern California, but by the 1970's, most of the coastal bluff and mesa habitats in southern California had been urbanized or otherwise disturbed. However, the butterfly still occupied known habitat locations inland and at higher elevations including Dictionary Hill, Otay Lakes, and San Miguel Mountain in San Diego County, and the Gavilan Hills in Riverside County. By the middle 1980's the species was thought to have disappeared from the known locations; the petition to list the species in 1988, suggested that it might be extinct. Current information suggests that the butterfly has been extirpated from Los Angeles, Orange, and San Bernardino Counties and the North County Multiple Habitat Conservation Program (MHCP) planning area in San Diego County. Nonetheless, new populations were discovered in portions of Riverside and San Diego Counties, and the species continues to survive in northern Baja California, Mexico. However, more than 75 percent of the Quino's historic range has been lost (Brown 1991, Service database), and more than 90 percent of the species' coastal mesa and bluff habitat, where most historic records are located, has been destroyed by habitat fragmentation, degradation, and development (Service database). It is estimated that Quino population density range-wide has been reduced 95 percent by human-caused impacts.

*Habitat Affinity*

In southwestern San Diego County, the primary host plants for the Quino are dot-seed plantain (*Plantago erecta*), thread-leaved bird's beak (*Cordylanthus rigidus*), and white snapdragon (*Antirrhinum coulterianum*). Larval Quino may also use other species of plantain (*Plantago spp*.) and annual owl's-clover (*Castilleja exerta*) as primary or secondary host plants and would diapause in or near the base of native shrubs, such as California buckwheat (*Eriogonum fasciculatum*) (73 FR 3327). While the use patterns of primary and secondary larval host plants are not fully understood, there is evidence that both may be necessary for the survival of Quino larvae (Service 2003a). Quino larvae, particularly in the early instars, have a very limited capacity for dispersion. Therefore, high local host plant density is necessary for high larval survival rates (Service 2003a). In its adult stage, the Quino use a number of flowering plants as nectar sources. These nectar sources are known to include lomatium (*Lomatium spp*.), goldfields (*Lasthenia spp*.), popcorn flowers (*Plagyobothrys* and *Cryptantha spp*.), gilia (*Gilia spp*.), ground pink (*Linanthus dianthiflorus*), chia (*Salvia columbariae*), annual lotus (*Lotus spp*.), onion (*Allium spp*.), yerba santa (*Eriodictyon spp*.), and California buckwheat (*Eriogonum fasciculatum*) (67 FR 18359, Mattoni *et al.* 1997).

Quino are generally found in open areas and ecotone situations which may occur in a number of plant communities, including grasslands, coastal sage scrub, and native woodlands with an open canopy cover. Open areas within a given vegetation community seem to be critical landscape features for Quino populations. Optimal habitat appears to contain little or no invasive exotic vegetation, and especially, a well developed crytogamic crust. Densely vegetated areas are not known to support Quino (Mattoni *et al.* 1997). Habitat patch suitability is determined primarily by larval host plant density, topographic diversity, nectar resources availability, and climatic conditions (Service 2003a).

*Life History*

The life cycle of Quino typically entails one generation of adults per year, with a four to six week flight period occurring generally February to May, depending on weather conditions (Emmel and Emmel 1973, Orsak 1978). During the flight period, adult butterflies move about and search for nectar sources and mates. Females also search for oviposition sites and deposit eggs. Females lay multiple masses of 20 to 150 eggs (Service 2003a) with a single female capable of producing more than 1,000 eggs. The eggs hatch in about 10 days and the larvae begin to feed immediately. At lower elevations in San Diego County, the primary host plant for Quino is the dot-seed plantain (*Plantago erecta*); however, Quino checkerspots may use other species of plantain (*Plantago* spp.) and annual owl's-clover (*Castilleja exserta*). As the larvae grow, they periodically shed their skin. Each phase between skin molts is referred to as an "instar" with the first instar being the first larval stage after hatching.

After hatching from eggs, the small, cryptic, larvae normally consume the plant on which they hatch and then migrate in search of additional plants (Service 2003a). As summer approaches

the food plants dry out. In their third or fourth instar, larvae enter into an obligatory diapause. Diapause is a low-metabolic resting state that may last for a year or more, depending on conditions. Diapause allows larvae to survive the regular seasonal climatic extremes and also to better survive times of extended adverse conditions, such as drought. After termination of diapause, larvae become active and feed. They then enter their pupal stage and within two to six weeks, transform into the adults and emerge as butterflies. The butterflies feed, disperse, mate, reproduce, and then die. Adults live for approximately 10 to 14 days.

Adult Quino are sedentary by nature and generally fly close to the ground. Evidence from the Bay checkerspot suggests that long-distance dispersal is rare (Ehrlich 1961, Brussard and Ehrlich 1970, Ehrlich and Murphy 1981). Bay checkerspots have been documented to move up to about 4.5 km (2.8 mi) to colonize distant habitat patches (Harrison 1989). For the Quino, many experts familiar with the species believe that populations separated by more than about 3 km (approximately 2 mi) may be demographically isolated. However, responses to abiotic factors, such as weather, may increase the distance butterflies would move (Ehrlich and Murphy 1987). Plant resources shift over time and Quino populations have evolved to respond to shifting habitat patch suitability in space and time (67 FR 18359). Additionally, adult Quino are known to "hilltop." Hilltopping is a behavior where male, and to a lesser extent female, butterflies form territories on hilltops, ridgelines, and other prominent geographic features in order to locate mates. Therefore, hilltops and ridgelines may be crucial for population survival, even in the absence of nearby larval host plants.

*Threats and Conservation Needs*

Quino are threatened primarily by urban and agricultural development, non-native plant species invasion, off-road vehicle use, grazing, and fire management practices (62 FR 2313). These threats destroy and degrade the quality of habitat and result in the extirpation of local Quino populations. Also, Quino population decline likely has been, and could continue to be, caused in part by enhanced nitrogen deposition, elevated atmospheric carbon dioxide concentrations, and climate change (Service 2003a). Nonetheless, urban development poses the greatest threat and exacerbates all other threats. Activities resulting in habitat fragmentation or host or nectar plant removal reduce habitat quality and increase the probability of local Quino population extirpation and species extinction. Other threats to the species identified in the final listing rule (62 FR 2313) include illegal trash dumping and predation. Dumping, a documented problem for some populations (67 FR 18356), is detrimental because of resulting habitat degradation and destruction. Over-collection by butterfly hobbyists and dealers is a probable threat, although the magnitude of this activity is unknown. Stamp (1984) and White (1986) examined the effects of parasitism and predation on the genus Euphydryas, although it is not clear whether these mortality factors pose a significant threat to this species. Predation by Argentine ants (*Iridomyrmex humilis*) has been observed in colonies of the butterfly in the laboratory (67 FR 18356) and intense predation by non-native Brazilian fire ants (*Solenopsis invicta*) is likely where they co-occur with Quino (Porter and Savignano 1990). Brazilian fire ants were documented in 1998 in the vicinity of historic Quino habitat in Orange County and have

subsequently been found in Riverside and Los Angeles Counties (California Department of Food and Agriculture 1999).

Recent studies have shown competitive exclusion by non-native plants may be accelerated by nitrogen deposition from atmospheric pollution in southern California vegetation communities (Allen *et al.* 1997, Eliason and Allen 1997, Padgett and Allen 1999, Padgett *et al.* 1999). The non-native weeds may also directly out-compete the native plants, including butterfly host-plant species. This effect has been documented in a native plant community that supports the Bay checkerspot butterfly (*E. e. bayensis*) in the San Francisco Bay area (Weiss 1999). Not only does the increase in weeds degrade the quality of the native habitat, it may also increase the frequency or severity of wildfires, further adversely impacting the vegetation community and resident wildlife species.

In the fall of 2007, San Diego County experienced several major wildfires. These fires burned extensive areas of Quino habitat within the Action Area and surrounding Service Quino survey areas, including the areas where TRC's 2008 surveys were positive for Quino (TRC 2008). The northernmost occupied areas within the Otay Mountain Core Occurrence Complex (Honey Springs and Dulzura non-core occurrence complexes as identified in the recovery plan) had the highest densities of adult butterflies and supported the most reproduction (observed larvae) of any known occupied areas in 2007 (Service 2009). These areas were not affected by the 2003 Otay and 2005 Border 50 fires. Therefore, observed relatively high Quino checkerspot butterfly abundance in 2007 in the Honey Springs and Dulzura areas (Service 2009) appears to have been primarily due to the lack of recent fire impacts (Alison Anderson, pers. comm., 2007). In 2007, the Harris Fire perimeter encompassed approximately 72 percent of the new Otay Mountain Core Occurrence Complex, including the northern areas that were not affected by fire in 2003 or 2005 (Service GIS database). Habitat damage within the 2007 fire perimeter is still being assessed. In 2008, caterpillars and butterflies were found in the Dulzura and Otay Lakes areas in patches of unburned habitat within the fire perimeter. Thus, we believe that the fire has temporarily reduced Quino density but is not likely to directly extirpate Quino in typical San Diego County habitat (Alison Anderson, Service, pers. com.).

Conservation needs include protecting habitat supporting known current populations (occurrence complexes) and landscape connectivity between them; conducting research necessary to refine recovery criteria; management of Quino habitat including enhancement of host plant populations, diversification of nectar sources and pollinators, and control of non-native plants; establishing and maintaining a captive propagation program; targeted reintroduction if determined to be necessary; and establishing a cooperative outreach program.

Significant areas of remaining Quino habitat have recently been protected through inclusion in HCP preserve areas, the San Diego National Wildlife Refuge, and through habitat acquisition initiatives as described below.

The subregional plan for the MSCP, did not list the Quino as a covered species at the time it was developed. However, the City of Chula Vista did cover the Quino in its MSCP Subarea Plan (conserving 1,135 ha (2,806 ac) of Quino habitat). Chula Vista also provides active Quino management in their preserve areas. Lands placed into the Service's San Diego National Wildlife Refuge also provide for the conservation of the Quino. The Rancho San Diego and Las Montanas Occurrence Complexes are located on the Otay/Sweetwater Unit of the Refuge. Approximately 3,642 ha (9,000 ac) of Quino habitat are conserved within the Refuge. CDFG manages over 4,047 ha (10,000 ac) of occupied Quino habitat within the current MSCP preserve. In addition, the Service provided the State of California with $10,000,000 for the additional acquisition of 333 ha (824 ac) of Quino habitat in the Proctor Valley area of the Southwest San Diego Recovery Unit.

The Western Riverside County MSHCP supports approximately 209,551 acres of potential Quino habitat. To offset impacts to Quino, 52,502 acres (25 percent) of modeled habitat will be conserved within the anticipated Additional Reserve Lands with management prescriptions that will benefit the Quino. An additional 59,159 acres (28 percent) of modeled habitat for the Quino checkerspot butterfly will remain in Public Quasi-Public Lands, which likely will be managed for the butterfly. In total, 53 percent of the modeled habitat for the Quino checkerspot butterfly will be conserved or remain in the Plan Area. In addition, 26 of 27 Quino occurrences are anticipated to remain following project implementation. The Permittees are also conducting ongoing monitoring of Quino populations and management actions to maintain or enhance Quino habitat, including management for nonnative species, farming, grazing, off-road vehicles, human collection, and other specific threats to the species. To minimize mortality from road strikes and maintain dispersal corridors, the Western Riverside County MSHCP proposes to implement engineering design measures including the potential use of wildlife overcrossings, undercrossings, or roadbed sinkings, and installation of tall barriers (*e.g.*, tall fencing, vegetation windrows) where cores and linkages intersect.

Within the USFS lands that the SRPL route passes through, the USFS is implementing the Cleveland National Forest Service Management Plan, under which Quino is a managed species. To offset impacts to Quino from activities within USFS lands, no new permanent loss of Quino occupied or designated critical habitat is expected under the Plan. Any new projects will be implemented so that they promote the recovery of Quino on USFS lands. Any potential impacts associated with ongoing use of roads, trails and recreation sites is expected to be minor or negligible upon implementation of designated minimization measures due to the low impact nature of anticipated activities (*i.e.*, such as maintenance of existing powerlines or use of roads on an infrequent basis).

The SRPL route also passes through BLM land that is managed under the ESDRMP. Under the ESDRMP, the Service issued a programmatic biological opinion that provided take for Quino in a biological opinion issued in September 2008. To offset unavoidable impacts to suitable/unoccupied and occupied Quino habitat by proposed projects, BLM was conditioned to restore degraded habitat at no less than a 2:1 ratio (restored:developed) for suitable/unoccupied

habitat and a 3:1 ratio for occupied habitat within the Planning Area. The BLM is also minimizing impacts to Quino and designated critical habitatthrough implementation of the following measures included in the ESDRMP: (1) rehabilitation of habitats that support Special Status Species would be priority, and (2) non-native invasive plant species would be removed through mechanical and/or herbicidal removal and prescribed fire to restore degraded native plant communities and to prevent non-native species infestations following fire events. Also, site-specific habitat evaluations and species-specific biological surveys would be conducted prior to initiation of ground-disturbing activities to determine the status of listed species for project proposals that may require consultation with the Service.

Environmental Baseline

According to historical sightings, historical range, and presence of host plant and other essential habitat features for Quino, suitable habitat for the Quino exists in the Inland Valley South Link and the CNF South Link between Milepost 27 to MP 119 (TRC 2008). The route from MP 27 to MP 119 falls within the Service's *Year 2005 Recommended Survey Areas 1 and 2* (Service 2005b). While this entire section of the route falls within the recommended survey areas, only a portion of it is suitable habitat.

Due to the large size of the action area, the large amount of private lands within the action area, and changes in the route after surveys were completed, the entire action area has not been surveyed; however, protocol surveys were conducted for SDG&E by TRC in 2007 and 2008 in much of the action area (Figure 5). In the absence of complete survey data, we relied on the species data provided in the BA from the TRC surveys that were conducted, the CNDDB, and the Service's knowledge of the species to determine the extent of suitable Quino habitat in the action area.

Given that comprehensive vegetation and protocol Quino surveys have not been conducted along the ROW, any part of the action area that falls inside the Service's Recommended Survey Areas and meets one or more of the following criteria was assumed to be potentially suitable for Quino: 1) is within 1 km (0.6 mi) of a known Quino occurrence; 2) intersects with either final or proposed critical habitat; or 3) contains any known Quino habitat requirements (*i.e.*, vegetation types, host plants, and nectar sources). Quino habitat is typically defined by the percent coverage and presence of host plants and nectar sources. The percent coverage was not available for the action area, so all areas with known locations of host plants and/or nectar sources within the ROW were identified as potential habitat. Based on information provided in the BA, 594.0 ha (1,467.9 ac) of suitable Quino habitat occurs within the SRPL ROW. Quino could also be present outside the ROW in the action area.

Based on the on-the-ground habitat assessments and species occurrence data collected by SDG&E, it is likely that the amount of occupied Quino habitat within the project footprint is substantially less than the area estimated above. As shown in Table 2 and described in Appendix C, the amount of occupied Quino habitat within the project footprint likely to be permanently

impacted is estimated as no more than 16.3 ha (40.3 ac) including designated critical habitat, or 46.4 ha (93.6 ac) including proposed revised critical habitat.

Potential Quino habitat appears to be concentrated along four different stretches of the proposed project: MP 32 to 39 in the Jacumba Unit of critical habitat, MP 72 to 84 near Barrett Lake; MP 103 to 109 near El Capitan Reservoir; and MP 112 to 119 near San Vicente Reservoir (Figure 5).

*MP 32 to 39 in the Jacumba Unit of critical habitat*

Surveys were not conducted in the CNF South Link between MPs 32 and 39; however, we believe that the potential for Quino to occur along this segment of the action area is high given its presence in critical habitat and near a known large occurrence complex at MP 35 and 36 (Figure 5). As described in the Status of the Species section, this core occurrence complex is believed to be important for the recovery of the species.

*MP 72 to 84 near Barrett Lake*

During protocol surveys conducted in 2008, 14 Quino individuals were observed (Figure 5) in the CNF South Link between MPs 75 and 82 near Barrett Lake, and host plants were recorded between MPs 75 and 84 (TRC 2008). This Quino population was previously unknown, and the high density of individuals documented in this area suggests that this is a potentially important population.

MP 72 to 75 were not surveyed; however, given that many of the new occurrences documented by TRC in 2008 were found adjacent to this portion of the action area, there is a moderate to high potential that Quino occur in this portion of the action area as well.

*MP 103 to 109 near El Capitan Reservoir*

Quino host plants were recorded by SDG&E's surveyors between MPs 103 and 109. High potential exists for Quino to occur between MP 106 and 107 due to the high concentration of host plants and proximity to known locations of Quino.

*MP 112 to 119 near San Vicente Reservoir*

In 2007, protocol surveys were conducted for Quino within the Inland Valley South Link from MPs 114 to 119 (TRC 2007). No Quino were observed. Quino host plants were recorded by SDG&E's surveyors between MPs 112 and 119. The Service's GIS database also includes two Quino occurrences to the north of 1.4 km (0.87 mi) of MP 113 and one occurrence 1.8 km (1.12 mi) to the southwest of MP 113.

Environmental Baseline for Critical Habitat

The SRPL Project will pass through the Jacumba Unit (Unit 4) of designated critical habitat. The action area includes a total of 198.9 ha (491.5 ac) of the 2,820 ha (6,968 ac) of existing designated Quino critical habitat in Unit 4 and 115.5 ha (258.5 ac) of the 1,017 ha (2,512 ac) proposed Quino critical habitat in Unit 4. There are multiple Quino observations within the action area at MP 35 and 36. As described in the Status of the Species section, Unit 4 contains unique habitat for Quino, consisting high-desert region of juniper woodlands, which provides a vital element of habitat heterogeneity in the species' range.

Like the rest of Unit 4, the action area contains all of the features essential to the conservation of Quino: Dwarf plantain and woolly plantain host plants; nectar sources; open, woody-canopy scrublands; and hilltops (Service 2003a, Service GIS database). Although this occurrence complex was described in the Recovery Plan as non-core, based on new occurrence information, we now consider this to be a core occurrence complex, which could be essential to conserve for the survival of the species (73 FR 3333). Habitat in this Unit is threatened by invasion of non-native annuals; Border Patrol activity; habitat destruction, degradation and fragmentation associated with development; and off-road vehicle use, foot traffic, and other recreational uses (Service 2003a).

Effects of the Action

For the purpose of this biological opinion and conference opinion, we addressed direct and indirect impacts to Quino occupied habitat using the values provided in Table 2. The acreages in Table 2 were calculated based on information obtained during 2008 field surveys along the proposed SRPL alignment, as described in Appendix C, and using the acreage of designated Quino critical habitat and proposed revised Quino critical habitat likely to be impacted by the proposed project. Potential effects during construction of the SRPL Project and from long-term operations and maintenance activities are included in our analysis.

The proposed project will permanently impact up to 10.0 ha (24.7 ac) of occupied Quino habitat and up to 6.3 ha (15.6 ac) of designated Quino critical habitat for total habitat impacts of up to 16.3 ha (40.3 ac) (Table 2). The proposed project will temporarily impact up to ha 21.8 ha (53.9 ac) of occupied Quino habitat and up to 14.8 ha (39.7 ac) of designated Quino critical habitat for total habitat impacts of up to 36.6 ha (93.6 ac). If proposed revised critical habitat is designated as final critical habitat, impacts to designated critical habitat will be reduced to 3.4 ha (8.4 ac) of permanent and 2.7 ha (6.6 ac) of temporary impacts.

Conservation Measures **SS-CM-3** through **SS-CM-7**, **SS-CM-26**, and **SS-CM-27** are particularly relevant to SDG&E's commitment to avoid, minimize, and offset impacts to Quino and are repeated here for ease of reference.

**SS-CM-3** A biologist permitted by the Service will delineate suitable/occupied habitat) that will be impacted by project construction. Suitable/unoccupied habitat is defined as areas containing the primary constituent elements (PCEs) as outlined in the January 17, 2008, proposed revision to critical habitat (73 FR 3328) (see the "Status of the Species/Critical Habitat" section below for a discussion of the PCEs for Quino). Occupied Quino habitat is defined as contiguous suitable habitat containing the PCEs within 2 kilometers of a known Quino occurrence ("habitat-based population distribution") (73 FR 3328). Delineated suitable/occupied habitat and the results of the Quino protocol presence/absence surveys will be submitted to the Service for review and approval before an incidental take permit may be issued for this species. Impacts to Quino habitat will be determined by the amount of suitable/unoccupied habitat and/or occupied habitat that is proposed to be impacted indirectly and directly.

**SS-CM-4** A pre-construction, Service protocol presence/absence survey for the adult Quino will be conducted within the delineated suitable/occupied habitat in the construction zone. Any surveys will be conducted in a year where Quino is readily observed at Service Quino-monitored reference sites to determine what areas are occupied by Quino (*i.e.*, any suitable habitat within 1 km (0.6 mi) of a current Quino sighting is considered occupied) and what areas are not occupied. The biologist will record the precise locations of Quino larval host plants and nectar sources within the construction zone (and 10 meters beyond) using GPS technology.

- If the protocol pre-construction Quino survey is determined by the Service to be conclusive, then areas found to be unoccupied by Quino will not require species-specific compensation.

- If the Service determines that the protocol pre-construction survey is not conclusive for determining Quino absence (due to limited detectability per the 2002 protocol, for example), then all suitable habitat areas will be considered potentially occupied. SDG&E will avoid siting any permanent or temporary impacts within 0.6 mi (1 km) of any known or newly discovered Quino occurrences. If the SDG&E believes that impacts to Quino are unavoidable, it will provide evidence to such an effect to the Service for review and approval. Any approved impacts to Quino occupied or Quino suitable habitat will require compensation as follows. If construction occurs outside the larvae and adult activity season (June 1 through October 15), stays at least 10 m (33 ft) away from all host plant locations, and does not impact suitable habitat then no compensation is required (Service 2007a). If construction occurs between October 16 and May 31, is within 10 m (33 ft) of host plant locations, or removes suitable habitat then, (1) temporary impacts to the habitat will be mitigated at 2:1 through 1:1 on-site restoration of temporarily disturbed areas and 1:1 offsite acquisition and preservation of an equal sized, contiguous area of Quino-occupied habitat, and (2) permanent impacts will be compensated through 3:1 off-site acquisition and preservation of Quino-occupied habitat (or Quino-designated critical habitat for impacts to designated critical habitat). Any acquired habitat will be approved by the CPUC, BLM, USFS, and the Wildlife Agencies. A Service approved biologist will be

present during all construction activities in potentially occupied habitat to monitor and assist the construction crews to ensure impacts occur only as allowed. This same compensation will apply where the protocol pre-construction survey was conclusive for determining that the Quino is present and where construction will occur in designated critical habitat. Impacts to Quino critical habitat must be off-set within the same Critical Habitat Unit where the impacts occur.

- If host plant mapping is not possible during the pre-construction survey (*e.g.*, drought prevents plant germination), then all suitable habitat (*i.e.*, non-excluded habitat per the 2002 protocol) will be considered occupied by the Quino and compensated under the assumption that Quino is present.

**SS-CM-5** Any Service-approved restoration of impacted habitat will be conducted in areas with appropriate topographical and biological features to be determined by the Service, BLM, USFS and SDG&E. The details of the restoration shall be based on Appendix II of the Recovery Plan for the Quino Checkerspot Butterfly (Service 2003a) and described in a plan to be reviewed and approved by the Service. The restoration plan shall include, but not be limited to: (1) larval host plants (local stock, if possible) to be planted; (2) nectar resources; (3) irrigation needs and/or other establishment procedures; (4) timeline for implementation; (5) success criteria; (6) contingency measures for success criteria that are not met; (7) weed control measures; (8) monitoring program; and (9) implementation schedule. The restoration plan will be prepared and submitted to the Service prior to commencement of ground disturbance associated with the proposed project. The proposed project will not commence until the restoration begins. The restoration plan actions will be completed no later than completion of project construction. Success criteria will be modeled on undisturbed native plant communities in the vicinity of the proposed project and sites within the area known to be occupied by Quino.

**SS-CM-6** Due the extreme importance of the Quino population located in the Jacumba Unit of Quino critical habitat, SDG&E will consult with the Service regarding the final design and siting of all permanent and temporary impacts (e.g., towers, pads, access roads, staging areas, pull down areas, helipads, and fuel modification zones) within Quino critical habitat. SDG&E will work with the Service to ensure that no larvae or adults within critical habitat will be impacted by this project.

