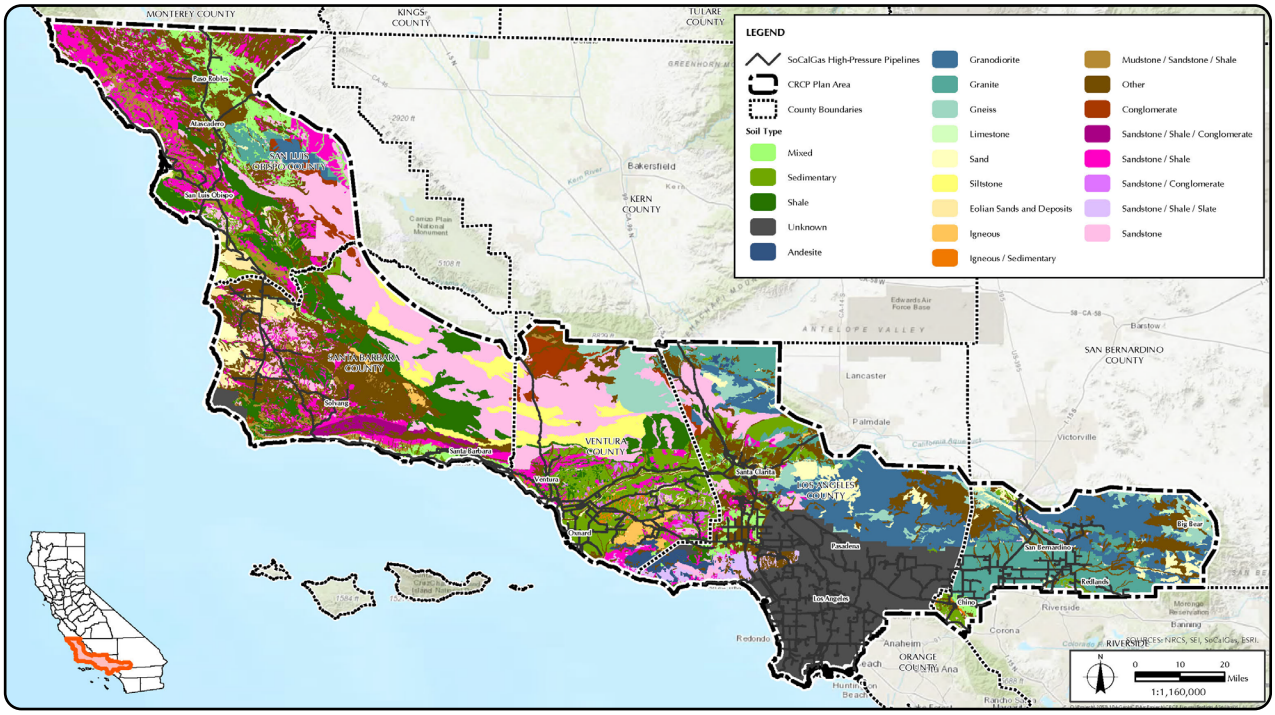
Southern California Gas Company

Coastal Region Conservation Program

MULTI-SPECIES HABITAT CONSERVATION PLAN



May 2020

Southern California Gas Company

Coastal Region Conservation Program

Multi-Species
Habitat Conservation Plan

May 2020

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LIST OF ABBREVIATIONS

The following abbreviations are used in this document:

AB	Assembly Bill
AC	alternating current
AF	acre-feet
AGM	above ground marker
AMM	avoidance and mitigation measure
APCD	Air Pollution Control District
AQMD	Air Quality Management District
ASBI	Areas of Special Biological Importance
BCC	Bird of Conservation Concern
BIOD	Biogeographic Information and Observation System
BLM	Bureau of Land Management
BMC	Braunton's milk-vetch
BMP	best management practice
BO	Biological Opinion
BSS	Belding's savannah sparrow
CAA	Clean Air Act
CAGN	Coastal California gnatcatcher
CAL FIRE	California Department of Forestry and Fire Protection
CARB	California Air Resources Board
CCBT	Chorro Creek bog thistle
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CE	Candidate Endangered
CEQ	White House Council on Environmental Quality
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CGS	California Geological Survey
CH	Critical Habitat
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CPUC	California Public Utilities Commission
CRCP	Coastal Region Conservation Plan
CRLF	California red-legged frog
CRPR	California Rare Plant Rank
CSD	County Sanitation District
CTS	California tiger salamander
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
CWHR	California Wildlife Habitat Relationships
° F	degrees Fahrenheit
DOT	U.S. Department of Transportation
DPS	distinct population segment
DSFF	Delhi sands flower-loving fly

DWR	California Department of Water Resources
E	Endangered
EA	environmental assessment
ECOS	Environmental Conservation Online System
EPA	U.S. Environmental Protection Agency
ESA	Federal Endangered Species Act
ESBB	El Segundo blue butterfly
FC	Federal Candidate
FD	Federally Delisted
FEMA	Federal Emergency Management Agency
FMMP	Farmland Mapping and Monitoring Program
FP	Fully Protected
FRAP	Fire and Resource Assessment Program
GBD	geodatabase
GEARS	Geographic Environmental Analysis Reporting System
GHG	greenhouse gas
GIS	geographic information systems
GPS	global positioning system
GWC	Gambel's water cress
HCP	habitat conservation program
HDD	Horizontal Directional Drilling
HPMS	Highway Performance Monitoring System
HUC	Hydraulic Unit Code
IKM	Indian Knob mountainbalm
IPM	integrated pest management
ITP	incidental take permit
LBV	Least Bell's vireo
LYS	Lompoc yerba santa
MBTA	Migratory Bird Treaty Act
MM	Modified Mercalli
MOU	memorandum of understanding
MPH	miles per hour
MSHCP	Multi-Species Habitat Conservation Plan
MSL	mean sea level
MSS	Morro shoulderband (banded dune) snail
MWD	Metropolitan Water District
$MTCO_2e$	metric tons of carbon dioxide equivalent
MYLF	Mountain yellow-legged frog
NAAQS	National Ambient Air Quality Standards
NCCP	Natural Communities Conservation Plan
NEPA	National Environmental Policy Act
NFR	National Response Framework
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NML	Nipomo Mesa lupine
NOA	Notice of Availability

NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
NRCS	National Resources Conservation Service
O&M	operations and maintenance
OPS	Office of Pipeline Safety
OSHA	Occupational Safety and Health Administration
PIP	pipeline integrity program
PRC	California Public Resources Code
PSDM	predictive species distribution model
PSEP	Pipeline Safety and Enhancement Plan
PT	Proposed Threatened
PVC	polyvinyl chloride
R	Rare
ROW	right-of-way
RTP	Regional Transportation Plan
RUSLE	Revised Universal Soil Loss Equation
RWQCB	Regional Water Quality Control Board
SAA	lake or streambed alteration agreement
SARW	Santa Ana River woollystar
SAS	Santa Ana sucker
SB	Senate Bill
SBB	Seaside bird's beak
SBKR	San Bernardino kangaroo rat
SCS	Sustainable Community Strategies
SD	State Delisted
SDG&E	San Diego Gas & Electric
SFVS	San Fernando Valley spineflower
SHS	Slender-horned spineflower
SJKF	San Joaquin kit fox
SKR	Stephens' kangaroo rat
SMMD	Santa Monica Mountains dudleya
SoCalGas	Southern California Gas Company
SOP	standard operating procedure
SRB	Southern rubber boa
SSC	Species of Special Concern
SWF	Southwestern willow flycatcher
SWP	State Water Project
SWPT	Southwestern pond turtle
SWRCB	State Water Resources Control Board
T	Threatened
UBC	Universal Building Code
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture
USFS	USDA Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

VHFHSZ	Very High Fire Hazard Severity Zones
VMF	Vandenberg monkey flower
VMMV	Ventura Marsh milk-vetch
WPA	Water Planning Area
WYBC	Western yellow-billed cuckoo
UTS	Unarmored threespine stickleback
APF	American peregrine falcon
CLT	California least tern
WTK	white-tailed kite
MBKR	Morro Bay kangaroo rat