**SS-CM-7** No new construction will occur during the Quino flight season within 0.6 mi of any known or newly discovered Quino occurrence. If it is not feasible to construct outside of the flight season in these instances, SDG&E must obtain written consent from the Service to proceed with construction.

**SS-CM-26** If access roads in Quino-occupied or suitable habitat are maintained (*i.e.*, regraded) and vegetation around structures is cleared at least once every two years, then no additional compensation will be required for this ongoing maintenance. If more than two years pass

without re-grading or clearing, then the maintenance will be considered a new impact to Quino and would be compensated based on SS-CM-2.

**SS-CM-27** Some O&M activities associated with the project may need to be conducted on emergency basis. Under these circumstances, no pre-activity survey will be conducted and no Quino adult surveys will be conducted. SDG&E may take action immediately and must contact the Service within 24 hours after undertaking the activity to provide information on the location and emergency nature of the activity. Unavoidable impacts that occurred during emergency O&M activities will be mitigated at a 2:1 ratio.

1. Construction Activities

*Direct Effects*

Activities along the transmission line to construct towers, pads, access roads, staging areas, pull down areas, and helipads will potentially result in direct impacts to Quino individuals. Potential direct impacts to Quino from the proposed project include the removal or crushing of host plants in constructions areas and the death of larvae or eggs of the Quino if they have colonized those plants. In addition, crushing or trampling of eggs, larvae or adults could occur if there is human foot traffic through host plants and/or nectar sources outside of the proposed impact area. Adult Quino checkerspot butterflies may be injured or killed by moving vehicles during construction.

In addition to the potential impacts to Quino individuals discussed above, the proposed project will permanently impact up to 16.3 ha (40.3 ac) of occupied Quino habitat, including designated critical habitat, and temporarily impact up to an additional 36.6 ha (93.6 ac) of occupied Quino habitat, including designated critical habitat. Permanent habitat removal within the action area will increase fragmentation of habitat known to support the species. Fragmentation of habitat has at least three risks for Quino: 1) demographic units may be destroyed, reduced in size, or subdivided, thus increasing their probability of extinction; 2) potential sources of immigrants may be lost; and 3) immigration may be impeded by conversion of natural habitat between areas of suitable habitat (Wilcox and Murphy 1985).

Permanent impacts to Quino habitat (occupied habitat and designated critical habitat) will be offset by the off site acquisition and preservation of similar Quino habitat at a minimum 3:1 ratio (SS-CM-4). Temporary impacts to Quino habitat (occupied habitat and designated critical habitat) will be offset through 1:1 on site restoration and 1:1 off site acquisition and preservation of similar Quino habitat **(SS-CM-4**). A total of up to 52 ha (128 ac) of occupied Quino habitat and up to 35.0 ha (86.5 ac) of designated critical habitat will be acquired off-site consistent with these ratios. If proposed revised critical habitat is designated as final critical habitat prior to project implementation, impacts to designated critical habitat will be reduced and offsite acquisition and onsite restoration requirements reduced, accordingly.

SDG&E will also restore up to 14.8 ha (39.7 ac) of designated critical habitat, or up to 2.7 ha (6.6 ac) if proposed critical habitat is designated as final critical habitat prior to project implementation. The proposed restoration will follow the methods and success criteria outlined in a Service-approved restoration plan, consistent with **SS-CM-5**. In addition, a long-term habitat management plan will be developed and implemented for all off-site preservation areas, consistent with **G-CM-17**. Based on these collective conservation actions, we believe the proposed replacement habitat will effectively offset the anticipated adverse effects to occupied Quino habitat, designated Quino critical habitat, and associated loss of Quino individuals from the SRPL Project's construction activities.

*Indirect Effects*

Indirect impacts to Quino habitat could occur where the construction is directly adjacent to Quino habitat. Wind borne dust particles from construction traffic and blasting could affect Quino host plants, such as dot-seed plantain (*Plantago erecta*), by covering them with a layer of dust. Dust on the plants could potentially inhibit their growth as well as decrease their palatability to Quino larvae. Elevated dust levels may also affect the ability of the larvae and adults to respire normally. Insects are known to be adversely affected by being coated with oil films, emulsions, or dust particles that clog the respiratory openings (spiracles) on their bodies and can stop respiration (Storer *et al*. 1972). Implementation of proposed dust reduction measures (**G-CM-5** and **G-CM-24**) proposed by SDG&E is anticipated to minimize effects associated with increased dust.

Lighting in areas where Quino occur could increase the number (and type) of Quino predators. Phototropism (moving toward light) in arthropods is common and if Quino are attracted to lights, they may be killed or harmed by the lights themselves, automobiles, or predators. The presence of lights is anticipated to increase the number of insectivorous bats foraging around some project features, such as substations. An increase in predatory bats could decrease the number of adult Quino in the action area. The use of night lighting that is of the lowest illumination allowed for human safety, selectively placed, shielded, and directed away from preserved habitat, as proposed by SDG&E (**G-CM-13**), is anticipated to minimize effects associated with lighting.

Potential indirect effects to Quino habitat also include the unintentional conversion from native vegetation to non-native annual grassland resulting in the potential displacement of larval host plants and replacement of nectar plants, including dominant shrubs. Unpaved roads and trails, such as access roads or footpaths, can serve as conduits of nonnative seed dispersal as seeds of invasive plant species could be transported through the project area on shoes, as well as construction and maintenance vehicles. Non-native plants have been shown to displace Quino host plant, which appears to be a poor competitor against non-native grasses (Service 2003a). In addition to displacing larval host plants, nonnative annuals have been shown to replace nectar sources (Service 2003a). Implementation of the Weed Control Plan (**G-CM-20**) proposed by SDG&E is anticipated to minimize effects associated with increased introduction of non-native plants.

2. Operations and Maintenance Activities

There is potential for direct and indirect effects to Quino during the operations and maintenance program for the project. The use of access roads constructed within and adjacent to occupied Quino habitat could result in the removal or crushing of host plants if roads are not maintained, and Quino host plants encroach into these areas. Road maintenance could also result in the death of larvae or eggs if Quino colonize plants along or within access roads that are not well maintained. **SS-CM-26** requires compensation for impacts to Quino habitat in the event that roads are not maintained.

Adult Quino may also be injured or killed by moving vehicles. Use and maintenance of roads may also facilitate the establishment of invasive non-native plant species. The seeds of invasive, non-native plants could be spread into Quino habitat by way of shoes, maintenance equipment, and vehicle tires. Implementation of **G-CM-21**, **G-CM-25**, **G-CM-26**, **G-CM-28**, **G-CM-29**, **G-CM-43**, and **G-CM-48** will minimize impacts to Quino that could occur due to the use of the project's access roads. Potential impacts that could occur due to non-native plant invasion will be minimized through the implementation of **G-CM-20** and **G-CM-47**.

Critical Habitat

The same direct and indirect effects are anticipated to occur in Quino critical habitat as anticipated to occur in the remainder of occupied Quino habitat. As such, impacts to both existing designated critical habitat and proposed revised critical habitat will be minimized through implementation of Conservation Measures **SS-CM-3** through **SS-CM-7**, **G-CM-5**, **G-CM-13**, **G-CM-17**, **G-CM-20, G-CM-21**, **G-CM-25**, **G-CM-26**, **G-CM-28**, **G-CM-29**, **G-CM-43**, **G-CM-47 and G-CM-48**. Specifically, before any construction may occur in Quino critical habitat, SDG&E must consult with the Service in siting all temporary and permanent impacts to ensure that no larvae or adults within critical habitat will be impacted by the project. In addition, SDG&E will prepare a Service-approved habitat restoration plan for any Quino habitat that is temporarily impacted by the project and will compensate for permanent impacts through the acquisition and preservation of Quino occupied habitat.

*Designated Critical Habitat (67 FR 18356)*

The project will permanently impact no more than 6.3 ha (15.6 ac) and temporarily impact no more than14.8 ha (39.7 ac) of designated Quino critical habitat in the Jacumba Unit (Unit 4, Service 2002). These impacts represent less than one percent of the 2,820 ha (9,970 ac) of designated critical habitat within Unit 4.

SDG&E will minimize the permanent loss of designated Quino critical habitat through off-site acquisition and preservation at a 3:1 ratio (**SS-CM-4**). Temporary impacts to designated Quino critical habitat will be offset at a 2:1 ratio and will include 1:1 on-site restoration and 1:1 off-site acquisition and preservation of designated Quino critical habitat.

The biological function of Unit 4 (identified as breeding, feeding and sheltering habitat) of designated Quino critical habitat is expected to be maintained during and after project construction because of the relatively small amount of permanent impacts, the restoration of temporary impacts, and the conservation measures described above.

*Proposed Revised Critical Habitat (73 FR 3328)*

The project will have no more than 3.4 ha (8.5 ac) of permanent impacts and 2.7 ha (6.6 ac) of temporary impacts to proposed revised Quino critical habitat in the Jacumba Unit (Unit 10; Service 2008). In Unit 10 of the proposed revised critical habitat, project impacts represent less than one half percent of the 1,017 ha (2,514 ac) of proposed revised critical habitat.

SDG&E will minimize and offset the permanent and temporary loss of the proposed revised Quino critical habitat prior to project implementation at the same ratios as the currently designated critical habitat (*i.e.*, off-site acquisition and preservation at a 3:1 conservation to impact ratio for permanent impacts and at a 2:1 ratio for temporary impacts (1:1 on-site restoration and 1:1 off-site acquisition and preservation of proposed revised Quino critical habitat). The amount of designated critical habitat proposed for offsite acquisition and onsite restoration is included in the overall offsite and onsite conservation acreages specified above in the direct effects section.

The biological function of Unit 10 (identified as breeding, feeding and sheltering in 73 FR 3328) of proposed revised Quino critical habitat is expected to be maintained during and after project construction because of the relatively small amount of permanent impacts, the restoration of temporary impacts, and the conservation measures described above.

Conclusion

After reviewing the current status of the Quino, the environmental baseline, effects of the proposed action, and the cumulative effects, it is our biological and conference opinion that the proposed action will not jeopardize the continued existence of the Quino or to adversely modify its designated or proposed critical habitat.

We reached this conclusion by considering the following:

1) Loss of Quino habitat will occur outside of the flight season, to the maximum extent practicable; we do not anticipate that Quino adults will be killed or injured during habitat clearing or grading activities.

2) Before impacts are allowed to occur within designated Quino critical habitat (either existing or proposed), SDG&E will consult with the Service to determine the final locations of all impacts so that the functionality of the critical habitat unit(s) will not be altered.

3) Loss of suitable Quino habitat will include permanent impacts of no more than 16.3 ha (40.3 ac) and no more than 36.6 ha (93.6 ac) of temporary impacts, which represents only a small portion of the occupied habitat throughout the species range;

4) Permanent and temporary loss of habitat will be spread across the CNF South Link and Inland Valley South Link portions of the action area and occur in small isolated patches measured in square feet, thus minimizing effects to Quino across the project area.

5) The temporary impacts to Quino habitat will be will be restored to its original condition or better at a 2:1 ratio;

6) Loss of designated or proposed revised Quino critical habitat represents only a very small portion (less than 1 percent) of the species designated and proposed revised critical habitat; thus the function of designated critical Habitat Unit 4 and proposed revised critical habitat Unit 10 to support breeding, feeding, and sheltering of Quino will be maintained;

7) Direct and indirect impacts to vireo would be avoided and minimized through the implementation of the General and Species-Specific Conservation Measures such that the impacts associated with the construction, operation, and maintenance of the proposed action are not expected to appreciably reduce the numbers, reproduction, or distribution of the Quino in the action area or throughout the species' range. The Quino populations in the action area are anticipated to remain viable for the foreseeable future following project implementation; and.

8) The Quino surveys in the action area and the offsite acquisition and protection of Quino occupied habitat will contribute to our knowledge of the species and support the range-wide conservation needs (recovery) of Quino.

**Arroyo Toad (*Bufo californicus*)**

Status of the Species

*Listing Status*

The Service listed the arroyo toad as endangered on December 16, 1994 (59 FR 63264), and a recovery plan was published in July 1999 (Service 1999). Critical habitat was designated for the toad on February 7, 2001 (66 FR 9414), but it was vacated by court order on October 30, 2002, and remanded for re-designation. Critical habitat for the toad was re-proposed on April 28, 2004 (69 FR 23254), and it was finalized on April 13, 2005 (70 FR 19562); no critical habitat is within the project area. A recovery plan for the toad was completed on September 24, 1999 (Service 1999).

*Species Description*

The arroyo toad is a small, dark-spotted toad of the family Bufonidae. The parotoid glands, located on the top of the head, are oval-shaped and widely separated. A light/pale area or stripe is usually present on these glands and on top of the eyes. The toad's underside is buff-colored and usually without spots (Stebbins 1985). Recently metamorphosed individuals will easily blend with the substrate and are usually found adjacent to water. At the time of listing, the toad was described as the arroyo southwestern toad (*Bufo microscaphus californicus*). Gergus (1998) published genetic justification for the reclassification of the arroyo southwestern toad as a full species (*i.e.,* arroyo toad (*Bufo californicus*)).

*Habitat Affinities*

Toads require shallow, slow-moving streams, and riparian habitats that have natural flooding regimes which maintain areas of open, sparsely vegetated, sandy stream channels and terraces (Service 2001b). Optimal breeding habitat consists of low gradient stream reaches that have shallow pools with fine textured substrates (*i.e.,* sand or gravel). Upland habitats used by toads during both the breeding and non-breeding seasons include alluvial scrub, coastal sage scrub, chaparral, grassland, and oak woodland (Griffin *et al.* 1999, Service 2001b). This species has been observed moving approximately 2.6 km (1 mi) within a stream reach and up to 1.1 km (0.7 mi) away from the stream, into native upland habitats (Holland and Goodman 1998, Sweet 1992) or agricultural areas (Griffin *et al.* 1999). Holland and Sisk (2001) found on Cristianitos Creek on Camp Pendleton that 88.73 percent (323 of 364) of captures of adult and subadult toads were within the riparian area and 11.26 percent (41 of 364) were in upland habitats; no metamorphic toads were captured in uplands. Of the 41 captures, distances from the edge of the riparian area varied greatly from 25-1,142 m (82-3,747 ft) (mean 539 m (SD=330 m)). Movement distances may be regulated by topography and channel morphology (Holland and Sisk 2000). Toads are critically dependent on upland terraces and the marginal zones between stream channels and upland terraces during the non-breeding season, especially during periods of inactivity, generally late fall and winter (Sweet 1992). Adult and juvenile toads burrow into loose soils in stream terraces and in uplands, where they may remain during daylight hours or for longer periods during the dry season (Sweet 1989).

*Life History*

Toads typically breed from February to July on streams with persistent water (Griffin *et al.* 1999). Female toads must feed for a minimum of approximately two months to develop the fat reserves needed to produce a clutch of eggs (Sweet 1992). Eggs are deposited, and larvae develop in shallow pools with minimal current and little or no emergent vegetation, and the substrate in these pools is generally sand or fine gravel overlain with silt. Toad eggs hatch in 4 to 5 days, and the larvae are essentially immobile for an additional 5 to 6 days. They then begin to disperse from the pool margin into the surrounding shallow water, where they spend an average of 10 weeks. After metamorphosis (June-July), the juvenile toads remain on the

bordering gravel bars until the pool no longer persists (usually from 8 to 12 weeks depending on site and yearly conditions) (Sweet 1992). Male toads reach adulthood in 1 to 2 years, and females become sexually mature in 2 to 3 years. Individuals may become sexually mature by the following spring if conditions are favorable (Sweet 1992, 1993).

Toad larvae feed on loose organic material such as interstitial algae, bacteria, and diatoms. They do not forage on macroscopic vegetation (Sweet 1992, Jennings and Hayes 1994). Juvenile toads rely on ants almost exclusively (Service 1999). By the time they reach 1.8 to 2.3 cm (0.7 to 0.9 in) in length, they take more beetles, along with ants (Sweet 1992, Service 1999). Adult toads probably consume a wide variety of insects and arthropods including ants, beetles, spiders, larvae, caterpillars, and others.

*Status and Distribution*

The toad was historically found in California from Monterey County to San Diego County and southward to the vicinity of San Quintín, Baja California, Mexico. They have been extirpated from an estimated 75 percent of their former range in the United States, and they now occur primarily in small, isolated areas in the middle to upper reaches of streams. The current distribution of the toad in the United States is from the Salinas River Basin in Monterey County, south to the Tijuana River and Cottonwood Creek Basin along the border with Mexico. Although the toad occurs principally along coastal drainages, it also has been recorded at several locations on the desert slopes of the Transverse Range (Patten and Myers 1992, Jennings and Hayes 1994). The current elevational range for most toad populations in San Diego County is about 305 to 1,402 m (1,000 to 4,600 ft), although they were historically known to extend into the lower portions of most river basins (Service 1999), and populations on Camp Pendleton extend down to just above sea level (Holland and Goodman 1998).

*Population Trend*

Toad populations vary considerably from year to year, depending on environmental conditions. Approximately three-fold changes have been observed from one year to the next (Sweet 1993), and greater variations would likely be observed with more data on toad populations. Because female toads lay an average of approximately 5,000 eggs during the breeding season (Sweet 1992), there is the potential for rapid increases in population size given favorable conditions, but toad recruitment reflects the inherent variability of their environment. During years of drought, pools may dry before larvae have reached metamorphosis, and females may forego breeding altogether. If flooding occurs after eggs have been laid, a large percentage of the eggs and larvae can be lost. Finally, heavy predation pressure by birds, mammals, reptiles, and other amphibians on metamorphosing and newly metamorphosed juveniles can drastically reduce recruitment. Once toads have reached the subadult stage, survivorship is higher. Annual mortality of adults and subadults has been estimated between 35 percent and 70 percent (Sweet 1993, Holland and Sisk 2000, 2001), which would mean that few toads survive past 5 years in the wild.

Stream order, elevation, and floodplain width are important factors in determining the size and long-term viability of a toad population (Sweet 1992, Barto 1999, Griffin 1999). Streams with the greatest potential to support self-sustaining populations are typically of a high stream order (*i.e.*, 3rd to 6th order), at low elevations (below 914 m (3,000 ft)), with wide floodplains (Sweet 1992, Barto 1999, Griffin 1999). Because of the dynamic nature of toad populations and their habitat, movements of individuals are likely important for colonizing areas where toads have been locally extirpated or where new habitat has been created due to flooding events or changes in human management.

This species was historically found in at least 22 river basins in southern California from the upper Salinas River system in Monterey County to San Diego County and southward to the vicinity of San Quintín, Baja California, Mexico. They have been extirpated from an estimated 75 percent of their former range in the United States, and they now occur primarily in small, isolated areas in the middle to upper reaches of streams.

Insufficient information regarding population dynamics and suitable habitat is available to estimate the range-wide arroyo toad population (Service 1999). The density of toads is unevenly distributed in space and time, with particular sites having high densities of larvae, metamorphs, subadults, and adults present under favorable ecological conditions, but absent during poor conditions (Holland *et al.* 2001). Dramatic natural fluctuations in all life-stage categories and difficulty in detecting adult toads under all but the most optimal conditions make accurate estimation of populations difficult. Due to the mobility of toads and other factors affecting their spatial and temporal heterogeneity, estimating toad densities (per unit area) at given sites may be considered to be inaccurate.

*Threats and Conservation Needs*

Many arroyo toad populations were reduced in size or extirpated due to extensive habitat loss from 1920 to 1980 (Service 1999), mainly because toad habitats (*i.e.,* broad, flat floodplains in southern California) are favored sites for flood control projects, agriculture, urbanization, and recreational facilities such as campgrounds and off-highway vehicle parks. The loss of habitat, coupled with habitat modifications due to the manipulation of water levels in many central and southern California streams and rivers, as well as predation from introduced aquatic species, caused toads to disappear from a large portion of their previously occupied habitat in California (Jennings and Hayes 1994). In 2001, a telemetry study of toads in San Juan Creek indicated that exotic predators and vehicle traffic were the cause of mortality for 2 of the 13 study animals (Cadre Environmental 2003). One toad was tracked by its transmitter to the gut of a bullfrog, and another was tracked to the treads of a dump truck that had driven on a dip-crossing through San Juan Creek. Other observations from the telemetry study included the desiccation of toad larvae in pools along the creek that dried up prior to the completion of toad metamorphosis (Cadre Environmental 2003). The authors speculated that drying of these pools may have been due to decreased rainfall or to groundwater pumping for agricultural practices that affected creek water levels.

Threats to toad populations include stream alteration, urban and rural development, mining, recreation, grazing, drought, wildfire, large flood events, and presence of exotic animal and plant species, such as the bullfrog (*Rana catesbeiana*), crayfish (*Procambarus* spp.), salt cedar (*Tamarix* spp.), and giant reed (*Arundo donax*) (59 FR 63264, 69 FR 23254). Conservation needs, as described in the recovery plan, include protecting and managing breeding and non-breeding habitat throughout the range of the species, monitoring existing populations to ensure recovery actions such as exotics removal are successful, identifying additional toad habitat and populations, obtaining research data to guide management efforts, and conducting outreach and public education regarding the toad.

Several incidental take permits pursuant to Section 10(a)(1)(B) of the Act have been issued for the arroyo toad addressing the effects of urban development on this species. In 1997 and 1998, the Service issued permits to the City of San Diego and the County of San Diego, respectively, for Multiple Species Conservation Plans. In 2004, the Service issued a permit for the Western Riverside County MSHCP. In 2007, the Service issued permits for the Orange County Southern Subregion HCP. These plans are expected to provide long-term protection for toads and toad habitat in western Riverside, Orange, and San Diego counties. For example, all known locations and about 78 percent of riparian suitable habitat will be conserved by the San Diego MSCP; conservation of 93 percent of toad locations (39 of 42 locations) is anticipated under the Western Riverside County MSHCP; 75 percent of modeled toad habitat (535 ha; 1,322 ac) will be conserved and managed under the Orange County Southern Subregion HCP. Conservation of toads through these HCPs address, at least in part, task 3 of the recovery plan of identifying and securing additional populations and suitable habitat (on non-Federal lands).

In September of 2005, the USFS published a Land Management Plan for the southern California National Forests (U. S. Forest Service 2005), which identified the distribution of arroyo toads in southern California forests, including Cleveland National Forest adjacent to the proposed project, proposed no new roads or trails in the area occupied by toads, and stated that any new project in an area occupied by toads or other federally listed species should “promote the conservation and recovery of these species and their habitats.”

Wildfire impacts on the species from fire related effects in 2003 and 2007 have not been quantified for this species. As most arroyo toads were aestivating when the fires occurred, the fast moving fire fronts would not have contributed much heat to the soil sub-surface. Field investigations during the 2007 fires by the Department of Interior, Burned Area Emergency Response (BAER) team supported this as vegetation in arroyo toad habitat was largely unburned or suffered low vegetation mortality (BAER 2007). Post-fire precipitation during the winter of 2007 and spring of 2008 did not result in any documented significant debris flows which could result in temporal adverse effects to breeding arroyo toads. The significant post-fire growth of exotic and nuisance plants species in arroyo toad habitat may have long-term adverse effects on arroyo toad and its habitat.

Environmental Baseline

Service protocol surveys have not been conducted along the entire portion of the proposed alignment and associated features. However, the USFS provided SDG&E with a GIS database showing suitable (modeled) habitat for the arroyo toad within the Cleveland National Forest. USFS suitable habitat includes potential breeding and upland habitat. The USFS habitat suitability model was based on the following key GIS parameters:

Elevation: 0-4300 FT North of Santa Clara River
0-5000 FT South of Santa Clara River

Stream Gradient: 0-2 percent

Lateral buffers: 1.1 km (0.66 mi) out for areas with slopes <70 percent. For steeper areas, buffer out to a gain of 24 m (80-ft) contour above stream bed elevation.

Stream Order: Second order or greater

Based on the USFS habitat suitability model, the proposed action area contains 500 ha (1,235 ac) of suitable arroyo toad habitat.

The USFS GIS information was used together with field habitat assessments to determine the potential for arroyo toads within the Inland Valley South Link and the CNF South Link (MPs 53.2 to 75.7 and MPs 91 to 100) (Figure 6). The majority of suitable habitat for the arroyo toad within the action area is located within the Cleveland National Forest boundary. However, arroyo toads do have the potential to occur on private lands within the action area. Private lands within the action area are within the planning area of the draft ECMSCP, which is currently in development.

The proposed alignment and associated features (*i.e.*, access roads, staging areas) will impact portions of 27 drainages, 16 of which are located on the Cleveland National Forest. Based on the arroyo toad occupancy information within the current Service GIS databases, and the USFS GIS database showing occupied and suitable (modeled) habitat within the Cleveland National Forest, 9 of the 27 impacted drainages contain suitable arroyo toad breeding habitat. Habitat assessments were conducted in the spring of 2007 by Helix Environmental for all drainages within the CNF that had suitable conditions or habitat quality to warrant focused surveys (from MP 53.2 to MP 103.4) for arroyo toad. Focused surveys were conducted in 2007 at some, but not all, of the drainages in the action area, and followed the Service protocol where possible. Below are the results of these surveys:

1) Protocol arroyo toad surveys conducted at the Sweetwater River site were negative. Habitat at that site was highly suitable, and the California Natural Diversity Database (CNDDB 2007) has a 2001 arroyo toad observation north of the intersection of Highway 79 and Riverside Drive less than 1 km (0.6 mi) northeast of the site.

2) Because the El Capitan Reservoir was closed at night, arroyo toad surveys at the San Diego River site were not conducted to protocol.

3) The site where the alignment crosses La Posta Creek is on a private in-holding within the Cleveland National Forest and surveys were not conducted because permission was not received from the landowner.

4) Arroyo toads have been recorded in Long Potrero Creek in 1993 (CNDDB 2007). This creek crossing was not surveyed in 2007 because it was dry at the time of the habitat assessment.

5) Arroyo toads were observed in Wilson and Taylor creeks.

6) Although Horse Canyon was dry at the time of the habitat assessment, it does contain suitable arroyo toad habitat.

7) Protocol surveys at the Pine Valley Creek site were negative although CNDDB has 1991 records from within 1 km (0.6 mi) of the crossing.

A number of projects and land uses within the project vicinity have degraded arroyo toad habitat in this area. Agriculture, roads, and urban development have degraded upland habitat, and sand mining, emergency road repairs, and introduction of invasive aquatic plants and predators have degraded riparian habitat. In addition, there is a long history of illegal fills and activities within riparian areas in San Diego County. Some of these have resulted in enforcement actions by the Corps of Engineers and EPA, but many unauthorized activities go undetected. These types of activities all have the potential to impact the arroyo toad either directly through mortality or indirectly due to loss or degradation of habitat. Nevertheless, arroyo toad populations within and adjacent to the action area are continue to persist and are important to the recovery of the species.

As previously mentioned, a majority of the suitable arroyo toad habitat within the action area occurs on public lands. A Land and Resource Management Plan has been developed for the Cleveland National Forest. Implementation of portions of this plan will result in long term benefits to the arroyo toad, including habitat acquisition, wildlife habitat management and monitoring, and pest and non-native species control.

Effects of the Action

For the purpose of this biological opinion, we addressed direct impacts to arroyo toad habitat in the action area based on suitable breeding and upland habitat modeled by the USFS, which includes 1) permanent impacts to suitable breeding habitat of 0.08 ha (0.20 ac) and to suitable upland habitat of 10.4 ha (25.7 ac) for a total of 10.5 ha (25.9 ac) of permanent impacts. No temporary impacts to suitable breeding habitat were identified, but the proposed actions will temporarily impact up to 74 ha (183 ac) of suitable upland habitat. Potential effects during

construction of the SRPL Project and from long-term O&M activities are included in our analysis.

Conservation Measures SS-CM-8 through SS-CM-15 are particularly relevant to SDG&E's commitment to avoid, minimize, and offset impacts to the arroyo toad and are repeated here for ease of reference.

**SS-CM-8** A pre-construction, Service protocol, survey will be conducted for the arroyo toad by a biologist approved by the Service to handle the toad) in all areas of the project located within suitable arroyo toad breeding habitat.

1) The removal of toad riparian breeding habitat will occur from October through December to minimize potential impacts to breeding adults (including potential sedimentation impacts to toad eggs) and dispersing juveniles.

**SS-CM-9** SDG&E will develop an arroyo toad translocation monitoring program to be implemented during all construction activities that have the potential to adversely affect the arroyo toad. This program will be coordinated with the Service, USFS, and BLM and finalized prior to initiation of construction activities. The program will include the following requirements:

1) Prior to clearing, grubbing, and construction activities, Service-permitted biologists will monitor arroyo toad breeding activity in those project areas containing or adjacent to breeding habitat. The biologists will determine when egg clutches or larvae are no longer present in the waterway (generally late May at lower elevation, June at higher elevation). When sign of breeding is no longer evident, an exclusionary fence will be installed and clearance surveys initiated.

2) Prior to clearing, grubbing, and grading activities, arroyo toad temporary exclusionary fence will be constructed along the perimeter of the project footprint within or immediately adjacent to arroyo toad habitat (breeding and aestivation). The intent of the fence is to fully contain the area(s) to be impacted and to remove and exclude arroyo toads. Exclusionary fence in aestivation habitat will not be installed prior to May 1. The Service-permitted biologist will be present during the exclusionary fence installation, reconfigurations, breach repairs, and weekly during the breeding season. The fence will consist of fabric or plastic at least 0.6 m (2 ft) high, staked firmly to the ground with the lower 0.3 m (1 ft) of material stretching outward along the ground and secured with a continuous line of gravel bags. No digging or vegetation removal will be associated with the installation of the fence and all materials shall be removed when the Project is complete. The removal of some vegetation, without disturbing the soil, within the project footprint to aid in the observance and collection of arroyo toads is acceptable. All fencing materials (*i.e.*, mesh, stakes, etc.) will be removed following construction. Ingress and egress of construction equipment and personnel will be kept to a minimum, but when necessary, equipment and personnel will use a single access point to the site.

This access point will be as narrow as possible and will be closed off by exclusionary fencing when personnel are not on the project site.

3) Prior to clearing, grubbing, and grading activities, but after exclusionary fencing has been installed, Service-approved biologists will perform a minimum of three nighttime surveys inside the exclusionary fence and remove all arroyo toads found within its perimeter. The approved biologist will continue until there have been two consecutive nights without arroyo toads inside the fencing. Any breach in the exclusionary fence during times when arroyo toads area active above ground, will result in repeating the 3-day minimum clearance surveys for that particular area.

4) If conditions do not occur that result in sufficient arroyo toad emergence and movement, a Service-approved biologist will attempt to elicit a response from the arroyo toads during nights late in the known breeding season, with temperatures above 50$^{o}$F, by spraying the area inside the exclusionary fence with water to a depth of approximately 2 to 5 cm (1 to 2 in) to simulate a rain event.

5) Whether or not a simulated precipitation event is done, arroyo toads found within the project footprint will be captured and translocated by Service-approved biologists to the closest area of suitable habitat. The Service-approved biologist will coordinate with the appropriate property owner(s) and the Service on where the arroyo toads will be placed.

6) Service-approved biologists will maintain a complete record of all arroyo toads encountered and moved from harms way during translocation efforts. The date and time of capture, sex, physical dimensions, and coordinates/specific location of capture will be recorded and provided to the Service, within 30 days of the completion of translocation. In addition to reporting on the translocation effort, monthly reports (including photographs of impact areas) will be submitted to the Service during construction activities within areas demarcated by arroyo toad exclusion fencing. The monthly reports will document general compliance with all applicable conditions and report all incidents not in compliance with this biological opinion. The reports will also outline the duration of arroyo toad monitoring, the location of construction activities, the type of construction that occurred, and equipment used. These reports will specify numbers, locations, sex, observed behavior, and remedial measures employed to avoid, minimize, and mitigate impacts to arroyo toads. All field notes and other documentation generated by the Service-approved biologist will be made available upon request to the Service.

7) To avoid transferring disease or pathogens between aquatic habitats during surveys and handling of arroyo toads, the approved biologists will follow the Declining Amphibian Population Task Force's Code of Practice (DAPTF, 1991) or newer version when available.

8) After the clearance surveys outlined above have been completed, daily surveys will be conducted each morning prior to the continuation of construction activity. Any toads found will be relocated per the translocation plan.

9) The applicant will submit, in writing, the names, any permit numbers, résumés, and at least three references (of people who are familiar with the relevant qualifications of the proposed biologist), of all biologists who might need to handle, move, or monitor arroyo toads for the proposed project. This information will be submitted to the Service for approval at least 15 days prior to the initiation of any arroyo toad surveys. Proposed activities will not begin until an authorized biologist has been approved by the Service.

**SS-CM-10** To offset the loss of occupied and suitable arroyo toad habitat within the project area, and to offset indirect effects of the project on arroyo habitat, SDG&E will develop and implement an arroyo toad predator control program on USFS lands. The scope and methods for this program will be developed in consultation with the Service and USFS.

**SS-CM-11** Compensation for the loss of arroyo toad-occupied habitat will be implemented as follows. Permanent impacts to occupied arroyo toad breeding habitat will include 3:1 off-site acquisition and preservation of occupied arroyo toad breeding habitat. Permanent impacts to occupied upland burrowing habitat will include 2:1 off-site acquisition and preservation of occupied upland burrowing habitat. Temporary impacts to occupied breeding habitat will include 1:1 on-site restoration and 2:1 off-site acquisition and preservation of occupied breeding habitat. Temporary impacts to occupied upland burrowing habitat will include 1:1 on-site restoration and 1:1 off-site acquisition and preservation of occupied upland burrowing habitat. Any acquired habitat will be approved by the CPUC, BLM, USFS, and Wildlife Agencies.

**SS-CM-12** To avoid and minimize impacts to arroyo toads, access road construction and use, with the exception of emergency situations, will occur during daylight hours (from 2 hours after sunrise to 2 hours before sunset) when amphibian movement is less frequent.

**SS-CM-13** No construction activities will take place during the arroyo toad breeding season (March 15-July 31) within suitable arroyo toad breeding habitat.

**SS-CM-14** To avoid long-term impacts to wildlife movement, including, but not limited to arroyo toad movement on the project site, all temporary arroyo toad exclusion fencing and temporary construction fencing will be removed at the conclusion of construction activities.

**SS-CM-15** Towers, pads, pull stations, access roads, staging areas, and fly yards will not be located within suitable/potential arroyo toad upland aestivation and riparian breeding habitat to the extent feasible. In cases where the applicant determines it is not feasible to fully avoid suitable/potential arroyo toad habitat, the applicant will consult with the Service to identify a site for the above-listed features that would avoid and minimize impacts to suitable/potential arroyo toad upland aestivation and riparian breeding habitat to the maximum extent.

1. Construction Activities

*Direct Effects*

Activities along the transmission line to construct towers, pads, access roads, staging areas, pull down areas, and helipads will result in the loss of suitable arroyo toad habitat including no more than 10.5 ha (25.9 ac) of permanent impacts and 74 ha (183 ac) of temporary impacts. No construction activities will occur during the arroyo toad breeding season (March 15-July 31) within suitable arroyo toad breeding habitat; therefore, no impacts are anticipated to occur to breeding arroyo toads, arroyo toad eggs, and/or arroyo toad larvae.

To avoid and minimize direct effects to the arroyo toad, barrier fencing will be installed around all construction/staging areas within potential arroyo toad upland habitat. The fencing will remain until all construction activities within these areas are completed. The area within the barrier fence will be surveyed by a qualified biologist prior to construction. If climatic conditions are not appropriate for arroyo toad movement during the pre-construction surveys, the biologist will attempt to illicit a response from the arroyo toad by irrigating the fenced area to simulate a rain event. Any arroyo toads detected within the barrier fencing will be collected by a permitted biologist and placed on the outside of the barrier fence within the nearest secure suitable habitat.

It is anticipated that impacts to adult and juvenile arroyo toads will be minimal with the implementation of the above-described fencing and translocation measures. However, adult and juvenile arroyo toads may still remain after translocation efforts are completed and may be burrowed within the impact area(s) or moving through the active construction site. Toads not detected and removed during translocation efforts will likely be crushed by land re-contouring and other surface disturbance during construction activities.

Furthermore, the effects related to the translocation of arroyo toads are unknown. The proposed conservation measures include handling procedures detailed in the *Declining Amphibian Population Task Force's Code of Practice* (proposed for revision); these procedures should reduce or eliminate direct death or injury if followed and arroyo toads react uniformly. However, eliciting the emergence of arroyo toads and translocating them could result in currently unknown physiological, ecological and biological impacts, as it could conceivably occur anytime of the year including mid-aestivation.

In addition to potential impacts to the arroyo toad from relocation efforts, the proposed project will result in the permanent loss of 0.08 ha (0.20 ac) of riparian and wetland habitat types that are potential breeding habitats for the arroyo toad. To offset the permanent impacts to arroyo toad breeding habitat, approximately 0.24 ha (0.60 ac) of arroyo toad occupied breeding habitat will be acquired and preserved off site. All off site acquisition areas will be preserved and managed in perpetuity. Therefore, we assume that the proposed replacement habitat will effectively offset the anticipated adverse affects to arroyo toad breeding habitat.

Permanent impacts to arroyo toad upland habitat will also occur as a result of the proposed project. Approximately 10.4 ha (25.7 ac) of suitable arroyo toad upland habitat will be permanently impacted by the proposed project and 74 ha (183 ac) of suitable arroyo toad upland habitat will be temporarily impacted by the proposed project. The loss of upland habitat for foraging, aestivation, and dispersal could affect arroyo toad populations in the project vicinity through increased competition for limited resources or increased predation risk. However, approximately 5,133 ha (12,685 ac) of suitable upland habitat occur on USFS lands in the vicinity of the proposed project, as well as additional habitat on private lands. Therefore, the amount of suitable arroyo toad habitat impacted by the project represents a very small proportion of the suitable upland habitat within and adjacent to the action area. Permanent impacts to suitable upland arroyo toad habitat will be offset by the off site acquisition and preservation of occupied, arroyo toad upland habitat at a minimum 2:1 ratio. Temporary impacts to arroyo toad upland habitat will be offset by through 1:1 on site restoration and 1:1 off site acquisition and preservation. The proposed restoration will follow the methods and success criteria outlined in a Service-approved creation/restoration plan. In addition, a long-term habitat management plan will be developed and implemented for all off site preservation areas, and a non-native predator control program will be implemented on USFS lands. Therefore, we assume that the proposed replacement habitat will effectively offset the anticipated adverse effects to arroyo toad upland habitat.

*Indirect Effects*

Project construction, operation, and maintenance could lead to a decrease in water quality in drainages adjacent to and crossed by the proposed project. Decreased water quality could be especially detrimental to arroyo toads through direct mortality or decreases in reproduction success. Contaminants, such as herbicides, pesticides, and fertilizers may kill toads, affect development of larvae, or affect their food supplies or habitat (Service 1999). Siltation in arroyo toad breeding pools can asphyxiate eggs and newly hatched larvae (Sweet 1992). Furthermore, pollution can have both direct and indirect effects on arroyo toads, and can affect amphibians in areas far from where it originates (Service 1999). The proposed project includes several construction BMPs (**G-CM-2**) to reduce the likelihood of decreased water quality, including erosion control measures such as silt fencing, sand bags, and straw matting,

Increased invasive flora and fauna, and associated habitat degradation/predation, are expected to occur to arroyo toads and arroyo toad upland habitat as a result of the proposed project. Seeds of invasive plant species could be transported through the project area on construction and maintenance vehicles. Invasive species are now recognized as a threat to biodiversity in native plant communities, second only to direct habitat loss and fragmentation (Pimm and Gilpin 1989, Scott and Wilcove 1998). Non-native, weedy species may out-compete and exclude native species, potentially altering the structure of the vegetation, degrading or eliminating upland habitat used by the arroyo toad, and providing food and cover for undesirable non-native animals

(Bossard *et al.* 2000). Implementation of the Weed Control Plan (**G-CM-20**) proposed by SDG&E is anticipated to minimize effects associated with increased introduction of non-native plants.

In addition, arroyo toads could be indirectly impacted through increased predation as a result of the proposed project. The powerline structures and associate facilities may attract and provide additional perch sites for potential predators of the arroyo toad, including ravens. Implementation of the Raven Control Program (**G-CM-19**) proposed by SDG&E is anticipated to minimize potential effects associated with increased perch sites for ravens.

The proposed project could lead to occasional fires due to arcing of the power lines. Increased fire frequency could result in increased sedimentation in adjacent creeks for the first few years following a fire, which could, in turn, temporarily reduce arroyo toad reproduction. Fires could kill toads in the upland environment that are above-ground at the time of the fire or, if the fire is hot enough, could kill some of the aestivating toads as well. However, arroyo toads are not dependent on a mature vegetation community in the riparian or upland environment, so fire-related effects of the proposed project are not anticipated to permanently degrade the suitability of the habitat for toad unless there is large-scale type conversion of upland habitat into non-native grassland.

2. Operations and Maintenance Activities

There is potential for direct impacts to arroyo toads during the O&M program for the project. The use of access roads constructed within suitable arroyo toad habitat could cause death or injury if toads attempt to cross the roads during upland foraging and dispersal. Toads may use roads and trails as dispersal routes and may congregate on roads at night to feed (Service 1999). To minimize impacts to arroyo toads from vehicle strikes access roads will not be located within suitable arroyo toad upland aestivation and riparian breeding habitat to the extent feasible. In cases where SDG&E determines it is not feasible to fully avoid suitable arroyo toad habitat, they will consult with the Service to identify a site for the above-listed features that will avoid and minimize impacts to suitable arroyo toad upland aestivation and riparian breeding habitat to the maximum extent. In addition, access road construction and use, with the exception of emergency situations, will occur during daylight hours (from 2 hours after sunrise to 2 hours before sunset) when amphibian movement is less frequent.

Conclusion

After reviewing the current status of the arroyo toad, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the construction and O&M of the proposed action is not likely to jeopardize the continued existence of the arroyo toad. We based this conclusion on the following:

1) Only a small amount of suitable arroyo toad breeding habitat will be permanently impacted (0.08 ha [0.20 ac]);

2) Most of the impacts to arroyo toad upland aestivation habitat (74 ha [183 ac] of the total 85 ha [209 ac] of impacts; 88 percent) will be temporary, and these areas will be restored to native habitat following construction;

3) Despite the permanent loss of 10.5 ha (25.9 ac) of arroyo toad habitat, the majority of the suitable arroyo toad upland and breeding habitat within the project vicinity will remain available to support the upland and breeding needs of the species;

4) The number of individual toads killed by construction in upland and breeding habitats will be minimized through trapping and relocation efforts conducted by qualified individuals knowledgeable of arroyo toad biology;

5) Impacts to water quality will be addressed through implementation of specific BMPs and a SWPPP during construction;

6) Impacts to suitable arroyo toad habitat will be offset through the onsite restoration of 74 ha (183 ac) and off site conservation and management of 95 ha (235 ac) of suitable arroyo toad habitat (95 ha (234 ac) suitable upland habitat and 0.2 ha (0.6 ac) of suitable breeding habitat). The predator control program on USFS lands is also anticipated to offset project-related impacts by reducing predation pressure on breeding arroyo toads and their young.

7) With implementation of the conservation measures, the impacts associated with the construction, operation, and maintenance of the proposed project are not expected to appreciably reduce the numbers, reproduction, or distribution of the arroyo toad in the action area or throughout the species' range. The arroyo toad populations in the drainages affected by the proposed project are anticipated to remain viable for the foreseeable future following project implementation.

**Peninsular Bighorn Sheep (*Ovis canadensis nelsonii*)**

Status of the Species

*Listing Status*

Desert bighorn sheep within the Peninsular Mountain Ranges of the United States were federally listed as an endangered distinct population segment on March 18, 1998 (63 FR 13134). A recovery plan was approved in October 2000, and 341, 918 ha (844,897 ac) of critical habitat were designated on February 1, 2001 (66 FR 8649). The decision to list the PBS was made because of declining population numbers and the continuing loss, degradation, and fragmentation of habitat throughout a significant portion of the population's range. Due to human developments, the population segment had become isolated from other populations of desert bighorn sheep. In addition, periods of depressed recruitment, likely associated with disease, and

high predation, coincided with low population numbers endangering the continued existence of these animals in southern California. The California Fish and Game Commission listed bighorn sheep inhabiting the Peninsular Ranges as "rare" in 1971. In 1984, the designation was changed to "threatened" by the CDFG to conform to the terminology in the amended California Endangered Species Act.

On March 7, 2005, the Agua Caliente Band of Cahuilla Indians filed a complaint against the Service's economic analysis of designated critical habitat. Other parties subsequently intervened as plaintiffs in the case. On July 31, 2006, a court approved consent decree resulted in the partial vacature of critical habitat designation on Tribal lands and remanded the critical habitat designation back to the Service for a new rulemaking. A revised critical habitat designation of approximately 155,565 ha (384,410 ac) was proposed on October 10, 2007. Currently, the October 10, 2007 proposed critical habitat is being revised, considering the content of public comments and hearings. It is anticipated that final critical habitat will be designated by March 30, 2009.

*Species Description*

Bighorn sheep inhabiting the Peninsular Ranges were once considered a separate subspecies (*Ovis canadensis cremnobates*) and were one of the 4 desert subspecies (*O. c. nelsoni, O. c. mexicana, O. c. cremnobates,* and *O. c.weemsi*) recognized by Cowan (1940). The validity of these subspecies delineations was questioned and reassessed when modern techniques became available. Based on morphometric and genetic results, Wehausen and Ramey (1993) and Ramey (1995) placed PBS within the *O. c. nelsoni* subspecies, which is the currently accepted taxonomy. The range of *O. c. nelsoni* or Nelson's bighorn sheep is relatively widespread covering much of Nevada, Utah, southern California, and northwest Arizona (Monson and Sumner 1980). Consequently, bighorn sheep in the Peninsular Ranges of the U. S. were listed as a distinct population segment under the ESA, and not as a separate subspecies. However, bighorn sheep inhabiting the Peninsular Mountain Ranges are still commonly referred to as Peninsular bighorn sheep.

*Distribution*

Within the United States, the range of PBS extends along the Peninsular Ranges from the San Jacinto Mountains in Riverside County south to the United States - Mexico border. Bighorn sheep habitat in the Peninsular Ranges of California is restricted to the east facing, lower elevation slopes that are typically below 1,402 m (4,600 ft) and located along the northwestern edge of the Colorado Division of the Sonoran Desert.

An examination of past records and current data suggests that the distribution of PBS in California has been altered during the past 25 years. Ewe groups along the Mexican border and in the northern San Jacinto Mountains (north of Chino Canyon) were apparently extirpated in the late1980's (DeForge *et al.* 1997, Rubin *et al.* 1998). DeForge *et al.* (1997) suggested disturbance

and habitat fragmentation were the primary factors driving the changes in bighorn distribution in the northern San Jacinto Mountains. Blong (1967) reported that construction of the Tramway Road through Chino Canyon severely reduced bighorn movement in this area. Ewes ceased regularly occupying the northern San Jacinto Mountains about 20 years after construction of the Palm Springs Aerial Tramway in Chino Canyon, though rams continued to cross Chino Canyon and use the area formerly occupied by the ewe group (DeForge *et al.* 1997). However, ewes were recently documented crossing Chino Canyon in route to Blaisdell Canyon in 2005, where they remained for several days before re-crossing Chino Canyon returning to Tachevah Canyon (Bighorn Institute 2005). The group, consisting of adult ewes, female lambs and yearlings, and male yearlings; has been regularly located within Chino Canyon since 2005 (Bighorn Institute 2005, 2007).

The possible extirpation of the bighorn subpopulation between Interstate 8 and the US-Mexico border was poorly documented, but the construction of the Interstate in the mid-1960's, railroad activity, livestock grazing, poaching, and fire suppression appear the most likely factors contributing to the isolation and decline of bighorn sheep in the area (Rubin *et al.* 1998). Recently, bighorn sheep sightings and their sign have become common around the Mountain Spring area of Interstate 8 (Service and CDFG GIS database, unpublished aerial census data, 2006, 2008). Bighorns have been observed crossing the Interstate (J. Collins, Naval Air Facility El Centro, *in litt*. 2007, 2008), and bighorn sheep have been observed further south in the Jacumba Mountains by the U. S. Border Patrol (D. Kim, pers. *in litt*., 2007).