CHAPTER 1.0
INTRODUCTION

The Southern California Gas Company (SoCalGas) is seeking an Incidental Take Permit (ITP) pursuant to Section 10(a)(B)(1) of the Federal Endangered Species Act (ESA) and a corresponding ITP under Section 2081 of the California ESA (CESA). SoCalGas is seeking the ITPs to support operations and maintenance (O&M) activities in all or portions of five counties: San Luis Obispo, Santa Barbara, Ventura, and the non-desert portions of Los Angeles and San Bernardino Counties. SoCalGas currently applies for take coverage on a case-by-case basis due to a gap in take coverage between the SoCalGas' proposed San Joaquin Valley Programmatic Habitat Conservation Plan (HCP), California Desert Conservation Area Plan, San Diego Gas & Electric (SDG&E) Natural Community Conservation Plan (NCCP), Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), the Coachella Valley Multiple Species HCP/NCCP, the proposed Rancho Palos Verdes NCCP/HCP, proposed Los Osos Communitywide HCP in San Luis Obispo County, and the Orange County Transportation Authority (OCTA) Measure M2 NCCP/HCP and County of Orange (Central/Coastal) NCCP/HCP in Orange County.

SoCalGas has prepared this MSHCP in compliance with Section 10(a)(2)(A) of the ESA, which requires any application for an ITP include a "conservation plan" that details the impacts of the incidental take requested by the ITP on endangered and threatened wildlife species and how the impacts of the incidental take will be minimized and mitigated to the maximum extent practicable.[1] The issuance of an ITP would enable SoCalGas to continue current and future O&M activities in coastal southern California counties, while avoiding, minimizing, and mitigating impacts on threatened and endangered wildlife species that could result from such activities. The ITP will cover 19 wildlife species. The ITP will not authorize incidental take of threatened and endangered plant species. However, 22 plant species are covered under the MSHCP in recognition of conservation benefits, to assist the Service in reviewing the effects to listed plants, and to provide "No Surprises" assurances under the ITP. These assurances are provided by the government through Section 10(a)(1)(B). In the event of "unforeseen circumstances," private landowners will not be required to commit additional land, water, financial compensation, or any other restrictions on the use of land, water, and natural resources beyond the level agreed to in the MSHCP. The 41 wildlife and plant species included in the MSHCP are referred to collectively as "Covered Species."

1.1 Overview and Background

As the nation's largest natural gas distribution utility, SoCalGas delivers clean, safe, and reliable energy to 21.6 million consumers through 5.9 gas meters in more than 500 communities. SoCalGas facilities the transport of natural gas through its transmission and distribution pipeline system to residential, commercial, industrial, and utility electric generating customers throughout Central and Southern California, in accordance with California Public Utilities Commission (CPUC) and Federal Pipeline Safety Regulations.

[1] "Take" as defined in Section 3(19) of the Act: "to harass, hunt, pursue, hunt, shoot, wound, kill, capture, or collect, or to attempt to engage in any such conflict" to any threatened or endangered wildlife species. Harm may include habitat modification where it actually kills or injures a listed wildlife species through impairment of essential behavior (e.g., nesting or reproduction).

SoCalGas' O&M activities often occur in areas that may harbor plant and wildlife species listed under the ESA and CESA. Accordingly, in an effort to streamline incidental take applications for its O&M activities pursuant to Section 10(a)(B)(1) of the ESA and Section 2081 of the CESA, SoCalGas is pursuing a programmatic MSHCP/ITP, hereinafter referred to as the Coastal Region Conservation Program (CRCP) MSHCP. The CRCP Plan Area encompasses all or portions of five counties in the central and southern areas of California.

SoCalGas initiated work on a CRCP MSHCP in 2007, and efforts culminated in a draft CRCP MSHCP in 2013. SoCalGas has reevaluated the scope of their requirements for incidental take in light of empirical data for recent O&M activities. All of the work completed during initial efforts on the draft CRCP MSHCP have been reviewed and considered in the development of this CRCP MSHCP. Two counties included in the 2013 draft CRCP MSHCP, Riverside and Orange, have been removed, as there are existing approved HCPs that cover those plan areas (Figure 1.1-1, *Establishment of CRCP Plan Area*). SoCalGas intends to seek coverage in Riverside County pursuant to the Western Riverside County MSHCP and Coachella Valley Multiple Species HCP/NCCP and seek coverage in Orange County pursuant to the County of Orange (Central/Coastal) NCCP/HCP. SoCalGas is proposing the San Joaquin Valley Programmatic HCP to the north of the CRCP Plan Area. Additionally, the approximately 8,614-acre proposed Rancho Palos Verdes NCCP/HCP Area in Los Angeles County and the approximately 3,390-acre proposed Los Osos Communitywide HCP Area in San Luis Obispo County have been removed from the CRCP Plan Area as SoCalGas intends to seek coverage in those areas pursuant to each NCCP/HCP after it has been adopted. The net effect of this approach was to reduce the CRCP Plan Area from approximately 8,656,707 acres to approximately 6,785,892 acres.