Rubin *et al.* (1998) suggested that in portions of the range, roads or increased traffic have contributed to habitat fragmentation by restricting ewe movement, as evidenced by four ewe groups having home ranges delineated by roadways. In the 1970's, ewes were observed crossing Highway 74 in the Santa Rosa Mountains (D. Jessup, *in litt.* 1999). However, no radio-collared ewes were observed crossing this road from 1993 to 2001 (Service 2000). California Department of Transportation records indicated Highway 74 traffic approximately tripled from 1970 onward. However, in recent years ewes have begun crossing Highway 74 in at least two locations documented by the Bighorn Institute. Additionally, the number of crossings by rams near Vista Point has also increased, and several have been struck by automobiles. As a result, Caltrans has installed wildlife crossing signs in the area.

*Habitat Affinities*

Bighorn sheep in the Peninsular Ranges and throughout the desert southwest have important habitat requirements that relate to topography, visibility, water availability, and forage quality and quantity. Bighorn sheep evolved predator evasion behaviors that use escape terrain, which is generally defined as steep, rugged slopes (Hansen 1980, Cunningham 1989). Escape terrain is critical because bighorn sheep typically do not depend upon speed alone to outrun their predators, but use their exceptional climbing abilities to out maneuver predators on steep, rocky outcrops and talus slopes (Geist 1971, McQuivey 1978). When ewes are ready to give birth they will typically seek out the most precipitous terrain, where they and their lambs will be safest

(Geist 1971). The presence of such steep terrain for predator evasion and lambing is, therefore, a crucial component of bighorn sheep habitat.
The predator evasion behavior of bighorn sheep also depends on the ability to visually detect danger at a distance. Bighorn sheep will avoid habitat in which dense vegetation reduces visibility (Risenhoover and Bailey 1985, Etchberger *et al.* 1989). This appears to be the case in the Peninsular Ranges, where bighorn sheep usually remain below the elevation of chaparral and other dense vegetation associations. In the Peninsular Ranges, bighorn sheep habitat occurs along the east-facing desert slopes, typically below approximately 1,402-m (4,600-ft) elevations (Jorgensen and Turner 1975, DeForge *et al.* 1997). The patterns of vegetation associations in the Peninsular Ranges, in combination with bighorn sheep predator avoidance behavior, result in habitat use patterns that are more restricted to lower elevations than in most other bighorn populations. The available habitat of PBS can, therefore, be visualized as a long, narrow band that runs north-south along the lower elevations of the Peninsular Ranges.

Variations in slope and aspect also help bighorn sheep to survive in a harsh environment. During hot weather, desert bighorn seek shade under boulders, over hanging rocks, and cliffs, or they may move to north facing slopes (Merritt 1974, Andrew 1994) where temperatures are moderated. During inclement weather bighorns may again seek protected caves, overhangs, or slopes that are protected from strong winds, and on cold winter days bighorns may move to sunny, south facing slopes (Andrew 1994).

In addition to mountainous terrain, other types of habitat are crucial to bighorn sheep populations. Areas of gentle terrain, such as valley floors, serve as important linkages between neighboring mountainous regions, thereby providing bighorn sheep temporary access to resources (*e.g.*, forage, water, or lambing habitat) in neighboring areas, and allowing gene flow to occur between subpopulations (Krausman and Leopold 1986, Schwartz *et al.* 1986, Bleich *et al.* 1990, Bleich *et al.* 1996). Alluvial fans and washes contain a greater diversity of browse species than steeper terrain, and this diverse vegetation furnishes important sources of high quality forage (Leslie and Douglas 1979). In summer and times of drought, wash vegetation remains green longer than vegetation in other areas, providing forage higher in nutrients and digestibility than the dry, brown forages found on the mountainsides under these conditions (Andrew 1994, Crawley 1983, Laycock and Price 1970). Leslie and Douglas (1979) noted that these areas became increasingly important to bighorn sheep not only in summer, but during any period of limited forage availability. Bighorn sheep in the Peninsular Ranges have been observed foraging on alluvial fans for extended periods of time in Coyote Canyon and other undeveloped washes and alluvial fans within Anza-Borrego Desert State Park (Service 2000). In the northern Santa Rosa and San Jacinto Mountains, much of the alluvial fan and wash habitat has been lost to residential and golf course development (Service 2000).

In hot, arid deserts, water is an important resource for bighorn sheep (Jones *et al.* 1957, Blong and Pollard 1968, Leslie and Douglas 1979, Turner and Weaver 1980, Elenowitz 1984, Cunningham and Ohmart 1986). A number of studies have shown that desert bighorn sheep will concentrate around water sources in the summer, with most animals found within a 3-to-5-km (2-

to-3-mi) radius of water (Jones *et al.* 1957, Leslie and Douglas 1979, Cunningham and Ohmart 1986). During periods of more abundant rainfall and cooler temperatures, sheep distribution is less coincident with permanent water sources (Leslie and Douglas 1979). Apparently, bighorn sheep obtain enough water from forage to meet their requirements during cooler, wetter portions of the year. Lactating ewes and lambs may be more dependent on free-standing water and are often found closer to water sources (Blong and Pollard 1968, Leslie and Douglas 1979, Bleich *et al.* 1997). Water sources are most valuable to bighorn sheep if they occur in proximity to adequate escape terrain with good visibility. Therefore, the juxtaposition of open escape terrain to water sources is an important factor in their utilization (Cunningham 1989, Andrew 1994). The critical importance of free-standing water to bighorn sheep has been questioned (Krausman and Leopold 1986, Broyles 1995), and some small populations apparently exist without free-standing water (Krausman *et al.* 1985, Krausman and Leopold 1986, Broyles 1995). However, in most populations, bighorn sheep will drink regularly when water is available and concentrate near water sources during the warmer months. In the Peninsular Ranges, bighorns migrate seasonally during the hot season, leaving mountain ranges where no standing water is known to exist, such as the Coyote Mountains, and moving to adjacent mountain ranges where standing water is available year-round. They then center their activity on standing water for the hot season, and this behavior may indicate that vegetation alone does not provide sufficient water during the hot season, and at least in some mountain ranges, standing water is a requirement.

In the Peninsular Ranges, bighorn sheep use a wide variety of plant species as their food source (Weaver *et al.* 1968, Jorgensen and Turner 1973). Turner (1973) recorded the use of at least 43 species, with browse being the food category most frequently consumed. Cunningham and Ohmart (1986) determined that the bighorn sheep diet in Carrizo Canyon (at the south end of the U.S. Peninsular Ranges) consisted of 57 percent shrubs, 32 percent forbs, 8 percent cacti, and 2 percent grasses. Scott (1986) and Turner (1976) reported similar diet compositions at the north end of the range. Diet composition varied among seasons (Cunningham and Ohmart 1986, Scott 1986), presumably because of variability in forage availability, selection of specific plant species during different times of the year (Scott 1986), and seasonal movements of bighorn sheep.

The time period surrounding late gestation, lambing, and nursing is very demanding in terms of the energy and protein required by bighorn ewes. Failure to acquire sufficient nutrients during late gestation and during nursing adversely affects the survival of newborn ungulates (Thorne *et al.* 1976, Julander *et al.* 1961, Holl *et al.* 1979). Crude protein and digestible energy values of early green-up species are usually much higher than those of dormant forages during the critical late gestation, lambing, and rearing seasons (Crawley 1983, White 1983). With their high nutrient content, even minor volumes of these forages within the overall diet composition may contribute important nutritional value at critical life stages (Wagner 2000). However, during the reproductive season, due to the varied topography of bighorn sheep habitat, these forages typically are concentrated on specific sites, such as alluvial fans and washes, where more productive soils support greater herbaceous growth than steeper, rockier soils. Furthermore, forage green-up follows an elevational gradient with lower elevations beginning spring growth earlier than higher elevations (Wehausen 1980, Berger 1991). Access to a range of elevations

provides bighorn sheep enhanced opportunities to acquire nutrients during critical seasons (Hebert 1973, Wehausen 1980, Berger 1991).

*Life History*

The movement patterns and habits of ewes are learned by their offspring (Geist 1971). By following older animals, young bighorn sheep gather knowledge about escape terrain, water sources, foraging areas, and lambing habitat (Geist 1971). As young rams reach 2 to 4 years of age, they begin to follow older rams away from their natal group (Geist 1971, Festa-Bianchet 1991). Because bighorn sheep rely on vigilance to detect predators, they benefit from gregariousness and group alertness (Geist 1971, Berger 1978).

The adult sexes tend to loosely segregate during much of the year, coming together primarily during the rut (Geist 1971, Bleich *et al.* 1997), which typically peaks from August through October in the Peninsular Ranges (Rubin *et al.* 2000). During the rut, rams join the ewe groups and compete to breed with receptive ewes. The largest rams presumably are the most successful breeders, but smaller rams have been reported to breed as well (Hogg 1984). During the period of sexual segregation, ewes and their lambs are typically found in steeper, more secure habitat, while rams may be found in less steep or rugged terrain (Geist 1971, Bleich *et al.* 1997).

Desert bighorn sheep are primarily diurnal (Krausman *et al.* 1985) but may be active at any time of day or night (Miller *et al.* 1984). Their daily activity pattern includes alternating feeding and resting/ruminating periods. Forage quality influences activity patterns because when forages are low in digestibility, bighorn sheep must spend more time ruminating and digesting forage. Consequently, bighorn sheep may establish a cycle of feeding and ruminating that reflects forage quality and optimizes nutrient intake (Wagner and Peek 1999, Wagner 2000).

In general, bighorn sheep are a wide-ranging species that requires large swaths of relatively pristine land. For example, in the San Jacinto Mountains, fixed-kernel home range sizes averaged 25 $km^2$ (9.65 $mi^2$) for rams and 20 $km^2$ (7.72 $mi^2$) for ewes (DeForge *et al.* 1997). Large home ranges allow for animals to move in response to variation in predation pressure and changes in resource availability. The size of individual or group home ranges depends on the juxtaposition of required resources (water, forage, escape, or lambing habitat) and, therefore, varies geographically. Home range size also is affected by forage quantity and quality, season, sex, and age of the animal (Leslie 1977, McQuivey 1978). Although most desert bighorn sheep do not seasonally migrate along elevational gradients like many populations in higher latitude mountain ranges, they do exhibit seasonal differences in habitat use patterns. In many populations, animals will have a smaller home range in summer (McQuivey 1978, Leslie and Douglas 1979, Elenowitz 1983), presumably due to their limited movement away from permanent water sources. During the cooler or wetter months of the year, bighorn sheep often exhibit an expanded range as animals move farther from water sources (Simmons 1980). Ewes generally display a higher degree of philopatry to their seasonal home ranges than do rams. Rams tend to range more widely, often moving among ewe groups (Boyce *et al.* 1997, DeForge

*et al.* 1997, Rubin *et al.* 1998). In most populations of desert bighorn sheep, ram home ranges have been found to be larger than those of ewes (Simmons 1980, DeForge *et al.* 1997).

The gregarious and philopatric behavior of ewes limits their dispersal and exploratory ability relative to those of rams (Geist 1967, 1971). Geist (1971) theorized, however, that a young ewe might switch to a new ewe group if she encountered neighboring sheep and followed them away from her natal ewe group. In the Peninsular Ranges, movement of radio-collared ewes between ewe groups is rare, however, inter-group movement does occasionally occur. During a 3-year study, one ewe moved over 30 km (18.6 mi) and temporarily joined another ewe group (Rubin *et al.* 1998). No emigration of ewes has been observed even though radio-collared animals have been regularly monitored in the northern Santa Rosa Mountains since 1981 (Ostermann *et al.* 2001) and throughout the range since 1993 (E. Rubin *et al*. 1998; DeForge *et al.* 1997). Bighorn sheep evolved movement patterns that were adapted to exploiting stable patches of habitat, consequently compared to other North American ungulates they are regarded as poor dispersers (Geist 1971). Nevertheless, dispersal and exploratory movements do occur, and genetic analyses reflect a low rate of ewe dispersal across the Peninsular Ranges in the evolutionary past (Boyce *et al.* 1999). In 2005, two yearling ewes crossed Chino Canyon, and temporarily occupied the area north of the canyon in an exploratory movement documented by the Bighorn Institute.

The breeding period, or rut, occurs in the late summer and fall months. In the Peninsular Ranges, ewes estimated to be between 2 and 16 years of age have been documented to produce lambs (Rubin *et al*. 2000, Ostermann *et al.* 2001). As parturition approaches, ewes seek secluded sites with shelter, escape terrain, and unobstructed views (Turner and Hansen 1980). They isolate themselves from other females while bearing their lambs (Etchberger and Krausman 1999). Lambs are born after a gestation of approximately 6 months-171 to 185 days (Turner and Hansen 1980, Shackleton *et al.* 1984, Hass 1995). During a 4-year (1993 to 1996) study conducted in the Peninsular Ranges south of the San Jacinto Mountains, the lambing season extended from February through August; however, 87 percent of the lambs were born from February to April, and 55 percent of the lambs were born in March (Rubin *et al.* 2000). DeForge *et al.* (1997) and Cunningham (1982) reported a similar onset of the lambing season in the San Jacinto Mountains and in Carrizo Canyon, respectively. However, in the San Jacinto and northern Santa Rosa Mountains, ewe groups, the lambing season has started in January during some years (Bighorn Institute 1997). Lambs usually are weaned by 6 months of age (Hansen and Deming 1980, Wehausen 1980).

From 1993 to 1996, the reproductive patterns of five ewe groups (Carrizo Canyon, south San Ysidro Mountains, north San Ysidro Mountains, Santa Rosa Mountains [Deep Canyon], and northern Santa Rosa Mountains) were monitored and annual lamb production averaged 77 percent (0.77 lambs born per “ewe-year”) for the 4-year period (E. Rubin, pers. comm.). Using a fecal-based enzyme immunoassay, Borjesson *et al.* (1996) determined that in the fall of 1992, at least 85 percent of sampled adult ewes were pregnant. Both of these observations suggest that conception rates are not currently limiting population growth in the Peninsular Ranges.

Lamb survival (to 6 months of age) was variable among groups and across years. A year of high lamb survival in one group was not necessarily a high survival year in another group (Rubin *et al.* 2000). Of the four groups studied, the northern Santa Rosa Mountains group typically had the lowest lamb survival, while the neighboring Deep Canyon group, located less than 8 km (5 mi) away, had the highest lamb survival. Lamb recruitment in the northern Santa Rosa Mountains was found to be very low between the years of 1977 and 1997 (DeForge *et al.* 1982, DeForge and Scott 1982, Turner and Payson 1982; Ostermann *et al.* 2001). Shorter periods of low lamb to ewe ratios, as well as clinical signs of pneumonia among lambs, have occasionally been observed in Anza-Borrego Desert State Park (Jorgensen and Turner 1973, Jorgensen and Turner 1975, Hicks 1978), but years of high lamb to ewe ratios (Cunningham 1982; M. Jorgensen, *in litt* 2000) have been observed in these areas as well (Rubin *et al.* 2000).

Wehausen (1992) suggested that periods of low recruitment may not warrant alarm because long-lived animals such as bighorn sheep can exist in viable populations if periods of low offspring recruitment are interrupted by periodic pulses of high offspring recruitment. Most ewe groups in the Peninsular Ranges appear to have exhibited such pulses of high recruitment but declining population trends suggest that at times they have not been sufficient to balance adult mortality.

In ruminants, reproductive success is related to the mother's body weight, access to resources, quality of home range, and age (Etchberger and Krausman 1999). Survival of offspring also depends on birth weight and parturition date. Festa-Bianchet and Jorgenson (1996) found that female sheep reduce the care of lambs when resources are scarce to favor their own nutritional requirements over their lamb's development. Ewes that fail to acquire a minimum level of energy reserves (*i.e.*, body weight) may not conceive (Wehausen 1984) or will produce smaller offspring with a poorer chance of survival (Price and White 1985). Several studies have documented a positive relationship between winter precipitation and lamb recruitment in the following year (Douglas and Leslie 1986, Wehausen *et al.* 1987). However, the relationships between climate, lamb recruitment, and population trends likely differ among different bighorn sheep populations, and are not fully understood (Rubin *et al.* 2000).

Lamb and yearling age classes experience high mortality rates relative to adult bighorns. After reaching adulthood at two years of age, bighorn sheep survival is high until ten years of age (Hansen 1980), or until shortly before the age of ecological longevity (Cowan and Geist 1971). However, observed values of annual adult survivorship in the PBS appear low relative to other reported desert populations. During November 1992 to May 1998, survivorship of 113 adult radio-collared bighorn sheep (97 ewes and 16 rams) was monitored between Highway 74 (in the Santa Rosa Mountains) and the U.S.-Mexico border. During this period, overall annual adult survival was 0.79, with no significant difference among three age classes of adults (Hayes *et al.* 2000). Annual survivorship of individual ewe groups ranged from 0.70 to 0.87, and a year of high survivorship in one group was not necessarily a year of high survivorship in other groups (Rubin *et al.* 1998). In the northern Santa Rosa Mountains ewe group, adult survivorship was monitored during a 14-year period (1985 to 1998), and was found to range between 0.50 and

1.00 annually (Ostermann *et al*. 2001). In the San Jacinto Mountains, DeForge *et al.* (1997) monitored the survival of adult (2 or more years of age) radio-collared bighorn sheep during 1993 to 1996 and estimated annual adult survival to be 0.75.

Survival of desert bighorn sheep in greater southeastern California averaged 0.91 (Andrew 1994), 0.86 or greater in northwest Arizona (when highway mortalities were excluded, (Cunningham and deVos 1992), 0.82 in New Mexico (Logan *et al.* 1996), and 0.85 or greater for four populations studied in the Mojave Desert (Wehausen 1992).

*Population Trends*

Bighorn sheep have been documented in the Peninsular Ranges since early explorers, such as Anza, observed them in the 1700's (Bolton 1930). Grinnell and Swarth (1913) described the area of Deep Canyon in the southern Santa Rosa Mountains, "...well worn trails, footprints, and feces were plentiful. In places it looked as though a herd of domestic sheep had been over the region." Rangewide population estimates were not made until the 1970's. Published estimates were as high as 971 in 1972 (Weaver 1972), and 1,171 in 1974 (Weaver 1975).

U. S. Range-wide population estimates were 570 in 1988 (Weaver 1989), 400 in 1992 (Service 1992), and between 327 and 524 in 1993 (Torres *et al.* 1994). Starting in 1994 a biennial helicopter census has been conducted throughout the Peninsular Ranges using radio-collared animals to estimate sighting probabilities. The range-wide population estimates were 347, 276, 334, 400, 667, 708, and 793 for the years 1994-2006, respectively. From the historic highs of the 1970's, population estimates declined to a low of 276 adults in 1996 (Service 2000); since 1996, the population has steadily increased. Currently, at least 8 ewe groups (or subpopulations) exist in the overall U. S. range, however, the population trajectory of each ewe group appears to be determined independently (Rubin *et al.* 1998). Climatic patterns are correlated across the Peninsular Ranges, suggesting that other local factors specific to each ewe group play important roles in determining long-term abundance trends (Rubin *et al.* 1998). Independent population trends also were observed among ewe groups in the Mojave Desert (Wehausen 1992). Bighorn sheep are relatively long-lived animals that have the potential to reproduce over an extended period of time (2-16 years). Therefore, periods of above average recruitment may compensate for periods of low recruitment (Wehausen 1992). Forage quality and quantity vary with environmental conditions; therefore, female condition, and conception, parturition and lamb survival rates reflect this natural variation. However, if mortality agents begin impacting adult survival, then subpopulation levels may drop dramatically, endangering the existence of a ewe group. Consequently, a ewe group's persistence is always vulnerable to disease outbreaks, high levels of predation, mortality caused by urbanization, and habitat loss from development and human disturbance.

An important influence on bighorn sheep population trends are their behavioral responses to human activity. Bighorn sheep were classified as a wilderness species by Aldo Leopold (1933) because they usually declined when confronted with expanding human developments and

activities. Over the past 75 years, numerous other scientists and land managers have expressed concerns regarding the impact of human activities on bighorn sheep populations (Horesji 1976, Hicks and Elder 1979, Graham 1980, Leslie and Douglas 1980, Hamilton *et al.* 1982, Stemp 1983, Miller and Smith 1985, Gionfriddo and Krausman 1986, Krausman and Leopold 1986, Smith and Krausman 1988, Etchberger *et al.* 1989, Krausman *et al.* 2001, Papouchis *et al*. 2001). These concerns have been echoed in the Peninsular Ranges where bighorn sheep have altered their movement and habitat use patterns in response to human activity (Jorgensen and Turner 1973, Hicks 1978, Olech 1979, Cunningham 1982, DeForge and Scott 1982, Gross 1987, Sanchez *et al.* 1988). The impacts of human development extend beyond the urban edge into bighorn sheep habitat. Growing human populations and their increased activities adjacent to and within bighorn sheep habitat have the potential to adversely affect bighorn sheep by directly converting habitat to human uses and fragmenting remaining use areas. Additionally, the behavioral responses of bighorn sheep to human activities may alter how they utilize resources occurring in their environment. These altered behavior patterns may be less than optimal and could eventually negatively affect population trajectories.

*Threats*

Threats to bighorn sheep in the Peninsular Ranges include habitat loss and fragmentation, urban sources of mortality, human disturbance, disease, and mountain lion predation (Service 2000). As discussed above, the population dynamics of ewe groups operate independently, and threats to the various ewe groups vary spatially and temporally.

Habitat loss is a leading cause of current species extinctions and endangerment worldwide (Burgman *et al.* 1993). It represents a particularly serious threat to PBS because they live in a narrow band of lower elevation habitat that represents some of the most desirable real estate in the California desert, and it is being developed at a rapid pace. At least 7,490 ha (18,500 ac) or about 77.7 $km^2$ (30 $mi^2$) of suitable habitat has been lost to urbanization and agriculture within the range of the three ewe groups that occur along the urban interface between Palm Springs and La Quinta, and development is spreading southward towards Anza-Borrego Desert State Park. Within the narrow band of habitat, bighorn sheep make use of sparse and sometimes sporadically available resources found within their home ranges. As humans encroach into this habitat, these resources are eliminated or reduced in value, and the survival of ewe groups is threatened. Bighorn sheep are also sensitive to habitat loss or modification because they are relatively poor dispersers (Geist 1967, 1971), largely learning their ranging patterns from older animals. When habitat is lost or modified, the affected group is likely to remain within their familiar surroundings but with a reduced likelihood of population persistence, due to the reduced quantity and/or quality of resources.

Encroaching urban development and anthropogenic disturbances have the dual effect of restricting animals to a smaller area and severing connections between ewe groups. Fragmentation poses a particularly severe threat to species with a metapopulation structure, such as PBS, because overall survival depends on interaction among subpopulations. Isolated, small

groups of animals are subject to greater risks of extinction, while inter-connected, small groups acquire much of the resilience of larger populations. The movement of rams and occasional ewes between ewe groups maintains genetic diversity and augments populations of individual ewe groups (Brown and Kodric-Brown 1977, Soulé 1980, Krausman and Leopold 1986, Schwartz *et al.* 1986, Burgman *et al.* 1993). Temporary moves by females between neighboring ewe groups could also provide new habitat knowledge facilitating future range expansion (Geist 1971). Increased fragmentation reduces such possibilities and increases the risk of ewe group extinction.

Beyond physical barriers to movement, fragmentation also can result from less obvious forms of habitat modification. Increased traffic on roads apparently make bighorn sheep, especially ewes, hesitant to cross these roads (Rubin *et al.* 1998; Epps *et al.* 2003). Animals that do cross suffer an additional risk of mortality from automobile collisions (Turner 1976, McQuivey 1978, Cunningham and deVos 1992, DeForge and Ostermann 1998a, Bighorn Institute 1999), with the result that a group whose range is bisected by a road can have reduced viability in the long-term (Cunningham and deVos 1992).

Bighorn sheep evolved in the presence of predators, and developed effective physical and behavioral mechanisms for dealing with them. Similar to other desert bighorn populations, sheep in the Peninsular Ranges have likely experienced varying levels of lion predation for thousands of years. However, when other factors, such as drought, habitat loss and fragmentation due to urbanization, diseases, and other mortality factors reduce populations to low levels and/or alter the abundance and distribution of alternate prey species, such as mule deer, then the influence of predation on population dynamics may increase (Logan and Sweanor 2001). For example, prey populations frequently respond to the presence of mountain lions by changing their distribution at a landscape scale (Hornocker 1970). Where habitats have become fragmented by human developments, bighorns may not be able to move away from areas of high predation risk.

In the Peninsular Ranges coyotes (*Canis latrans*), golden eagles (*Aquila chrysaetos*) and bobcats (*Lynx rufus*) are also potential predators of bighorn sheep (Weaver and Mensch 1970, Jorgensen and Turner 1975, DeForge and Scott 1982).

The westward spread of Europeans and their domestic livestock across North America was thought to play a significant role in reducing the distribution and abundance of bighorn sheep due to the introduction of new infectious diseases (Spraker 1977, Onderka and Wishart 1984). In particular, domestic sheep have been repeatedly implicated in *Pasteurella* pneumonia die-offs of bighorn sheep. It has been hypothesized that disease has played an important role in the population dynamics of bighorn sheep in the Peninsular Ranges (DeForge *et al.* 1982, DeForge and Scott 1982, Turner and Payson 1982, Wehausen *et al.* 1987). Numerous pathogens have been isolated or detected by serologic assay from bighorn sheep in these ranges. These pathogens include bluetongue virus, contagious ecthyma virus, parainfluenza-3 virus, bovine

respiratory syncytial virus (BRSV), *Anaplasma*, *Chlamydia*, *Leptospira*, *Pasteurella*, *Psoroptes,* and *Dermacentor* (DeForge *et al.*, 1982; Clark *et al.* 1985, 1993; Mazet *et al*. 1992; Elliott *et al.* 1994; Boyce 1995; Crosbie *et al.*, 1997, DeForge *et al.* 1997).

Numerous bighorn sheep biologists and land managers have felt compelled to write about their experiences and observations concerning the impacts of human activity on bighorn sheep. These scientists and mangers developed their opinions by and large independently over a lengthy period of time (approximately 75 years). The overwhelming majority expressed concern, recounted increases in human activity with accompanying changes in bighorn sheep behavior, and at times decreased population levels. They almost universally recommended management of human activity in bighorn sheep habitat.

The strength of inference varies within the literature, ranging from simple opinion to reporting expensive and difficult to conduct field studies in peer-reviewed scientific publications. The most compelling evidence available is the local extinctions of bighorn sheep populations living next to expanding urban areas where bighorns experienced high levels of human activity within their home ranges (Krausman *et al.* 2001). Occasional encounters with humans that result in flight or other behavioral and physiological reactions are probably well within the abilities of bighorn sheep to tolerate. Bighorn sheep have evolved to deal with occasional disruptions of their usual behavioral patterns, such as the presence of a predator. However, it appears beyond a certain threshold of human activity, bighorns can simply be overwhelmed, and a number of factors interact to determine the effects of human activity on bighorn sheep.

Bighorn response to human activity is variable and depends on many factors, including but not limited to: the type and predictability of the activity, presence of domestic dogs, the animal's previous experience with humans, size or composition of the bighorn sheep group, location of bighorn sheep relative to the elevation of the activity, distance to escape terrain, and distance to the activity (Weaver 1973; McQuivey 1978; Hicks 1977, 1978; Hicks and Elder 1979; MacArthur *et al.* 1979, 1982; Wehausen 1980; Hamilton *et al*. 1982; Whittaker and Knight 1998; Papouchis *et al.* 1999).

The history of sheep and human interactions has shown that not all bighorn sheep react in the same way to human disturbance. As in humans, there are individual differences in behavior and different groups of sheep have had different experiences with humans (King and Workman 1986). A portion of individuals in some populations may not react as strongly to disturbance as others (Hicks and Elder 1979, Leslie and Douglas 1980, Papouchis *et al.* 2001). Different groups of bighorns may possess different “cultures” in terms of their reactions to human activities. Ewes with lambs typically are more sensitive to disturbance (Light and Weaver 1973, Wehausen 1980) than groups without young. Attraction, habituation, and avoidance are behavioral events that should be placed in careful context with descriptions of the conditions under which the animal displayed a particular response. Individual animals or populations should not be labeled based on the limited responses of a few animals (Whittaker and Knight 1998).

Although the reactions of bighorn sheep to human activity are complex, for communication purposes it is useful to divide them into habitat effects and physiological effects. Habitat effects refer to the relocation of bighorn sheep away from human activity, and this can also be considered spatial displacement. The end result of moving away from humans reduces the options bighorns have for meeting their resource needs. Physiological effects refer to changes that occur within bighorn sheep when they perceive and react to danger or disturbance, such as elevated heart rate or the additional energy expended in moving away from sources of concern. In reality, habitat and physiological effects are not mutually exclusive, and both usually occur when sheep act to avoid danger or disturbance.

A variety of recreational activities such as hiking, mountain biking, hang gliding, horseback riding, camping, hunting, dog-walking, and use of aircraft and off-road-vehicles have the potential to disrupt normal bighorn sheep social behaviors and use of essential resources, and cause bighorn sheep to abandon traditional habitat (Graham 1971, Jorgensen 1973 and 1974, McQuivey 1978, MacArthur *et al*. 1979, Olech 1979, Wehausen 1979, Graham 1980, Leslie and Douglas 1980, Monson and Sumner 1980, Wilson *et al.* 1980, MacArthur *et al*. 1982, Bates and Workman 1983, Wehausen 1983, Miller and Smith 1985, Cunningham and Ohmart 1986, Krausman and Leopold 1986, Armentrout and Brigham 1988, Krausman *et al.* 1989, Goodson *et al*. 1999, Papouchis *et al*. 1999, 2001). For example, Graham (1971) found that areas with more than 500 visitor-days of use per year resulted in a decline of use by bighorn sheep. Jorgensen (1974) reported that PBS use of an area of Anza Borrego Desert State Park was reduced by about 50 percent on days when more recreational vehicle traffic occurred, versus periods of low or no vehicle use. Etchberger *et al.* (1989) found that habitat abandoned by bighorn sheep in the Pusch Ridge Wilderness had greater human disturbance and differences in vegetation and visibility as a result of fire suppression when compared to currently occupied habitat. In addition to recreation, construction, industrial, and agricultural activities may also disturb bighorn sheep (Krausman *et al*. 1989, Leslie and Douglas 1980).

Cases have been cited in which bighorn sheep populations did not appear to be greatly affected by human activity. However, even when bighorn sheep appear to be tolerant, continued and frequent human use of an area can cause them to eventually avoid the area, interfering with use of resources, such as water, mineral licks, lambing or feeding areas, or use of traditional movement routes (Jorgensen and Turner 1973, McQuivey 1978, Graham 1980, Leslie and Douglas 1980, DeForge and Scott 1982, Hamilton *et al.* 1982, Krausman and Leopold 1986, Rubin *et al.* 1998).

In addition to spatial displacement, human activity can result in physiological responses, such as elevated heart rate, even when no behavioral response is discernable, and the cumulative energetic cost of such responses may potentially affect the nutritional status of individuals and potentially populations (Stemp 1983, MacArthur *et al.* 1979, 1982). Responses can range from cautious curiosity to immediate flight. Cardiac and behavioral responses of bighorn sheep to an approaching human were determined to be greatest when a person was accompanied by a dog or approached from over a ridge (MacArthur *et al.* 1979, 1982). When individuals perceive

danger, changes can occur within the endocrine system along with increased heart rates. These changes are actually adaptive and evolved to deal with imminent danger, such as a mountain lion attack. However, long-term chronic activation of this "flight or fight" mechanism may cause physiological reactions that impair immune function, endocrine regulation, and growth and development (Desert Bighorn Council 1992). Additionally, bighorn sheep prevented from using preferred foraging areas or following normal activity patterns by frequent human disturbance may experience less than adequate nutrition, which can also adversely affect the immune system (Festa-Bianchet 1988, Wagner and Peek 1999).

Similar to predation, prolonged drought is a natural factor that can have negative impacts on desert bighorn sheep populations, either by limiting water sources or by affecting forage quality and quantity (Rosenzweig 1968, Hansen 1980a, Monson 1980, Douglas and Leslie 1986, Wehausen *et al.* 1987). During drought years, the concentration of bighorn sheep near remaining water sources may increase competition for forage as well as water, thereby limiting population growth through density dependent regulation (Caughley 1977). In addition, increased density potentially renders animals more susceptible to diseases or parasites (Anderson and May 1979, May and Anderson 1979).

In the Peninsular Ranges, the presence of tamarisk (*Tamarix* sp.), also known as saltcedar, represents a serious threat to bighorn sheep. This exotic plant has rapid reproductive and dispersal rates (Sanchez 1975, Lovich *et al.* 1994), enabling it to out compete native plant species in canyon bottoms and washes. It has the following negative effects on bighorn sheep: 1) it reduces or eliminates the standing water on which bighorn sheep depend, 2) it out competes plant species on which bighorn sheep feed, and 3) it occurs in thick, often impenetrable stands that block access to water sources and it provides cover for predators.

Fire suppression can influence the distribution and habitat use patterns of bighorn sheep by causing avoidance of areas with low visibility (Risenhoover and Bailey 1985, Wakelyn 1987, Etchberger *et al.* 1989, Etchberger *et al*. 1990, Krausman 1993, Krausman *et al*. 1996). Long-term fire suppression results in taller, denser stands of vegetation, thereby reducing openness and visibility and making bighorn sheep more susceptible to predation (Sierra Nevada Bighorn Sheep Interagency Advisory Group 1997). In addition, Graf (1980) suggested that fire suppression reduces forage conditions on some bighorn sheep ranges. In the Peninsular Mountains, changes in vegetation succession are evident in some portions of bighorn sheep habitat, primarily in higher elevation chaparral and pinyon-juniper habitats, and this change has apparently decreased bighorn sheep use of certain canyons and springs (M. Jorgensen, Anza-Borrego Desert State Park, *in litt* 2000).

The number of illegal immigrants entering the U.S. from Mexico continues to increase. Some of these immigrants travel through the Peninsular Ranges and camp at water sources where they may occasionally kill and consume bighorn sheep, or displace them. The U. S. Border Patrol is also increasing its activity along the border and in the southern Peninsular Ranges. Consequently the level of human activity in the area is increasing. This scenario may cause

bighorn sheep to avoid areas they once utilized and may potentially prevent bighorn sheep population connectivity between the United States and Mexico. In addition, the U. S. is planning to construct an intermittent fence along the border, and the design of the fence will prevent the movement of large mammals, as well as humans. The locations of the constructed portions will likely funnel immigrants into the Jacumba Mountains increasing the number of immigrants traversing these mountains to enter the United States.

*Status of Critical Habitat*

On February 1, 2001 (66 FR 8649), 341,918 ha (844,897 ac) of critical habitat were designated in the Peninsular Ranges of the United States in the counties of Riverside, Imperial, and San Diego. The designation of critical habitat attempted to follow the line delineating essential habitat as presented in the Recovery Plan (Service 2000). At the time of listing and initiating the Recovery Plan, the PBS population was near its historic low point of 276 adults and yearlings. One of the primary goals outlined in the Recovery Plan was protecting sufficient space within essential habitat to support the population growth needed to reach the recovery criteria of maintaining subpopulations of at least 25 adult ewes within each of nine designated recovery regions, which corresponded to known and potential ewe groups, plus sustain an overall population level of 750 adults and yearlings.

As explained in the Recovery Plan (Introduction, Section 4, Page 4) these ewe groups are considered subpopulations in a metapopulation context, thus their recovery and persistence depend upon maintaining habitat connections between the ewe groups. Additionally, bighorn sheep adapt to changing environmental conditions and predation by altering their spatial distribution, therefore securing space for making such adaptive adjustments is necessary for the long-term persistence of the population segment (Epps *et al***.** 2004**,** Hornocker 1970, Logan and Sweanor 2001). Furthermore, desert bighorn sheep make use of gentle terrain, such as alluvial fans and washes for travel routes and to access nutritious forage during droughts and other challenging periods, such as lactation (Berger 1991, Bleich *et al.* 1990, Bleich *et al.* 1996 Krausman and Leopold 1986, Schwartz *et al.* 1986, Leslie and Douglas 1979, Wehausen 1980). The essential habitat boundary encompassed the home ranges of existing ewe groups, the habitat connections between them, alluvial fans and washes, space for adapting to changing environmental conditions, and all primary constituent elements listed in the final critical habitat designation of February, 2001 (66 FR 8649). Therefore, the critical habitat designated in February, 2001, attempted to match the Recovery Plan's essential habitat line as closely as possible.

On March 7, 2005, the Agua Caliente Band of Cahuilla Indians filed a complaint against the Service's economic analysis of designated critical habitat. Other parties subsequently intervened as plaintiffs in the case. On July 31, 2006, a court approved consent decree resulted in the partial vacature of critical habitat designation on Tribal lands and remanded the critical habitat designation back to the Service for a new rulemaking. A revised critical habitat designation of approximately 155,565 ha (384,410 ac) was proposed on October 10, 2007 (72 FR 57739).

Currently, the October 10, 2007 (72 FR 57739) proposed critical habitat is being revised, after evaluating the content of public comments and hearings. It is anticipated that final critical habitat will be designated by March 30, 2009.

The primary constituent elements of a designated critical habitat include the general categories of: "space for individual and population growth, and normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction and rearing of offspring; and habitats that are protected from disturbance or are representative of the historic geographical and ecological distribution (66 FR 8649)." Specifically for PBS the primary biological and physical constituent elements listed as essential to the conservation of bighorn sheep in the February 1, 2001 (66 FR 8649), designation included: "space for normal behavior of groups and individuals; protection from disturbance; availability of various native desert plant communities found on different topographic slopes, aspects, and landforms, such as steep slopes, rolling foothills, alluvial fans, and canyon bottoms; a range of habitats that provide forage, especially during periods of drought; steep, remote habitat for lambing, rearing of young, and escape from disturbance and/or predation; water sources; suitable linkages allowing individual bighorn to move freely between ewe groups; and maintain connections between subpopulations within the Peninsular Range metapopulation; and other essential habitat components to accommodate population expansion to a recovery level."

In the proposed critical habitat (72 FR 57739) published on October 10, 2007, the primary constituent elements were reorganized and stated as: 1) Moderate to steep, open slopes (20 to 60 percent) and canyons, with canopy cover of 30 percent or less (below 1,402 m (4,600 ft) elevation in the Peninsular Ranges) that provide space for sheltering, predator detection, rearing of young, foraging and watering, mating, and movement within and between ewe groups. 2) Presence of a variety of forage plants, indicated by the presence of shrubs (e.g., *Ambrosia* spp., *Caesalpinia* spp., *Hyptis* spp., *Sphaeralcea* spp., *Simmondsia* spp.), that provide a primary food source year round, grasses (e.g., *Aristida* spp., *Bromus* spp.) and cacti (e.g., *Opuntia* spp.) that provide a source of forage in the fall, and forbs (e.g. Plantago spp., Ditaxis spp.) that provide a source of forage in the spring. 3) Steep, rugged slopes (60 percent slope or greater) (below 1,402 m [4,600 ft] elevation in the Peninsular Ranges) that provide secluded space for lambing as well as terrain for predator evasion. 4) Alluvial fans, washes, and valley bottoms that provide important foraging areas where nutritious and digestible plants can be more readily found during times of drought and lactation and that provide and maintain habitat connectivity by serving as travel routes between and within ewe groups, adjacent mountain ranges, and important resource areas, such as foraging areas and escape terrain. 5) Intermittent and permanent water sources that are available during extended dry periods and that provide relatively nutritious plants and drinking water.

*Background*

In a desert environment, resources are often times sparse, widely distributed, and ephemeral. Resources, such as food and water may vary in their abundance and availability through time and

space. On an annual basis, most moisture arrives in the Peninsular Ranges of the U. S. during the cooler months of the year, with the warmer months being drier (Turner and Brown 1982). However, occasionally summer thunderstorms contribute significant moisture to localized areas, resulting in a bimodal distribution of moisture, although one that is highly variable (Turner and Brown 1982). Typically, bighorns in the Peninsular Ranges concentrate their activity around permanent sources of water during the warmer, drier months, and expand their use areas during the cooler, wetter months, when they apparently are not dependent upon free-standing water (Jones *et al.* 1957, Leslie and Douglas 1979, Cunningham and Ohmart 1986). On a long-term basis, moisture patterns can vary over many years, and bighorns may be confronted by extended droughts. Under drought conditions, the environment of bighorn sheep can change markedly, with water sources drying up, and nutritious vegetation becoming difficult to find (Andrew 1994, Leslie and Douglas 1979). Consequently, during extended droughts the distribution of bighorn sheep may differ from that observed at other time periods (McQuivey 1978, Leslie and Douglas 1979, Elenowitz 1983).

The lower elevations of the Peninsular Ranges are part of the Colorado Division of the Sonoran Desert, which is considered the driest of the North American deserts (Turner and Brown 1982). As a consequence, the plants which bighorn sheep utilize for food generally are not found in great quantity on any given area compared to other ecosystems, such as forests and grasslands that receive greater moisture. In addition, when moisture does arrive it is often patchily distributed; with some areas receiving a large amount while nearby areas receive little or none. The variations in moisture patterns cause the availability of quality forage to also vary in time and spatial distribution. Therefore, as herbivores, bighorns need to range widely and adjust to changing environmental conditions to sustain themselves, and this requires adequate "space" and "availability of various native desert plant communities found on different topographic slopes, aspects, and landforms, such as steep slopes, rolling foothills, alluvial fans, and canyon bottoms; a range of habitats that provide forage, especially during periods of drought (66 FR 8649)." Likewise, primary constituent elements, "2) Presence of a variety of forage plants, indicated by the presence of shrubs (e.g., *Ambrosia* spp., *Caesalpinia* spp., *Hyptis* spp., *Sphaeralcea* spp., *Simmondsia* spp.), that provide a primary food source year round, grasses (e.g., *Aristida* spp., *Bromus* spp.) and cacti (e.g., *Opuntia* spp.) that provide a source of forage in the fall, and forbs (e.g. Plantago spp., Ditaxis spp.) that provide a source of forage in the spring." and "4) Alluvial fans, washes, and valley bottoms that provide important foraging areas where nutritious and digestible plants can be more readily found during times of drought and lactation and that provide and maintain habitat connectivity by serving as travel routes between and within ewe groups, adjacent mountain ranges, and important resource areas, such as foraging areas and escape terrain" would apply (72 FR 57739).

Few areas of the modern West are not desired for human use, be it development or some form of recreation. Where bighorn sheep appear able to coexist well with humans they also have access to large blocks of intact habitat and extended time periods where they can avoid high levels of human activity (Krausman et al. 2001, Wagner and Peek 1999). Over time, incremental increases in human use, plus habitat loss and fragmentation can eliminate large, blocks of habitat

to the degree bighorn sheep may completely avoid an area. Eventually, there may not be enough intact habitat remaining to sustain a bighorn population. Likewise, one strategy bighorn sheep use to cope with the persistent presence of mountain lions is moving an extended distance to a new area that contains an adequate mix of required resources (Hornocker 1970, Logan and Sweanor 2001). If there are no such areas available, or access to them is prevented by human developments, then the isolated bighorn groups can experience heavy losses to mountain lion predation. Both of these aspects of bighorn sheep behavioral ecology underscore the need for conserving adequate "space for normal behavior of groups and individuals; protection from disturbance;" and "suitable linkages allowing individual bighorn to move freely between ewe groups; and maintain connections between subpopulations within the Peninsular Range metapopulation; and other essential habitat components to accommodate population expansion to a recovery level (66 FR 8649)." Proposed critical habitat primary constituent elements 1 and 4 would similarly apply (72 FR 57739).

Bighorn ewes isolate themselves from other female sheep when bearing lambs. They are sometimes widely separated from other sheep during this period, and this behavior can be explained as a mechanism for coping with predators (Geist 1971). By spreading out and utilizing rugged, steep terrain, bighorn ewes reduce the likelihood of detection and increase the chances of evading predators if located. The amount of terrain possessing the characteristics of optimum lambing habitat is limited. Therefore, an adequate "space" must be conserved to ensure enough lambing habitat is available to sustain the population and provide, "steep, remote habitat for lambing, rearing of young, and escape from disturbance and/or predation (66 FR 8649)", and "3) Steep, rugged slopes (60 percent slope or greater) (below 4,600 feet (1,402 meters) elevation in the Peninsular Ranges) that provide secluded space for lambing as well as terrain for predator evasion (72 FR 57739)."

Ewes return to their groups once lambs are several weeks old, then they begin to utilize a variety of habitats to rear their young (Geist 1971). They will continue to rely upon rugged, steep terrain for predator evasion and bedding areas, but will seek out sources of nutritious forage and water that may not be abundant in steep, rugged terrain. Therefore, to secure needed resources, bighorn ewes require habitat connections that facilitate moving across the landscape, and adequate "space" must be conserved to capture these travel routes and dispersed resources. Additionally, bighorn rams often travel between several ewe groups during the mating season (Geist 1971). This aspect of bighorn sheep biology helps prevent the loss of genetic diversity that could lead to inbreeding depression. Although female bighorn sheep do not move between ewe groups as often as rams, such movements do occur (Boyce *et al.* 1999), and these events are beneficial genetically, as well as from a population demographic standpoint (Brown and Kodric-Brown 1977). In order for these inter-group movements to occur, adequate "space" must be conserved to provide the necessary travel routes and habitat connections.

In the Peninsular Ranges, bighorn sheep use a wide variety of plant species for food (Weaver *et al.* 1968, Jorgensen and Turner 1973). Cunningham and Ohmart (1986) determined that the bighorn sheep diet in Carrizo Canyon (at the south end of the U.S. Peninsular Ranges) consisted

of 57 percent shrubs, 32 percent forbs, 8 percent cacti, and 2 percent grasses. Scott (1986) and Turner (1976) reported similar diet compositions at the north end of the range. Bighorn diet composition varied seasonally and annually as different plant species became available at various locations and time periods. Therefore, designated and proposed critical habitats must contain an "availability of various native desert plant communities found on different topographic slopes, aspects, and landforms, such as steep slopes, rolling foothills, alluvial fans, and canyon bottoms; a range of habitats that provide forage, especially during periods of drought (66 FR 8649)", and from the proposed critical habitat, primary constituent element 3 would apply.

Similar to other desert bighorn populations (Miller and Gaud 1989), bighorn diet composition in the Peninsular Ranges was dynamic, with sheep adjusting to the changing availability and nutritional content of various plant species. To survive as relatively large herbivores in a harsh desert environment, PBS require a diverse assemblage of forage plants, and such plant species diversity is created by the varied landscape. Thus, critical habitat was designated to include the full range of elevations, aspects, and land forms existing in the desert regions of the Peninsular Ranges. For example, the time period surrounding late gestation, lambing, and nursing is very demanding in terms of the energy and protein required by bighorn ewes. Failure to acquire sufficient nutrients during late gestation and during nursing adversely affects the survival of newborn ungulates (Thorne *et al.* 1976, Julander *et al.* 1961, Holl *et al.* 1979). Crude protein and digestible energy values of early green-up species are usually much higher than those of dormant forages during the critical late gestation, lambing, and rearing seasons. With their high nutrient content, even minor volumes of these forages within the overall diet composition may contribute important nutritional value at critical life stages (Wagner and Peek 2007). However, during the reproductive season, due to the varied topography of desert bighorn sheep habitat, these forages typically are concentrated on specific sites, such as alluvial fans and washes, where more productive soils support greater herbaceous growth than steeper, rockier soils. Such areas are also important during the hot season or extended droughts. Vegetation growing on washes and alluvial fans remains green longer than vegetation in other areas, providing forage higher in nutrients and digestibility than the dry, brown forages found on the mountainsides under these conditions (Andrew 1994). Leslie and Douglas (1979) noted that washes and alluvial fans became increasingly important to bighorn sheep not only in summer, but during any period of limited forage availability. Consequently, the primary constituent elements: "4) Alluvial fans, washes, and valley bottoms that provide important foraging areas where nutritious and digestible plants can be more readily found during times of drought and lactation and that provide and maintain habitat connectivity by serving as travel routes between and within ewe groups, adjacent mountain ranges, and important resource areas, such as foraging areas and escape terrain. 5) Intermittent and permanent water sources that are available during extended dry periods and that provide relatively nutritious plants and drinking water (72 FR 57739)" would apply, along with the appropriate language: "availability of various native desert plant communities found on different topographic slopes, aspects, and landforms, such as steep slopes, rolling foothills, alluvial fans, and canyon bottoms; a range of habitats that provide forage, especially during periods of drought (66 FR 8649)", from the designated critical habitat rule.