In an effort to focus the applications for incidental take pursuant to Section 10(a)(B)(1) of the ESA and Section 2081 of the CESA to those species that would most likely require authorization for incidental take based on historic and anticipated O&M activities, SoCalGas has also reduced the number of species for which it is seeking coverage to 19 wildlife species. In addition, Covered Species under the MSHCP include 22 rare, threatened, or endangered plant species for which incidental take is not being requested and select California Species of Special Concern, which may be regularly encountered by SoCalGas or its contractors or may be reasonably expected to be listed within the term of the permit. By way of background, SoCalGas considered coverage for up to 123 species in the 2013 draft CRCP MSHCP. The streamlined approach reflects three factors: (1) removal of areas covered by the Rancho Palos Verdes NCCP/HCP, Los Osos Communitywide HCP, Western Riverside County MSHCP, and Orange County NCCP/HCP; (2) prioritization of species that are listed or under consideration for listing under the ESA or CESA in the reasonably foreseeable future; and (3) emphasis on species that have a reasonable probability of being encountered in relation to the covered activities.

1.2 Purpose and Need

This MSHCP addresses potential impacts to the Covered Species from the use, maintenance, repair, and decommissioning of SoCalGas' existing natural gas facilities and appurtenant facilities and improvements or replacements required by Pipeline Safety Regulations and advances in the industry to ensure safe and reliable delivery of natural gas. Appurtenant facilities include properties owned in fee title, leases, rights-of-way (ROWs), easements, and points of access and egress. SoCalGas constructs new, expanded, and modified utility infrastructure on an ongoing basis, and conducts maintenance and repair activities on existing facilities to maintain uniform, adequate, safe, and reliable gas service. Collectively, these activities are known as Covered Activities (see Chapter 2.0, *Project Description and Covered Activities*).