In the southern Peninsular Ranges, consisting of the southern Santa Rosa, San Ysidro, Pinyon, Vallecito, Tierra Blanca, Sawtooth, and In-Ko-Pah Mountains, the primary constituent elements are largely secured by the existence of Anza-Borrego Desert State Park and Federal lands that are favorably managed for bighorn sheep. For example, the Park has identified and protected bighorn water sources, and has pursued an aggressive program aimed at eliminating exotic plant species from most areas of the park. A significant portion of the southern Peninsular Ranges is designated State or Federal wilderness. The major impacts in this southern area are associated with Highways S-2, S-22, 78, and I-8, where along certain sections bighorns are regularly struck by automobiles, plus the growing prevalence of legal and illegal off-road vehicle recreation threatens to degrade some areas. Currently, most hiking trails in the southern Peninsular Ranges are located in the canyon bottoms and washes, which place recreationists in a non-threatening position below bighorn sheep. With the exception of the area surrounding the town of Borrego Springs, the area has seen comparatively little residential development compared to the northern Peninsular Ranges.

Mining operations exist in both the Fish Creek and Coyote Mountains. Gypsum mining in the Fish Creek Mountains involves blasting and hauling away the nearly pure mineral, primarily for the manufacture of wall board. An adequate reclamation of the site can result in improved foraging opportunities for bighorn sheep. However, the almost constant presence of workers and machinery may reduce bighorn use of the area. In the Coyote Mountains, gravel is currently mined by excavating alluvial fans along the western base of the mountain range. Extensive, but not active, mine sites exist within the interior of the mountain range.

The Jacumba Mountains, the most southerly in the U. S., are the site of extensive illegal immigration and law enforcement operations. To promote national security, an intermittent fence is being constructed along portions of the U. S. /Mexico border. Fencing will not be constructed where the Jacumba Mountains cross into Mexico, therefore, human traffic and law enforcement may actually increase in the mountain range as immigrants encounter obstacles at other locations. Additionally, I-8 cuts through these mountains, and it apparently presented an obstacle to bighorn sheep movement for many years. However, recently the number of bighorn sightings south of the interstate and within the I-8 Island (a segment of the interstate where the east and west-bound lanes diverge leaving approximately 1,214 ha [3,000 ac] of habitat) has increased markedly, and sheep have been seen close to and actually crossing the interstate. This period of increased sheep activity coincides with an increase in bighorn population levels within nearby Carrizo Gorge, which is located north of I-8. As the growing human population attempts to assure continual supplies of energy, the California desert has become viewed as an important area for generating geothermal, wind, and solar power. Consequently, the area's human population may expand, and the I-8 corridor used to transfer energy to cities on the west coast.

In summary, confining PBSs to isolated, remnant islands of rugged habitat imbedded in a landscape matrix dominated by human uses would substantially reduce the probability of population persistence. PBS distribution, especially ewes with young lambs, is tied to steep, rugged terrain that is generally not highly valued by humans for development, thus it is tempting

to only consider remote and rugged areas for critical habitat designation. However, when all aspects of bighorn sheep ecology are considered, and the importance of all segments of the population acknowledged, it is evident that a variety of connected topographies and land forms are important. Generally, the primary constituent elements in the southern Peninsular Ranges have been much less impacted by human activities, such as development and recreation, than the northern Peninsular Ranges. A large portion of bighorn sheep habitat in the southern ranges is protected by Anza-Borrego Desert State Park and State and Federal wilderness areas.

Environmental Baseline

*Status of the Species in the Action Area*

Bighorn sheep populations inhabiting desert portions of San Diego County were poorly known prior to 1968 (Weaver *et al*. 1968). Starting at that time, CDFG initiated a state-wide inventory of desert bighorn sheep. Methods included ground and aerial surveys, waterhole counts, and interviews with local residents. Due to funding and time constraints, information for what is now the project's action area was obtained mainly by interviewing local residents, with some having lived and worked in the area as far back as 1919. For example, Lloyd Lovell was raised in the area by the McCain family, early ranchers and namesakes for nearby McCain Valley. Lovell related that the area north and including Devil's Canyon had been good sheep habitat in his youth and he frequently observed them in the area. At the time of the Weaver *et al*. survey, the number of sheep in the area appeared reduced compared to earlier years. Based upon these interviews and limited ground surveys, Weaver et al. (1968) estimated the number of bighorn sheep using Devil's Canyon at 12 animals, the number south of Highways I-8 at 20 individuals, and the number inhabiting Carrizo Gorge to the north at 20. The Jacumba Mountains south of I-8 were mapped as containing a permanent population of bighorn sheep. The surveys were continued for three years and final population estimates for the Jacumba Mountains and In-ko-pah Mountains were 83 and 20 total animals, respectively (Weaver *et al.* 1972).

Hicks (1978) reported a study of the status and distribution of bighorn sheep in the In-ko-pah Mountains, which mentioned a sighting of bighorn sheep attempting to cross Interstate 8 near Myer Creek during spring 1978. When questioned, highway maintenance crews said they had not observed sheep in the area since 1971. Additionally, the area around Mountain Springs and Interstate 8 was mentioned as an area containing bighorn sheep by immigrants moving up from Mexico (Hicks 1978). The number of sheep inhabiting the In-ko-pah and Jacumba Mountains was estimated at 80 to 100 animals. Cunningham (1982) studied bighorn sheep in the area soon after Hicks (1978), and observed that Interstate 8 acted as a boundary to sheep movement. He reported that > 30 bighorn sheep were believed to inhabit the area south of the Interstate. Cunningham (1982) speculated that the area around the I-8 Island was once important bighorn sheep habitat because six water sources were relatively close to the highway from In-Ko-Pah to Ocotillo. Local residents also reported that three of these springs had been used by bighorn sheep, and highway department personnel stated that bighorn sheep were common when construction of I-8 began. The Interstate most likely bisected a once continuous distribution of

bighorn sheep (Cunningham 1982). In summary, bighorn sheep populations in the Jacumba Mountains north of I-8 to Carrizo Gorge were well studied and documented by field biologists (see also Olech 1978 and Sanchez 1988). However, population estimates for the area from I-8 to the Mexican border were largely derived from interviewing local residents and highway department personnel.

Helicopter surveys became the favored method for surveying bighorn sheep populations inhabiting remote, roadless areas in the 1980's. A limited number of flights occurred south of I-8, because few animals were regularly observed (Rubin et al. 1998). However, a small population of < 25 animals was assumed to exist south of the Interstate as reported in 1994 (Torres et al. 1994), when regular biennial, range-wide helicopter surveys of the Peninsular Ranges were started by CDFG. A subsequent aerial survey of the area failed to find any bighorn sheep south of the Interstate or around the I-8 Island, and this subpopulation of bighorn was assumed to be extirpated by 1996 (Torres et al. 1996, Rubin et al. 1998, Service 2000). Therefore, subsequent aerial surveys spent minimal time south of Carrizo Gorge (Rubin et al. 1998). The construction of I-8 in the mid-1960's, railroad activity in Carrizo Gorge, livestock grazing, poaching, and fire suppression were suggested as the likely causes of the decline and disappearance of bighorn sheep in the I-8 area south to the Mexican border (Rubin et al. 1998). Helicopter surveys conducted in the mid-1990's in Baja Norte, Mexico, documented bighorn sheep just south of the border in the Sierra Cucapa Mountains, although the number of sheep recorded was low and numbers of domestic livestock were considered high compared to neighboring mountain ranges in Baja Norte (DeForge *et al.* 1993).

For approximately 10 years, bighorn sheep were regarded as absent from the I-8 corridor and southern Jacumba Mountains. Starting in January 2006, bighorn sheep sightings began occurring on a regular basis in the Jacumba Mountains. The first sightings were from the U. S. Border Patrol, and they were centered on the Mountain Springs area, including the I-8 Island. The November 2006 CDFG aerial survey detected two ewes in Devil's Canyon and a six ewes, four lambs, and four rams over looking the east-bound lanes of I-8. Follow-up hikes through the area by Dr. Esther Rubin and USFWS personnel revealed bighorn sheep tracks and fecal piles. Automatic cameras were set up at the permanent water source at Mountain Springs by Jackie Selby, and several groups of bighorn sheep were photographed and observed. The BLM also supplied photographs and point locations of bighorn sheep observed in the area. During 2007, several visits to the I-8 Island area were made by Service biologists and Caltrans personnel and each observed sheep tracks and fecal pellets. The November 17, 2008, CDFG aerial survey detected five groups of bighorn sheep in the area totaling 30 individuals. within the I-8 Island and just north of the west bound lane. Due to insufficient funds, the aerial survey did not cover the entire area south of Interstate 8 to the border.

Based upon the plentiful tracks leading under the two bridges that span Devil's Canyon on the west bound side of I-8, it is apparent bighorn sheep are using these bridges as underpasses to access the approximately 1,214 ha (3,000 ac) island of habitat between the east and west bound lanes. On the east bound side there are no similar bridges, only large culverts and smaller, lower

bridges. Questions remain as to whether the east bound lanes pose a significant obstacle to sheep movement. It is unknown if bighorns use the culverts at times. However, there have been several sightings of bighorn sheep crossing Interstate 8 on the highway's surface (J. Collins, Naval Air Facility El Centro, in litt 2007, 2008) and the California Highway Patrol confirmed that an adult ram was killed on the left shoulder of the east bound lanes on August 12, 2008. Additionally, the U. S. Border Patrol has reported several observations of bighorn sheep south of the Interstate (D. Kim, U. S. Border Patrol, in litt 2008).

In summary, bighorn sheep appear to have re-colonized the I-8 Island area, and the bighorn being observed may have either moved to the area as the population in Carrizo Gorge expanded in numbers and geographic distribution, represent an increasing remnant of an original population, or be animals that moved northward from areas further south, including Mexico. None of the animals observed so far have been radio-collared, and some Carrizo Gorge sheep are radio-collared. However, bighorns observed at Mountain Springs apparently enter and exit the area from the north (E. Rubin, in litt, 2006). A field-trip to the border area on April 24, 2008, detected fecal pellets in lower Pinto Wash, which based upon the elevation, topography, and micro-site, have a high probability of being of bighorn sheep origin. The U. S. Border Patrol has reported observations of bighorn sheep south of the Interstate (D. Kim, *in litt*. 2008), but few are very far from the Mountain Springs/I-8 corridor. Due to insufficient funds, the 2008 aerial survey did not cover the entire area south of Interstate 8 to the Mexican border, and the number of bighorns inhabiting or traversing this area has not been quantified.

A portion of the Sunrise Powerlink crosses into 2001-designated critical habitat near the southeastern foothills and alluvial fans of the Coyote Mountains. Bighorn sheep inhabit the Coyote Mountains during the wetter months of the year. There are no known permanent, year-round water sources in the Coyote Mountains, and these bighorns represent a migratory sub-group of the greater Carrizo Canyon ewe group. Once hot weather arrives, Coyote Mountain sheep cross State Highway S2 to return to Carrizo Canyon, where exist year-round, dependable sources of water. The period of time bighorn ewes utilize the Coyote Mountains corresponds to the lambing season, and ewes with lambs have been observed (R. Bota, CDFG, *in litt*. 2008). The number of sheep migrating to the Coyote Mountains varies, but it is generally <30 animals. These animals use the entire mountain range, but are usually found at the higher elevations.

Bighorn sheep moving from Carrizo Canyon to the Coyote Mountains temporarily reduces the density of animals living near permanent water sources in Carrizo Canyon. This reduction in density provides an opportunity for forage resources to recover from the higher levels of browsing experienced during the summer months. Bighorns migrating to the Coyote Mountains may acquire lower levels of intra-specific competition for quality forage during the cooler, wetter months. The Coyote Mountains may also provide parturition and lamb rearing areas where predation risk from mountain lions is lower than Carrizo Canyon.

Environmental Baseline for Designated and Proposed Critical Habitat

Bighorn sheep critical habitat in the I-8 Island corridor consists of steep, broken country characterized by desert vegetation typical of the Colorado Division of the Sonoran Desert. The area contains a varied topography including two large drainages, In-Ko-Pah Gorge and Devil's Canyon, and numerous side canyons and tributaries. The complex topography harbors a variety of plant species, aspects, and physical features used by desert bighorn sheep. A water source located just west of Mountain Springs has been enclosed by concrete walls to form a small pool. This dependable water source is used by bighorn sheep and mule deer. Several other water sources are said to exist nearby, but their current status is unconfirmed.

The dominant man-made features include Interstate 8, Southwest Powerlink, and the small settlement of Mountain Springs. Remnants of Old Highway 80 pass through a portion of the I-8 Island, and several dirt roads branch off, leading to camping sites and down into Devil's Canyon. Most roads are confined to the southern end of the Island, with the northern portions of the Island accessible only by foot. Due to its strategic location, immigrants from Mexico pass through the Island and surrounding area in relatively large numbers, and there is much associated litter in the southern portion of the project area. Off-road vehicle enthusiasts use highly modified vehicles to traverse the dry water falls of Devil's Canyon. They sometimes use the camp and spend several days during the cooler months.

Bighorn sheep critical habitat affected by the Sunrise Powerlink in the Coyote Mountain area is characterized by broad, rolling alluvial fans and foothills dissected by wide meandering desert washes. The dominant vegetation consists of creosote bush scrub. This area contains no known water sources, but several natural catchments may occasionally fill during rain events. The dominant man-made features in the area include several gravel mines in Shell Canyon, and an Imperial County landfill. The area of the Coyote Mountains affected by the project receives less bighorn sheep use than other areas of the Coyote Mountains. Its main value for bighorn sheep are the expanses of alluvial fan habitat that may provide good forage when adequate moisture is available.

Effects of the Action

The effects of the action not only depend upon the specific design elements of the proposed project, but also the behavioral responses of bighorn sheep to the action. The behavioral response of bighorn sheep to the proposed project can be categorized by their response to the construction phase of the project, followed by their response to the actual structures and their continued operation and maintenance. Bighorn sheep are large wide-ranging mammals living in a harsh desert environment. Compared to some species, bighorns require large areas to find the resources required to maintain themselves. In addition, they have specialized habitat requirements for predator evasion and for coping with the extremes of their desert environment. Conservation of expansive areas of intact habitat and specific key resources are required for bighorn sheep to persist. The degree to which habitat and life history requirements of bighorn

sheep may be adversely affected by human activities and economic interests depends upon the direct and indirect effects of the proposed action.

General Conservation Measures **G-CM-16**, **G-CM-17**, **G-CM-20**, and **G-CM-22** and Species-Specific Conservation Measures **SS-CM-22 –SS-CM-25** are particularly relevant to SDG&E's commitment to avoid, minimize, and offset adverse effects to Peninsular bighorn sheep. Species-Specific Conservation Meausres **SS-CM-22 –SS-CM-25** are repeated here for ease of reference.

**SS-CM-22** Construction activities (including the use of helicopters) in 2001- designated critical habitat will be limited to outside the lambing season (January 1 through June 30) and the period of greatest water need (June 1 through September 30) as defined in the Recovery Plan. Construction activities in 2001-designated critical habitat may occur during the lambing season and/or period of greatest water need if prior approval is obtained from the Wildlife Agencies.

**SS-CM-23** Compensation for the loss of occupied bighorn sheep habitat will be implemented as follows. Permanent impacts to 2001-designated critical habitat will include 5:1 offsite acquisition and preservation of critical habitat. Temporary impacts to 2001-designated critical habitat will include 1:1 on-site restoration and 2:1 offsite acquisition and preservation of critical habitat. Any acquired habitat will be approved by the CPUC, BLM, and Wildlife Agencies.

**SS-CM-24** A biological consultant approved by the Wildlife Agencies shall be retained by SDG&E to collect data on bighorn sheep movements in the area during the construction phase. Prior to construction the biologist shall submit a bighorn sheep monitoring plan that meets the approval of the Wildlife Agencies. Helicopters shall follow regular flight corridors coinciding with the ROW to the maximum extent possible and avoid low-flying "short-cuts" or sight-seeing trips away from the project site. Helicopters shall avoid flying within 0.6 miles (1 kilometer) of bighorn sheep water sources. Helicopter landing areas, vehicle parking sites, and fly yards shall be cited at least 0.6 miles (1 km) from bighorn sheep water sources and other key resource areas identified by the biologist. When bighorn sheep are detected within the I-8 Island, construction operations shall cease until bighorns leave the area as verified by the biologist.

**SS-CM-25** To help reconnect desert bighorn sheep subpopulations and at least partially offset impacts to the overall population caused by the project, SDG&E will:

- Fund the design and construction of an overpass or underpass (for sheep), or tunnel (for vehicles) to facilitate desert bighorn sheep movement across a highway at a location determined by the USFWS (in coordination with CDFG). Tunnel or overpass design must be approved by the Wildlife Agencies, and construction of the facility shall be completed prior to connecting and energizing the proposed project to the grid.

- Fund, design, and construct a system of fences to prevent bighorn sheep from crossing on the surface of westbound Interstate 8. The fencing shall be designed in

consultation with Caltrans and the Wildlife Agencies to facilitate bighorn sheep movement through/across the island using structures currently present, such as the bridges spanning Devil's Canyon, and the culverts/low bridge along eastbout Interstate 8.

- Fund removal of tamarisk, fountain grass, other invasive species, and hazardous fences for the life of the project in the action area, and install and maintain water sources per direction and at locations specified by the Wildlife Agencies for the life of the project.

- Fund a minimum 10-year-long program to monitor the effects of the project on bighorn sheep behavior, movements, and dispersal in the area from Carrizo Gorge south to the international boundary (10 years is needed to measure the influence of the project while factoring in rainfall cycles, vegetative productivity, and drought). This program will be designed and implemented by the Wildlife Agencies following construction. Funding for the project shall be provided prior to completion of project construction and is estimated to cost $150K per year in 2008 dollars.

- The project proponent shall provide sufficient funds to CDFG, or a third party designated by CDFG, to ensure five complete biennial aerial surveys from Carrizo Gorge to the international boundary, for the 10-year period beginning with the scheduled 2010 CDFG survey.

- Water used for operation and maintenance purposes shall not be obtained from water sources utilized by bighorn sheep or other wildlife.

*Direct Effects*

The route of the proposed Sunrise Powerlink crosses two separate areas of designated Peninsular bighorn sheep critical habitat, the I-8 island area and the southeast foothills and alluvial fans of the Coyote Mountains (Figures 7). The construction of the Powerlink will require temporary and permanent losses of designated and proposed critical habitat as well as more limited areas that are neither designated nor proposed. Temporary habitat losses would result from construction of staging areas, pull sites, and fly yards (helicopter landing areas) that would not be needed for operation and maintenance once the project is completed. It is expected that 45.7 ha (113.0 ac) of designated critical habitat and 7.3 ha (18 ac) of proposed critical habitat will be temporarily disturbed. The foundations for the lattice towers (*i.e.*, pads or structure sites), and permanent access and spur roads, helicopter pads, and pull sites will result in the direct loss of 12.4 ha (30.6 ac) of 2001-designated critical habitat and 1.4 ha (3.5 ac) of proposed critical habitat.

Bighorn sheep would loose foraging opportunities and other resources that may exist on these areas, such as potential bedding sites. The permanent loss of 12.4 ha (30.6 ac), distributed across the area in small patches (typically a 30.5 by 30.5 m [100 by 100 ft] pad, adjoined by a 10.7 by 22.9 m [35 by 75 ft] pad and 6 by 6 m [20 by 20 ft] helicopter pad for each lattice tower) should

not substantially reduce foraging opportunities, because the number of individual forage plants eliminated will be minimal compared to the amount of forage remaining in the area. Additionally, due to land ownership patterns, the threat of future permanent and significant losses to the forage resource is small. To minimize the adverse effects, the project proponent proposes to restore native desert plant communities on all sites that are temporarily disturbed. Consequently, bighorns should eventually regain foraging opportunities on these areas. However, favorable growing conditions are unpredictable and restoration efforts may be challenging in the harsh desert environment. To further minimize impacts, the project proponent commits to purchase 109.7 ha (271.1 ac) off-site, restore 22.6 ha (55.8 ac) on-site, and initiate and maintain an invasive species program. Conservation Measures **G-CM-16**, **G-CM-17**, **G-CM-20**, **G-CM-22**, **SS-CM-23** and **SS-CM-25** will minimize the above adverse effects of the project to bighorn sheep habitat.

Cunningham (1982) concluded the Devil's Canyon and In-Ko-Pah Gorge area probably contained a self-sustaining and distinct subpopulation of bighorn sheep prior to the construction of I-8. Habitat characteristics, available water sources, and the testimony of local residents, also support this scenario. In the years following interstate construction, the group was eventually extirpated (Rubin *et al*. 1998), or at least declined to a very low number that remained undetected for many years. Because the decline was not studied or well documented, one cannot state with certainty the reasons it occurred. The concentration of human activities in the area resulting from the construction of I-8, Mountain Springs, and the Southwest Powerlink may have contributed to the apparent extirpation. Such a decrease in sheep numbers would be consistent with other desert bighorn sheep populations that have declined following marked increases in human activity, including construction of highways and other human structures, within their home ranges (Krausman *et al*. 2001).

Nevertheless, bighorn sheep eventually regained use of the I-8 Island area, and they have apparently increased in numbers in the vicinity given the results of the 2006 and 2008 aerial surveys (Service GIS database, CDFG 2006 and 2008 aerial censuses, unpublished data). Additionally, bighorns appear to be crossing both east and west-bound lanes of I-8. Assuming 1996 (Torres *et al*. 1994, 1996) as the date of extirpation, it has taken over a decade for this re-emergence or re-colonization to occur. Likewise for over a decade, I-8 seemed to function as an impassable barrier to bighorn sheep movement, which permanently cut-off bighorns in the U. S. from sheep living south of the interstate. Bighorn sheep largely acquire their movement patterns by following the traditions of previous generations, and this trait tends to make them slow to find and use vacant habitat (Geist 1971). Therefore, when sheep re-occupy available habitat and regain movement patterns, it represents a significant event in population recovery and persistence.

The construction of the SRPL transmission line risks reversing the range expansion exhibited by bighorn sheep in the area, and their likely avoidance of the area during and for an unknown period after construction, may resurrect the I-8 zone of disturbance as a barrier to sheep movement. Should such a scenario be realized, it could take many years for bighorn to regain

use of the I-8 Island and movement south of I-8. Bighorn sheep have been observed to alter their spatial distribution and activity patterns when construction projects have occurred in or near their home ranges. For example, the number of point locations obtained from three radio-collared ewes in an area of the Little Harquahala Mountains in Arizona declined from 24 percent to 1 percent after a road leading to a gravel mine was constructed and truck traffic increased substantially (Krausman and Leopold 1986, Krausman *et al*. 1989, Etchberger and Krausman 1999). Ewes were slow to regain use of the area once truck traffic decreased. Bighorn sheep shifted their use of a water source near Parker, Arizona, following start of a construction project. Sheep visitation to the water source declined and bighorns altered the timing of visits to avoid working hours (Campbell and Remington 1981). Similarly, bighorn ewes in the River Mountains of Nevada shifted to alternative water sources, and in some cases altered their home range in response to construction of a water project (Leslie and Douglas 1980). Conservation Measure **SS-CM-25** should help minimize adverse effects to habitat connectivity resulting from the construction of the SRPL Project.

Construction of the Powerlink through the I-8 Island area will require the use of helicopters, and bighorn sheep may respond dramatically to helicopter flights by changing their spatial distribution (Bleich *et al*. 1990, 1994) or reducing foraging efficiency (Stockwell *et al.* 1991). Helicopter disturbance may cause animals to depart higher quality habitat, and if such displacements continue for an extended period of time, they may adversely affect nutritionally stressed animals or increase vulnerability to predation (Bleich *et al*. 1994). Additionally, as mentioned previously, a number of other authors have documented behavioral responses, such as flight and elevated heart rates, when bighorn sheep have perceived humans, their pets, or machinery as threats. Therefore, it is reasonable to conclude that the construction phase of the project will alter bighorn sheep use of the area. Bighorn sheep will likely avoid using the general area while multiple helicopter flights are occurring and workers are regularly present on the ground. Conservation Measures **G-CM-1**, **G-CM-32**, and **SS-CM-24** should minimize the adverse effects of construction activities on bighorn sheep found in the action area.