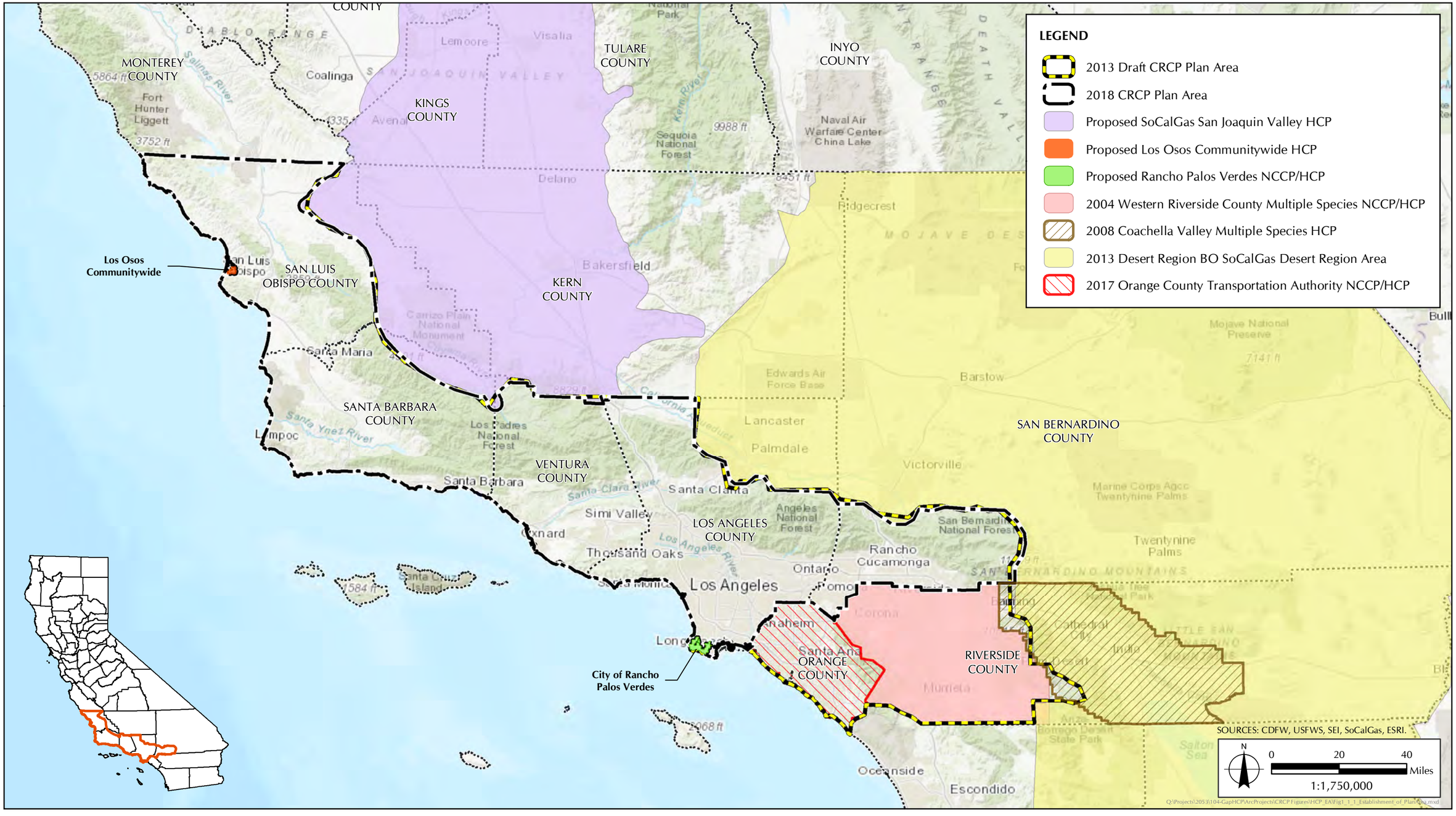

FIGURE 1.1-1

Establishment of CRCP Plan Area

The purpose of this MSHCP is to support issuance of a permit for incidental take that may result from implementation of the Covered Activities. The MSHCP will, to the maximum extent practicable, minimize and mitigate the impacts of the taking. The taking will also not appreciably reduce the likelihood that covered species will survive and recover in the wild. This CRCP MSHCP addresses areas within the SoCalGas service territory where no incidental take coverage is currently authorized or anticipated by a proposed NCCP/HCP. Collectively, these areas fall outside the respective Plan Areas of SoCalGas' proposed San Joaquin Valley Programmatic HCP, SoCalGas' California Desert Conservation Area Programmatic BO, SDG&E NCCP, Riverside County pursuant to the Western Riverside County MSHCP and Coachella Valley Multiple Species HCP/NCCP, the Rancho Palos Verdes NCCP/HCP, the Los Osos Communitywide HCP, the OCTA Measure M2 NCCP/HCP, and the County of Orange (Central/Coastal) NCCP/HCP (Figure 1.2-1, *Current and Anticipated Incidental Take Coverage Areas Surrounding the CRCP Plan Area*).

1.3 Plan Area

The CRCP Plan Area includes SoCalGas natural gas storage facilities, pipelines, appurtenant facilities, and potential small capital improvements projects. SoCalGas operates natural gas storage facilities and interconnecting pipelines within the CRCP Plan Area that encompasses facilities in five counties: San Luis Obispo, Santa Barbara, Ventura, and the non-desert portions of Los Angeles and San Bernardino Counties (Figure 1.3-1, *CRCP Plan Area*).

The CRCP Plan Area is defined in relation to diverse information (see Figure 1.2-1):

- Bounded on the north by the northern boundary of San Luis Obispo County
- Bounded on the east by the proposed San Joaquin Valley HCP, and excluding desert portions of Los Angeles and San Bernardino Counties
- Bounded on the south by Western Riverside County MSHCP, Coachella Valley Multiple Species HCP, and Orange County Transportation Authority NCCP/HCP
- Bounded on the west by the proposed Rancho Palos Verdes NCCP/HCP, proposed Los Osos Communitywide HCP, and the Pacific Ocean
- SoCalGas network of facilities and pipelines
- County/regional boundaries
- Regional landscape and topography
- Life history and range information for species listed pursuant to the ESA and CESA
- Discussions with USFWS, CDFW, U.S. Department of the Interior Bureau of Land Management (BLM), U.S. Department of Agriculture (USDA) Forest Service (USFS), National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), U.S. Army Corps of Engineers (USACE), and SoCalGas