The reaction of bighorn sheep to human activities is variable, and some subpopulations are more tolerant than others of human activities. In some cases the tolerance reaches a level frequently termed "habituation". However, only a portion of the population may display this type of behavior (Papouchis *et al*. 2001). Generally, these situations are characterized by human activity that is predictable in location and action, and non-threatening. Often there is an attractant, such as a water source, mineral lick, or irrigated lawn that draws bighorn sheep to an area where they learn to tolerate humans at closer distances. The context of the "habituation" is important, and in a different context the same animals may react differently to people.

The effects of constructing the Palo Verde to Devers 500kV Transmission Line was studied in Arizona by closely monitoring the movement patterns of radio-collared bighorn ewes and rams in Kofa National Wildlife Refuge (Smith *et al*. 1986). The authors spent considerable field time monitoring sheep before, during, and after construction of the line. They focused their analysis on bighorns whose home ranges were originally in proximity to the transmission line ROW.

There was no clear indication that construction or operation of the line caused bighorns to alter or abandon their home ranges. They also documented many instances of bighorns crossing the ROW during and after construction. However, at more narrowly defined movement corridors, construction activities did appear to preclude ram crossings between the New Water and Kofa Mountains. This crossing area consisted of mainly open, rolling country, which is not considered escape terrain. Whereas at another crossing area in the Dome Rock Mountains, extensive escape terrain existed, and construction activities did not appear to inhibit ram crossings. The above example demonstrates the variable nature of bighorn sheep behavior and illustrates that individual animal and site-specific factors may interact to determine ultimate responses to human activity.

Once the SRPL Project is completed, bighorns will encounter the new physical structure in their environment and its associated noises. The question remains as to whether sheep will avoid using the ROW or crossing under the line. Perhaps, the best predictor of the group's future behavior towards the Sunrise Powerlink is their present behavior towards the Southwest Powerlink, a 500kV transmission line currently existing in the I-8 Island. Bighorns continue to use the area, and they obviously must cross under it. Whether their use of the immediate area is reduced compared to earlier pre-construction periods is unknown. In Arizona, bighorn sheep foraged beneath and crossed under similar structures, showing no outward reaction to the transmission line (Smith *et al*. 1986). At several other locations in southwestern deserts, bighorn sheep cross under 500kV and 230kV transmission lines (Bleich *et a*l. 1990, 1997, Epps *et al*. 2003, Jeager 1994); however, it is unknown if crossing rates habitat use patterns in proximity have been altered as a direct result of transmission line construction. Smith *et al*. (1986) did not detect differences in crossing rates between pre- and post-construction time periods for the Palo Verde – Devers transmission line. These findings also indicate that typical operation and maintenance practices do not prevent bighorn sheep from crossing beneath transmission lines.

Bighorn sheep have re-claimed use of the I-8 Island while the area was experiencing relatively high levels of human activity. Obviously, vehicular traffic on the interstate is virtually continuous, and Devil's Canyon has received both legal and illegal off-road vehicle use. Other recreationists use the I-8 Island for camping and hiking, and there is a relatively high number of immigrants moving north from Mexico that pass through the Island and surrounding area. As a consequence, the U. S. Border Patrol conducts frequent missions on foot, and with vehicles and helicopters. Military aircraft also occasionally use the airspace over the project area during training missions. Helicopters are used by CDFG to census and to capture bighorn sheep for research purposes. Such capture operations may leave the individuals that were pursued and net-gunned by helicopter especially sensitive to future encounters with such aircraft (Bleich *et al*. 1990, 1994). However, none of the animals observed in the area have been radio-collared, and the group likely lacks previous experiences with helicopters.

The nature, as well as the number of interactions with humans, is an important factor determining the behavioral response of bighorns to human activity. Bighorns in Utah with a negative history of human contact fled more often and farther than a group that had not

experienced the same history (King and Workman 1986). The construction phase of the project will add to the already high levels of human activity in the project area. The interactions associated with construction will most likely differ from current interactions with humans by being longer in duration, and due to the amount of low-elevation helicopter time, likely more threatening. The apparent increasing use of the project area by bighorn sheep suggests that encounters with humans are brief and not particularly alarming to bighorns, and such encounters probably occur frequently. Bighorn sheep currently using the area do not appear to have a negative or traumatic history with human beings. Consequently, a displacement of bighorn sheep from the project area would likely be temporary. However, it is difficult to determine the length of time sheep may avoid using the area or avoid crossing Interstate 8 to use resources in the southern Jacumba Mountains if construction of the SRPL changes bighorn sheep use of the area. Employing appropriate conservation measures should lessen the time bighorn sheep likely will be displaced from the area, and minimize disruptions to habitat connectivity and bighorn sheep habitat use. Conservation Measure **SS-CM-24** and **SS-CM-25** should minimize adverse effects on bighorn sheep behavior, movement patterns, and population trajectories. These conservation measures also ensure that the long-term and short-term effects of the project are adequately monitored at a meaningful temporal and spatial scale.

Bighorn sheep that seasonally use the Coyote Mountains should not be affected by the construction phase of the project, if construction occurs during the hot season in this area. As mentioned previously, this sub-group of sheep seasonally migrates to Carrizo Canyon, where there are dependable sources of water during the summer months. During the cooler, wetter months of the year, the group generally uses the higher elevations, and they should find adequate areas distant from and higher than the project site.

The Coyote Mountains represents one of the eastern-most limits of Peninsular sheep habitat in the U. S., and bighorns migrate westward across S2 several miles north of the proposed ROW. Therefore, in the Coyote Mountains, the proposed transmission line should not interfere with bighorn sheep movement patterns. A small area of habitat will be permanently converted to human uses, resulting in a loss of foraging opportunities. However, the minimal spatial extent of the losses, distance from escape terrain and **SS-CM-22** should minimize the adverse effects of the proposed project.

*Indirect Effects*

Indirect effects are caused by the proposed action, are later in time, and are reasonably certain to occur. Access roads constructed as part of the project may facilitate entry to bighorn sheep critical habitat by unauthorized vehicles. Access road construction will occur in the Coyote Mountain area where OHV use is common. In the I-8 Island area, construction and maintenance of the Powerlink will use helicopters and no access roads will be constructed. However, future helicopter use for operation and maintenance has the potential to disturb bighorn sheep, possibly temporarily displacing them from the I-8 Island area.

Conclusion

After reviewing the current status of Peninsular bighorn sheep, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological and conference opinion that the proposed action is not likely to jeopardize the continued existence of Peninsular bighorn sheep and is not likely to destroy or adversely modify designated or proposed critical habitat.

Bighorn sheep presently use the project area, even with relatively high levels of human activity, which include Interstate 8 traffic, illegal immigrants moving north from Mexico, U. S. Border Patrol missions and patrols, and OHV recreation, hiking, and camping. Consequently, it is reasonable to assume this subpopulation of bighorn sheep has become accustomed to the presence of humans in their environment to a certain degree. Additionally, the Southwest Powerlink, a similar transmission line currently exists in the project area, and sheep do not appear to avoid the structure.

Bighorn sheep did not cross I-8 for many years, and the interstate acted as a barrier to sheep movement. Recently, bighorns have begun crossing I-8, and re-establishing former movement patterns. However, the intense and sustained presence of humans and machinery, especially low-flying helicopters, associated with the construction phase of the project will most likely cause bighorn sheep to avoid the action area during project construction and for an unknown time period post-construction due to the cumulative increase in human-related disturbance. This avoidance reaction likely will resurrect I-8 as a barrier to animal movement until disturbance levels subside and sheep adjust behaviorally. Such displacement and avoidance may be short-lived or it may last much longer. Sheep in the area were apparently extirpated by 1996, and it has taken over a decade for them to regularly use the project area. At the same time, this range expansion demonstrates the ability of this subpopulation of bighorn to re-gain movement patterns and recolonize their historic range. This characteristic and the conservation measures included in the project description should minimize the impacts of the project and enable bighorn sheep to recover from the adverse effects of the project. The spatial extent of critical habitat that will be permanently lost is relatively small, and the primary function and value of the critical habitat in this area (foraging and dispersal/connectivity functions) will be maintained. Finally, the habitat acquisitions and management actions that will be implemented as part of the project will adequately minimize adverse effects to critical habitat and support the range-wide conservation (recovery) of the species.

## INCIDENTAL TAKE STATEMENT

Section 9 of the Act, and Federal regulations issued pursuant to section 4(d) of the Act, prohibit take of endangered and threatened species without a special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that actually kills or injures a listed species by significantly

impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an action that creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), such incidental taking is not considered to be a prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The precise amount, extent, location, and timing of incidental take that may occur as a result of implementing the SRPL Project will be specified following site-specific surveys and coordination with BLM, USFS, and SDG&E to identify locations of structures and related facilities in a manner that avoids and minimizes incidental take to listed animal species to the maximum extent feasible, considering engineering and safety constraints. The precise levels of take anticipated and any necessary reasonable and prudent measures/terms and conditions will be developed by the Service and appended to this opinion following the process identified and outlined in Appendix A. In the interim, the Service is quantifying the level of anticipated take for construction activities using the amount of habitat-based permanent and temporary impacts identified in Table 2 as take thresholds that must not be exceeded. No incidental take associated with operations and maintenance activities were identified during this consultation; thus, none are anticipated or authorized.

## AMOUNT OR EXTENT OF TAKE

Habitat-based take thresholds are identified as follows for construction of the SRPL Project:

**Coastal California Gnatcatcher**

- Loss of 11.3 ac of critical habitat;
- Loss of 23.4 ac of suitable habitat;
- Loss of 8.3 ac of occupied habitat; and
- Loss of 10.6 ac of CNDDB habitat

**Least Bell's Vireo**

- Loss of 7.4 ac of suitable habitat; and
- Loss of 0.9 ac of occupied habitat;

**Arroyo Toad**

- Loss of 0.20 ac of occupied breeding habitat;
- Loss of 20.2 ac of upland habitat; and
- Loss of 5.48 ac of upland habitat.

**Quino Checkerspot Butterfly**

- Loss of 15.6 ac of critical habitat; and
- Loss of 24.7 ac of occupied habitat.

**Peninsular Bighorn Sheep**

- Loss of 27.3 ac of bighorn sheep habitat/critical habitat

## EFFECT OF TAKE

In the accompanying biological opinion, we determined that the level of habitat-based impacts and any associated incidental take of coastal California gnatcatchers, least Bell's vireo, arroyo toad, Quino checkerspot butterfly, and Peninsular bighorn sheep is not likely to result in jeopardy to these species.

## REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize and monitor the impacts of this incidental take of gnatcatcher, vireo, arroyo toad, Quino, and PBS.

- SDG&E will minimize unnecessary clearing of habitat for the gnatcatcher, vireo, arroyo toad, Quino, and PBS during construction of the SRPL Project.

## TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, BLM, USFS, and/or SDG&E must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above, and outline required reporting/monitoring requirements These terms and conditions are nondiscretionary.

- BLM, USFS, and SDG&E shall follow the procedures outlined in Appendix A in implementing this process-oriented biological opinion.

## CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The recommendations provided here do not necessarily represent complete fulfillment of the Forest Service's responsibility for the species discussed herein, pursuant to section 7(a)(1) of the Act. We have not identified any additional conservation recommendations beyond the General Conservation and Species-Specific Conservation Measures identified in the Project Description and committed by SDG&E for implementation.

## REINITIATION NOTICE

This concludes formal consultation on the proposed action. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Because this biological opinion and conference opinion is process-oriented covering both the initial construction and the operation and maintenance by SDG&E of the SRPL Project over an extended timeframe, we anticipate ongoing coordination will be necessary and appropriate as the proposed action is implemented. In addition, we anticipate that certain future actions as identified in Appendix A and B may require subsequent consultations on a case by case basis as additional project-specific details become available. Specifically, certain operations and maintenance activities may require project-level consultation for actions if listed species may be affected in a manner that was not considered or known at the time of this consultation. For example, no specific habitat-based impacts were identified for future operations and maintenance activities, and no incidental take of listed species was anticipated for these actions. During the course of implementing this biological opinion, project-level consultation may be warranted to address such impacts. Because conservation measures that minimize potential effects to listed species are already committed to by SDG&E, these project-level consultations may only require informal consultation and, in the event that formal consultation is necessary, may be streamlined.

This conference opinion for proposed critical habitat for Quino and PBS may, upon written request from the BLM, be adopted as a biological opinion if the critical habitat becomes designated, provided that no significant new information is developed for the proposed critical habitat, and no significant changes are made to the Federal action.

If you have any questions or comments concerning this biological or conference opinion, please feel free to contact us. Future coordination efforts to implement this process-oriented opinion should be directed to Kathleen Brubaker or Felicia Sirchia of my staff at (760) 431-9440.

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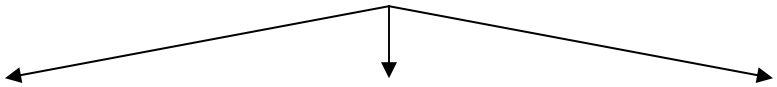
# APPENDICES

# APPENDIX A
## Pre-Construction Consultation Process for the Sunrise Powerlink Project

The final project footprint and avoidance/minimization measures will be evaluated for consistency with the biological opinion: a) the limits of construction will be mapped and staked in the field; b) habitat for federally listed species within the action area will be evaluated and quantified; c) protocol surveys will be conducted within the action area for each federally listed species; d) SDG&E will list the avoidance and minimization measures used for each area where listed species were detected based on the survey results. SDG&E will compile this information, evaluate it for consistency with the biological opinion, and submit it to the Carlsbad Fish and Wildlife Office (CFWO), BLM, and USFS for review and approval prior to the clearing of vegetation or other construction-related activities.



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|---|---|---|
| If the proposed project is within the area anticipated to be impacted; b) impacts to listed species habitat are the same or less than anticipated in the biological opinion; c) impacts to individuals/populations of federally listed species are consistent with what was anticipated in the biological opinion (*e.g.*, no unexpected concentrations of species found within or adjacent to the project footprint); and d) the proposed avoidance/minimization measures are consistent with what was anticipated in the biological opinion, then: | If the project is changed or new information regarding the distribution and abundance of federally listed species affected by the proposed project becomes available, but the potential effects to federally listed species are minor (*i.e.*, the changes do not substantially increase the anticipated impacts to federally listed species or their habitat and do not substantially affect the likelihood that the project will jeopardize the survival and recovery of federally listed species), then: | If SDG&E is unable to implement their proposed offsetting conservation measures, or if changes to the project description or new information regarding the distribution and abundance of federally listed species affected by the proposed project that substantially increase anticipated impacts to federally listed species or their habitat, then: |
| ⇩ | ⇩ | ⇩ |
| The Service will amend the incidental take statement and specify the amount or extent of take anticipated for the federally listed animal species. | The Service will amend the biological opinion and incidental take statement (including specifying the amount or extent of take anticipated), while addressing the proposed changes in impact or new biological information. Such analysis will be streamlined (*i.e.*, analysis will limited to information necessary to evaluate the differences between the originally anticipated impacts and the revised impacts and potential effects to the survival | BLM and USFS shall reinitiate consultation with the Service, and the Service will provide a new biological opinion based on the new information. |

# APPENDIX B
## Operations and Maintenance Consultation Process for the Sunrise Powerlink Project

Coordination with the Service is not necessary for routine operations, maintenance, and emergency activities described in the project description that involve no new habitat loss and incorporate the proposed avoidance/minimization measures. This includes maintenance of existing cleared areas but does not include vegetation removal in areas where maintenance has not been conducted and habitat has not been cleared at least once every two years. For operations and maintenance activities involving removal of habitat or new impacts to federally listed species, SDG&E will provide the Service and BLM or USFS with information on the amount and type of habitat and federally listed species potentially impacted and the avoidance/minimization measures that will be implemented in association with the activity. Upon receiving the information, the Service will advise SDG&E on the appropriate course of action. Depending on the anticipated effects of the activity, the Service will consult on the proposed activity using one of the following approaches[1]:

If potential effects to federally listed species are minor (*i.e.*, proposed activities do not substantially increase the anticipated impacts to federally listed species or their habitat and do not substantially affect the likelihood that the project will jeopardize the survival and recovery of federally listed species), then:

⇩

The Service will amend the biological opinion and, if necessary, develop a new take statement addressing the proposed changes in impact, but the analysis will be streamlined (*i.e.*, the analysis will only contain sufficient information to evaluate the differences between the originally anticipated impacts and the revised impacts and potential effects to the survival and recovery of the species).

If SDG&E is unable to implement the proposed offsetting conservation measures or if the proposed activity will substantially increase anticipated impacts to federally listed species or their habitat and/or potentially affect the survival and recovery of federally listed species, then:

⇩

BLM or USFS will reinitiate consultation with the USFWS, and the Service will provide a new biological opinion based on the new information.

[1]For emergency activities (e.g., an activity that is urgent enough to require a 24-hour response), SDG&E, BLM, and USFS will take all necessary actions to protect human health and property. If there is an opportunity, CFWO will be contacted regarding initial recommendations for avoiding and minimizing impacts to federally listed species and their habitat. These recommendations will not impede response efforts. Following the emergency, CFWO will be contacted to assess the appropriate approach for consultation. As with planned operations and maintenance activities, emergency actions that adversely affect federally listed species will be evaluated to determine if a streamlined amendment to this biological opinion is sufficient or if the impacts require the preparation of a new biological opinion.

## APPENDIX C
## Rationale for Determining Quino Occupied Acreage Outside Critical Habitat

Table 2 in the BA indicates that the proposed project would result in approximately 175.13 ha (432.75 ac) of permanent and 382.98 ha (946.37 acres) of temporary impacts to potential Quino habitat. However, because comprehensive habitat suitability and protocol surveys have not been conducted for the majority of the action area, it is likely that the impact acreages given in Table 2 overstate potential impacts to Quino.

SDGE subsequently revised the impact estimate downward based on 2008 surveys conducted in the general vicinity of the action area. Results of the 2008 surveys indicated that approximately 43 percent of previously identified suitable Quino habitat was unsuitable. In addition, only approximately 1 percent of the confirmed suitable habitat was found to be occupied by Quino. Although the proposed SRPL alignment has been refined since the 2008 surveys, the currently proposed alignment is in close proximity to the previous alignment in most locations; therefore, the current proposed alignment is expected to have similar habitat characteristics to the alignment that was surveyed in 2008.

Based on the 2008 survey results, SDG&E estimated that 43 percent of potential habitat along the current proposed alignment was unsuitable for Quino, and of the remaining 57 percent, no more than 10 percent would be occupied. Although the 2008 surveys found less than 1 percent of the area occupied by Quino, SDG&E estimated that up to 10 percent of the area could be occupied. SDG&E used 10 percent, rather than 1 percent, because Quino population size can be highly variable from year-to-year, depending on site specific ecological factors. All habitat within Quino critical habitat was assumed to be 100 percent occupied, therefore the 10 percent estimate was not applied to critical habitat.

Based on the above, impacts to Quino outside of designated critical habitat were calculated as follows:

<u>Permanent impacts:</u>
175.13 ha (432.75 ac) x 57% = 99.82 ha (246.67 ac) of Quino suitable habitat
99.82 ha (246.67 ac) x 10% = 9.98 ha (24.67 ac) of occupied Quino habitat

<u>Temporary impacts:</u>
382.98 ha (946.37 acres) x 57% = 218.3 ha (539.43 ac) of Quino suitable habitat
218.3 ha (539.43 ac) x 10% = 21.83 ha (53.94 ac) of occupied Quino habitat

Permanent impacts to occupied habitat outside critical habitat will increase 2.89 ha (7.15 ac [(from 432.75 ac to 439.90 ac]) if/when the proposed revisions to critical habitat are finalized. Temporary impacts to occupied habitat outside critical habitat will increase

12.16 ha (30.05 ac [from 946.37 ac to 976.42 ac]) if/when the proposed revisions to critical habitat are finalized. Based on the above, impacts to Quino outside of proposed revised critical habitat were calculated as follows:

Permanent impacts:
178.02 ha (439.90 ac) x 57% = 101.47 ha (250.74 ac) of Quino suitable habitat
101.47 ha (250.74 ac) x 10% = 10.15 ha (25.07 ac) of occupied Quino habitat

Temporary impacts:
395.14 ha (976.42 acres) x 57% = 225.23 ha (556.56 ac) of Quino suitable habitat
225.23 ha (556.56 ac) x 10% = 22.52 ha (55.66 ac) of occupied Quino habitat

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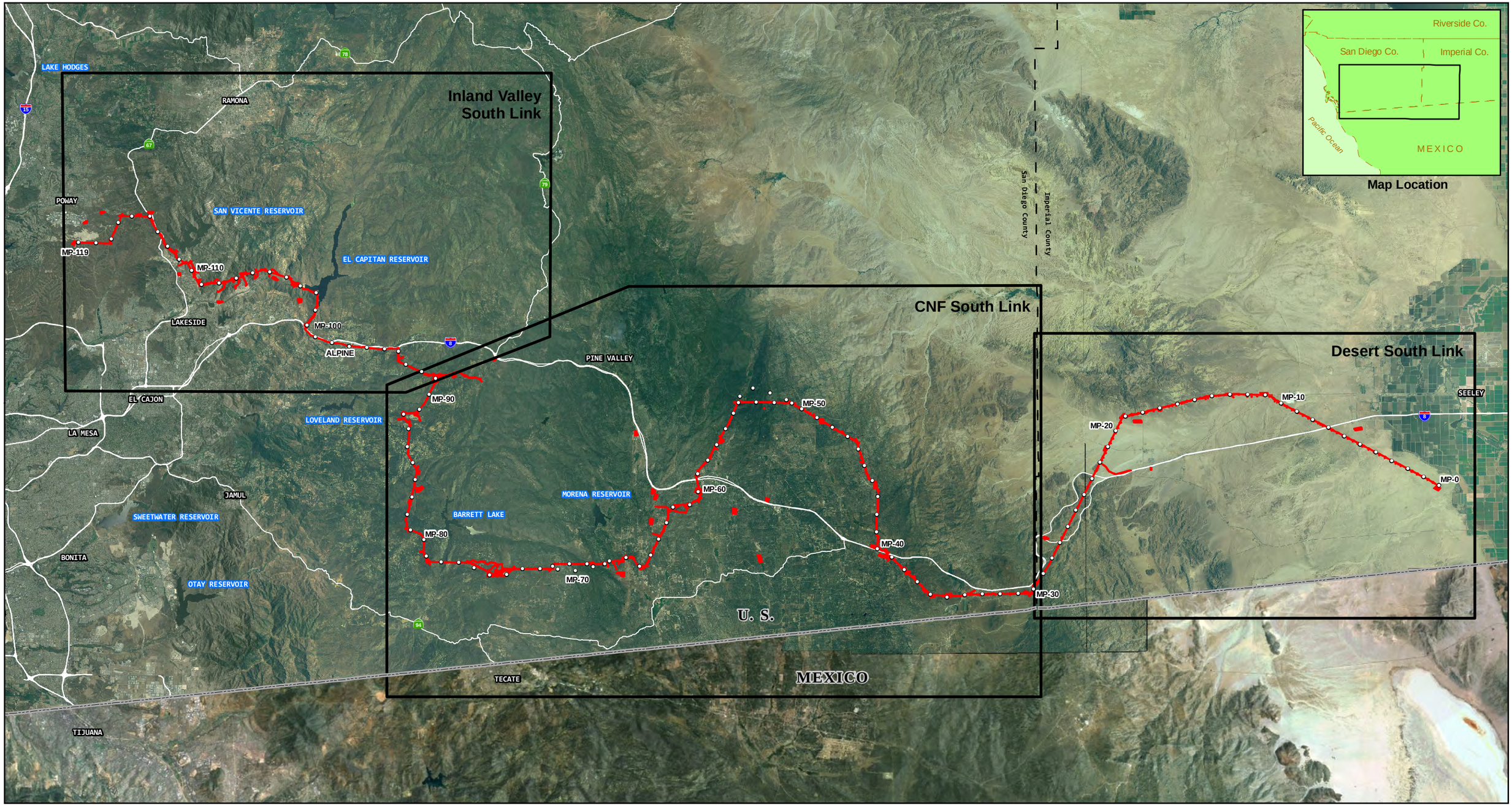
***FIGURE 1.***
***Sunrise Powerlink project action area***

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Action Area
Milepost
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***FIGURE 2.***
***Action area and distribution of San Diego thornmint***

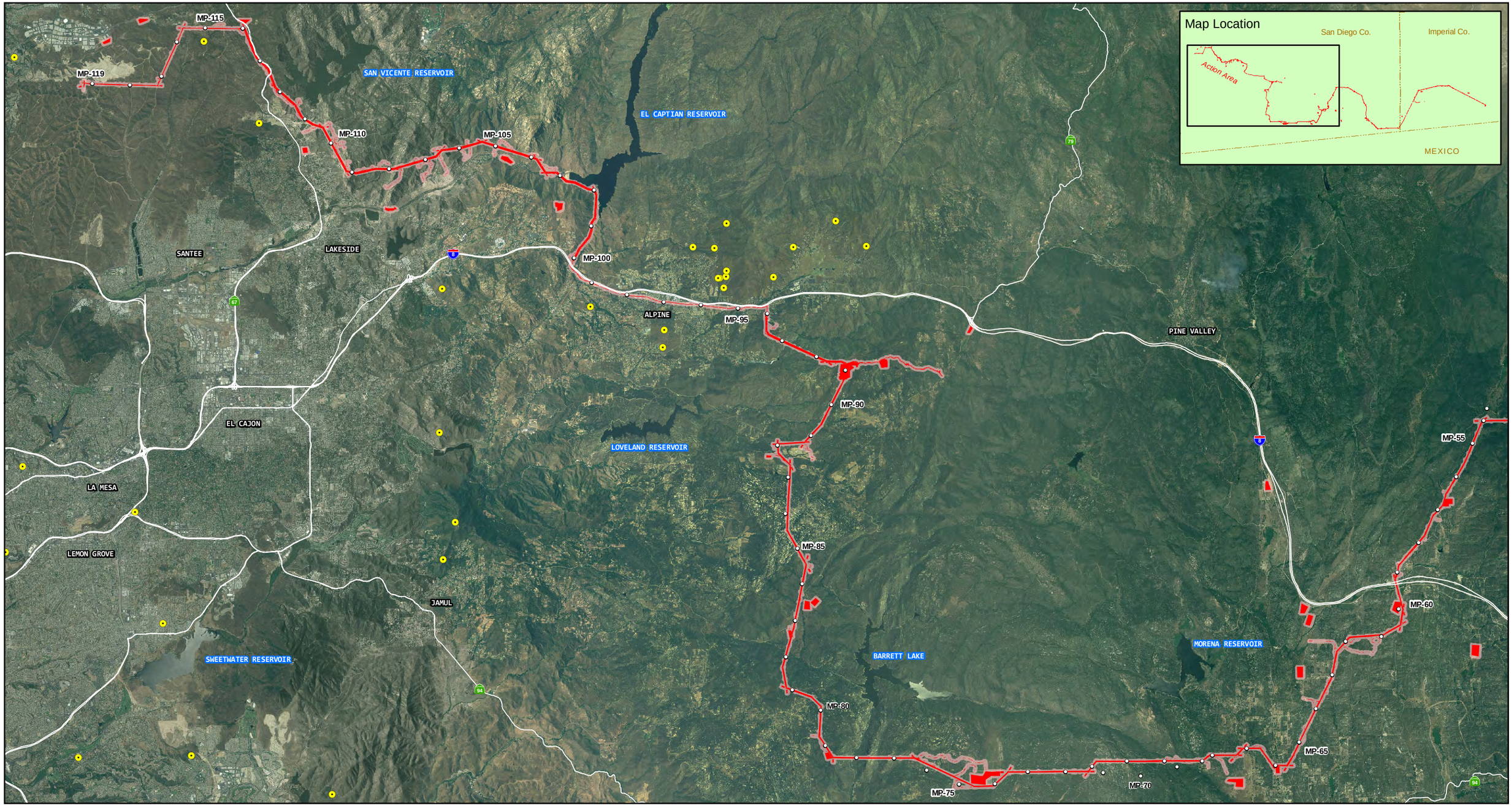


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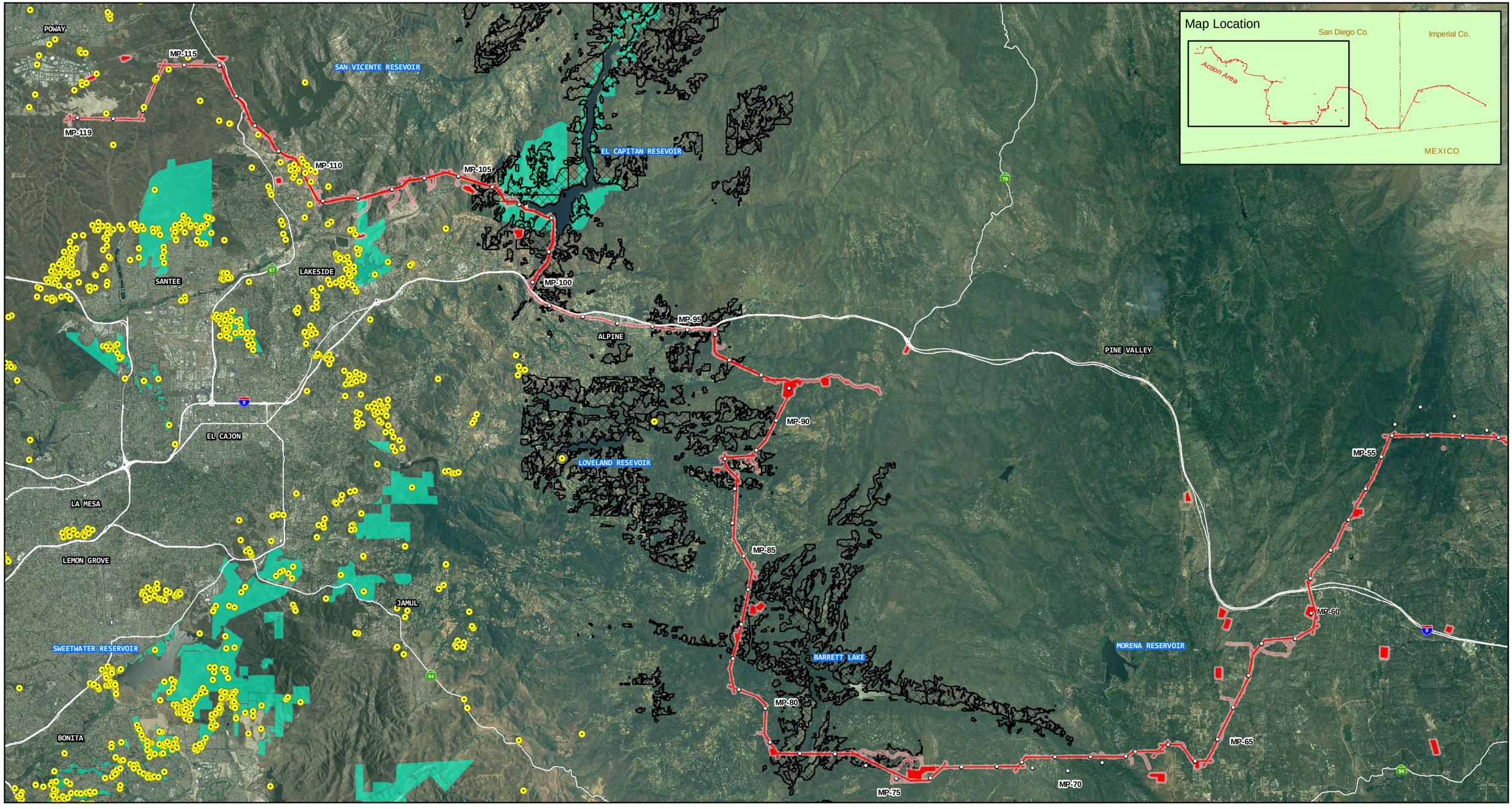
***FIGURE 3.***
***Action area and distribution of coastal California gnatcatcher***

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- Coastal California Gnatcatcher Occurrence Data
- CAGN Critical Habitat
- U.S. Forest Service CAGN Habitat Model
- Project Alignment (ROW, temp. & perm. impacts)
- Action Area
- Milepost

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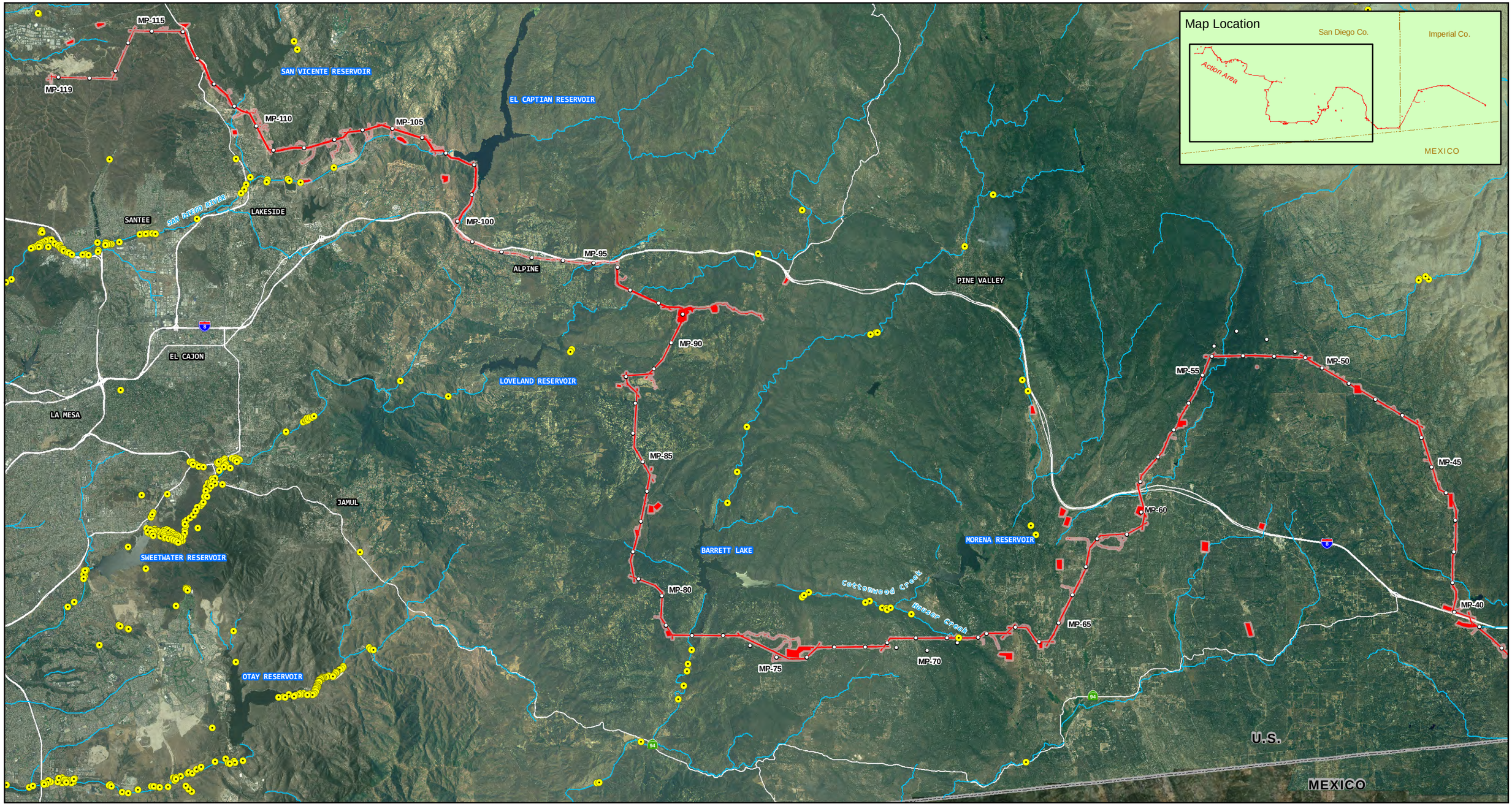
***FIGURE 4.***
***Action area and distribution of least Bell's vireo***

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- Least Bell's Vireo Occurrence Data
- Project Alignment (ROW, temp. & perm. impacts)
- Action Area
- Milepost
- River
- International Border

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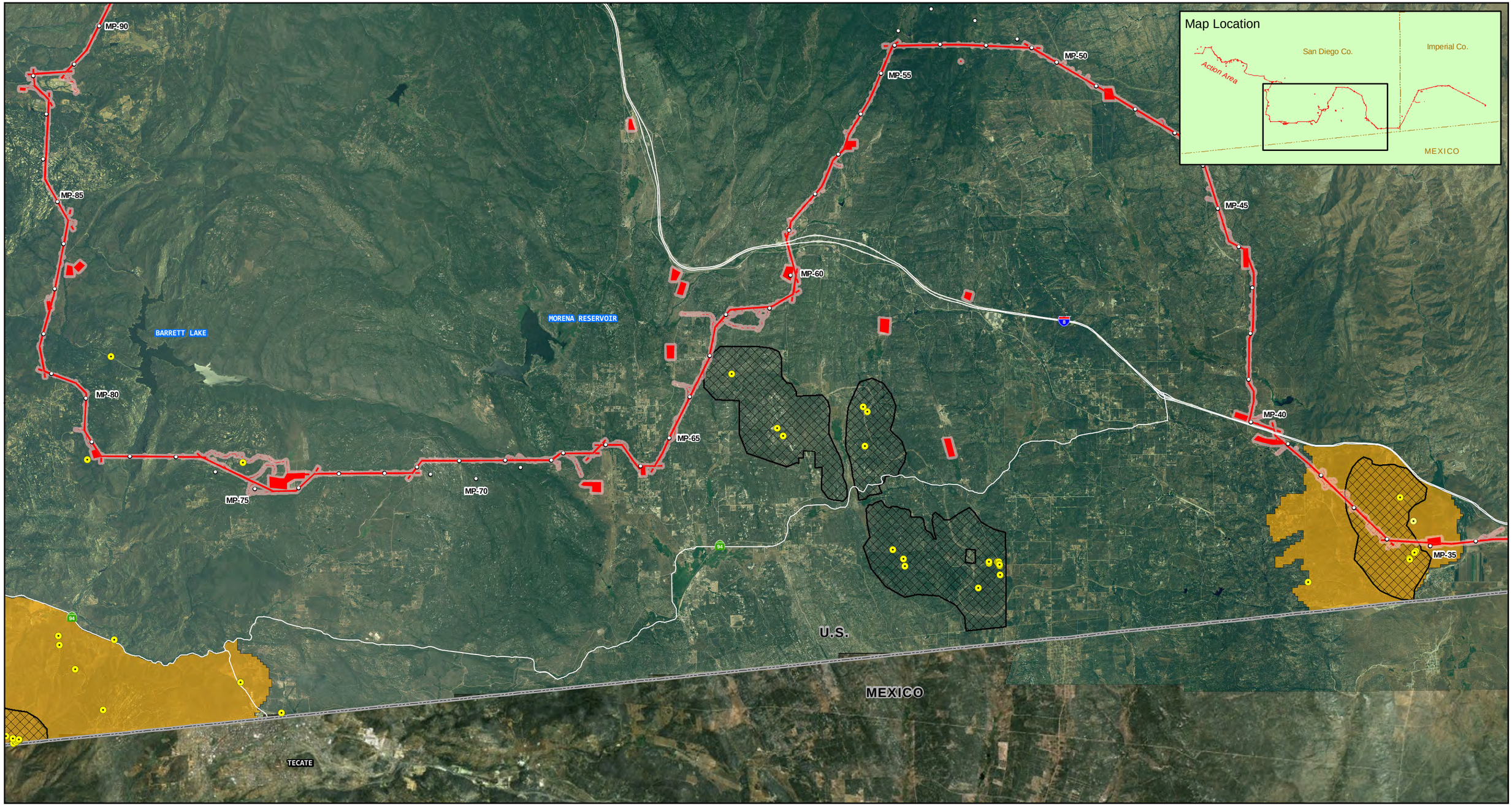
***FIGURE 5.***
***Action area and distribution of Quino checkerspot butterflly***

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- Quino Occurrence Data
- Quino Critical Habitat
- Quino Proposed Critical Habitat
- Project Alignment (ROW, temp. & perm. impacts)
- Action Area
- Milepost
- International Border

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***FIGURE 6.***
***Action area and distribution of arroyo toad***

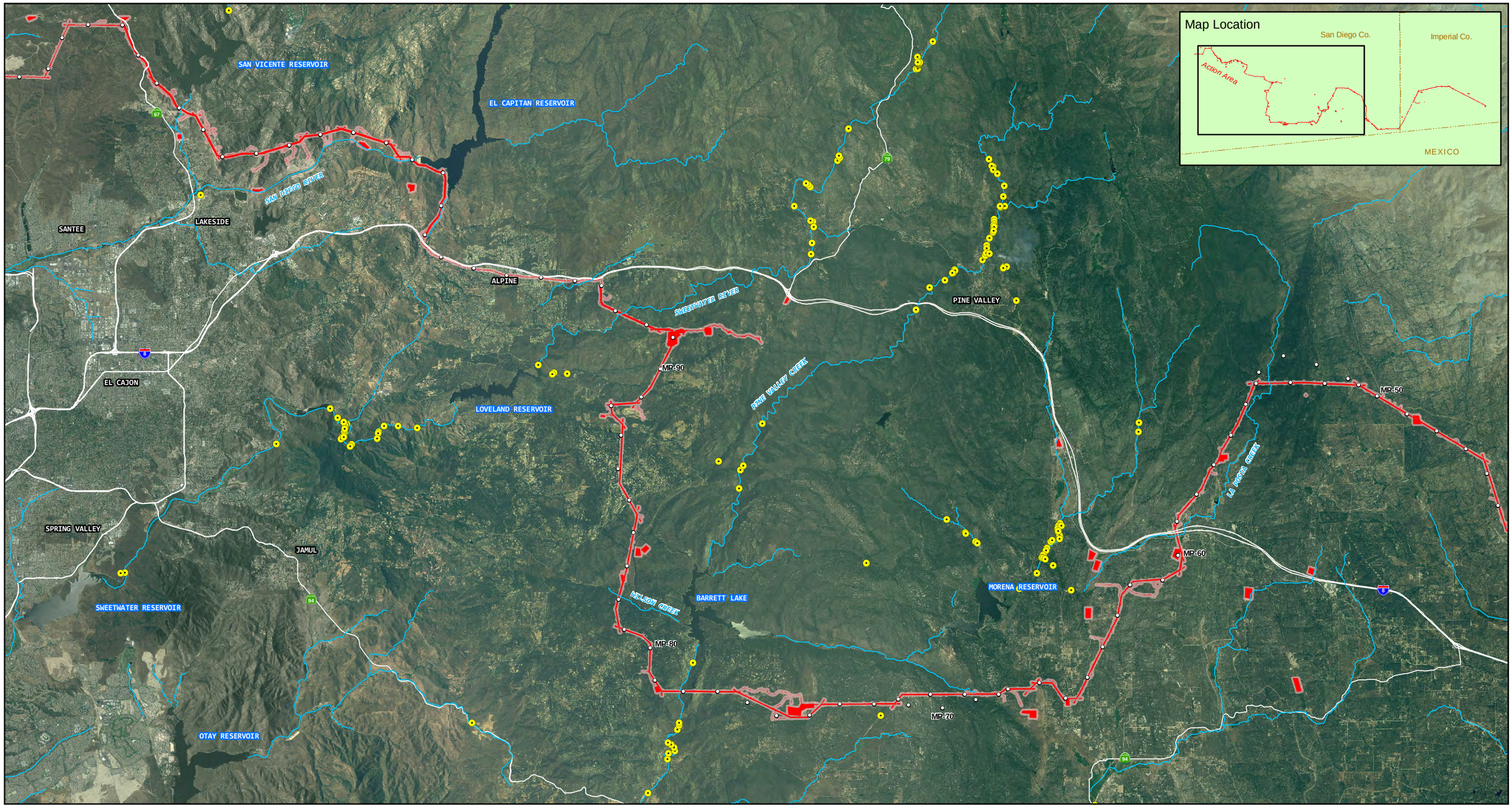

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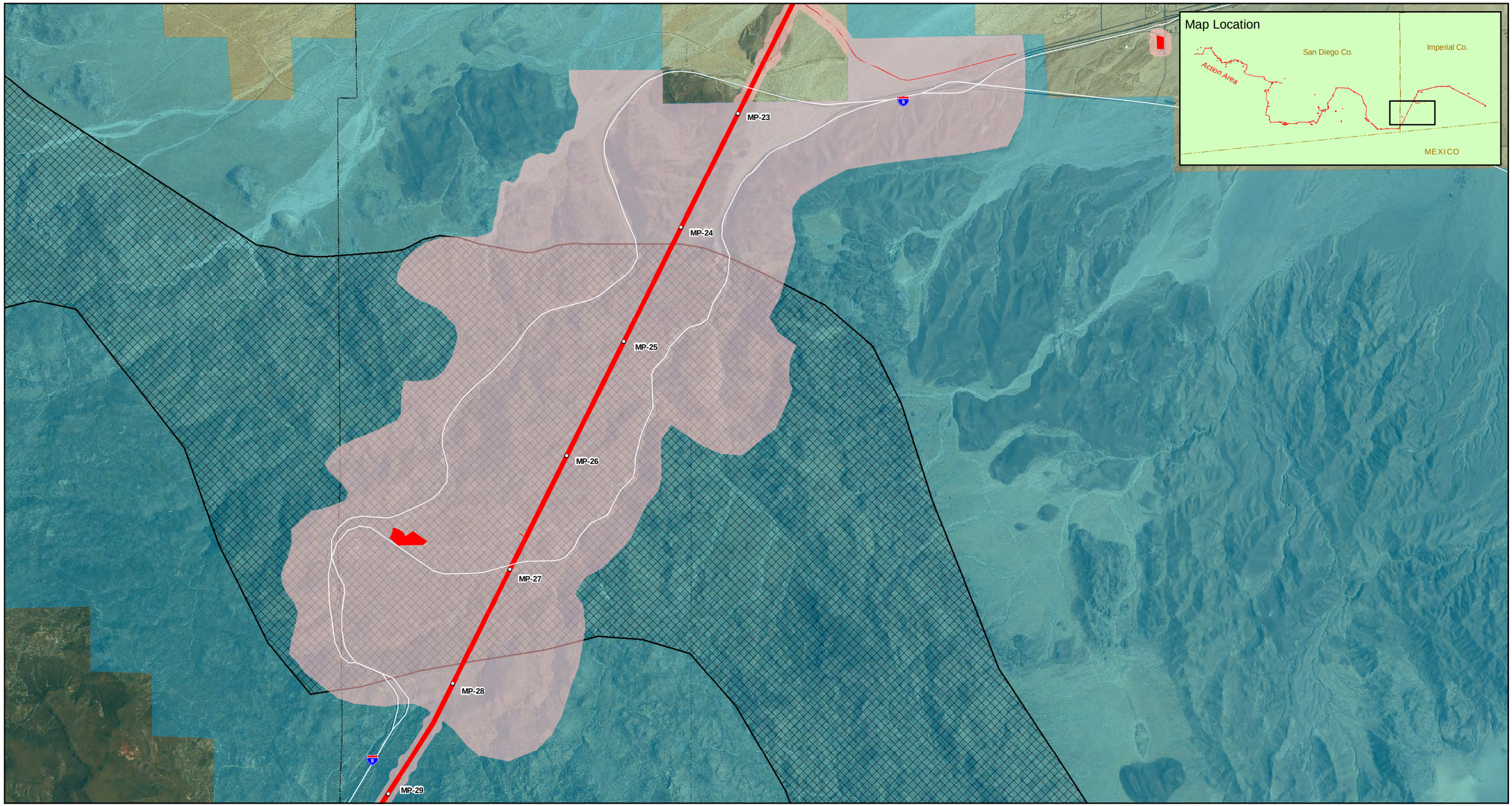
***FIGURE 7.***
***Action area and peninsular bighorn sheep critical habitat***

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