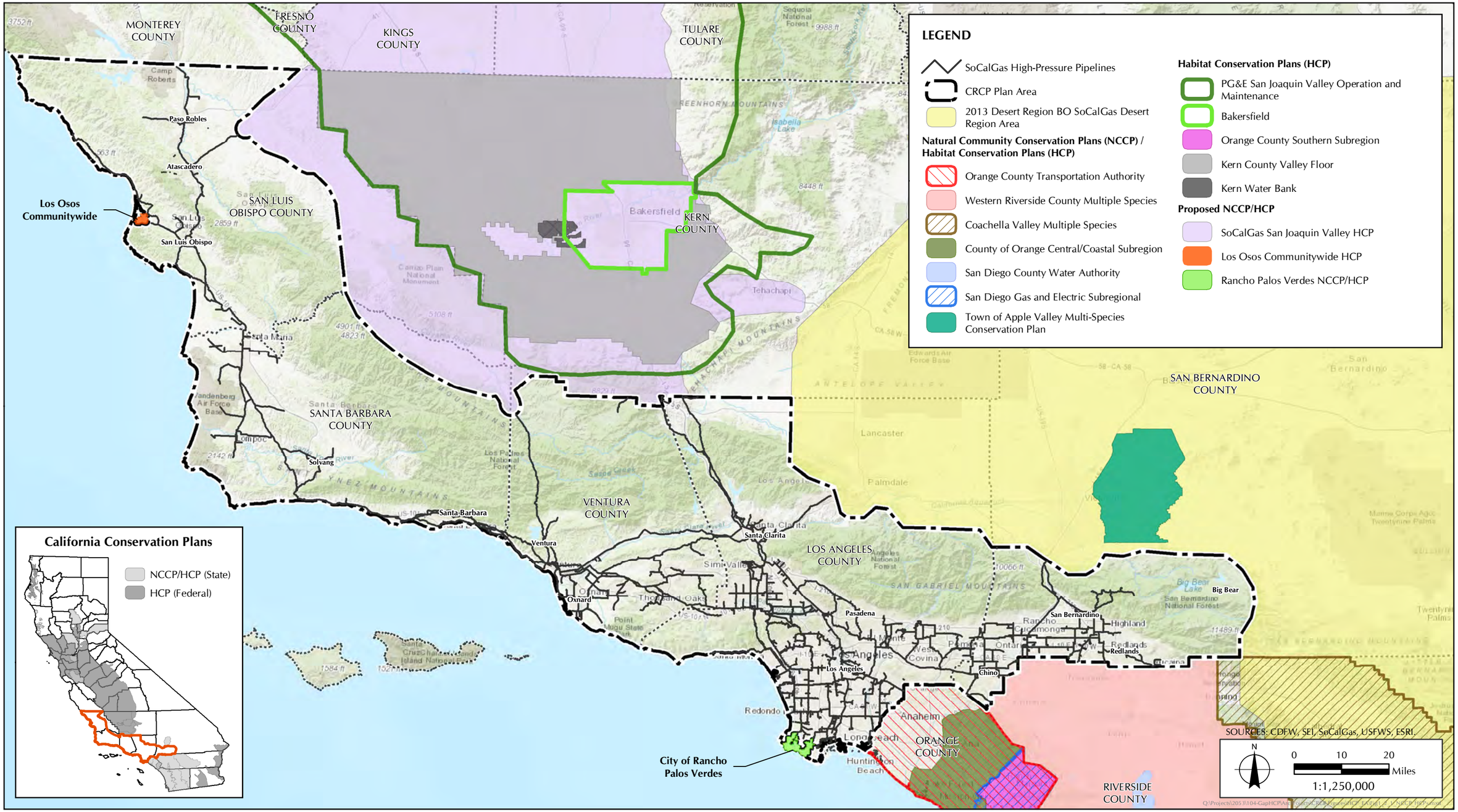

FIGURE 1.2-1

Current and Anticipated Incidental Take Coverage Areas Surrounding the CRCP Plan Area

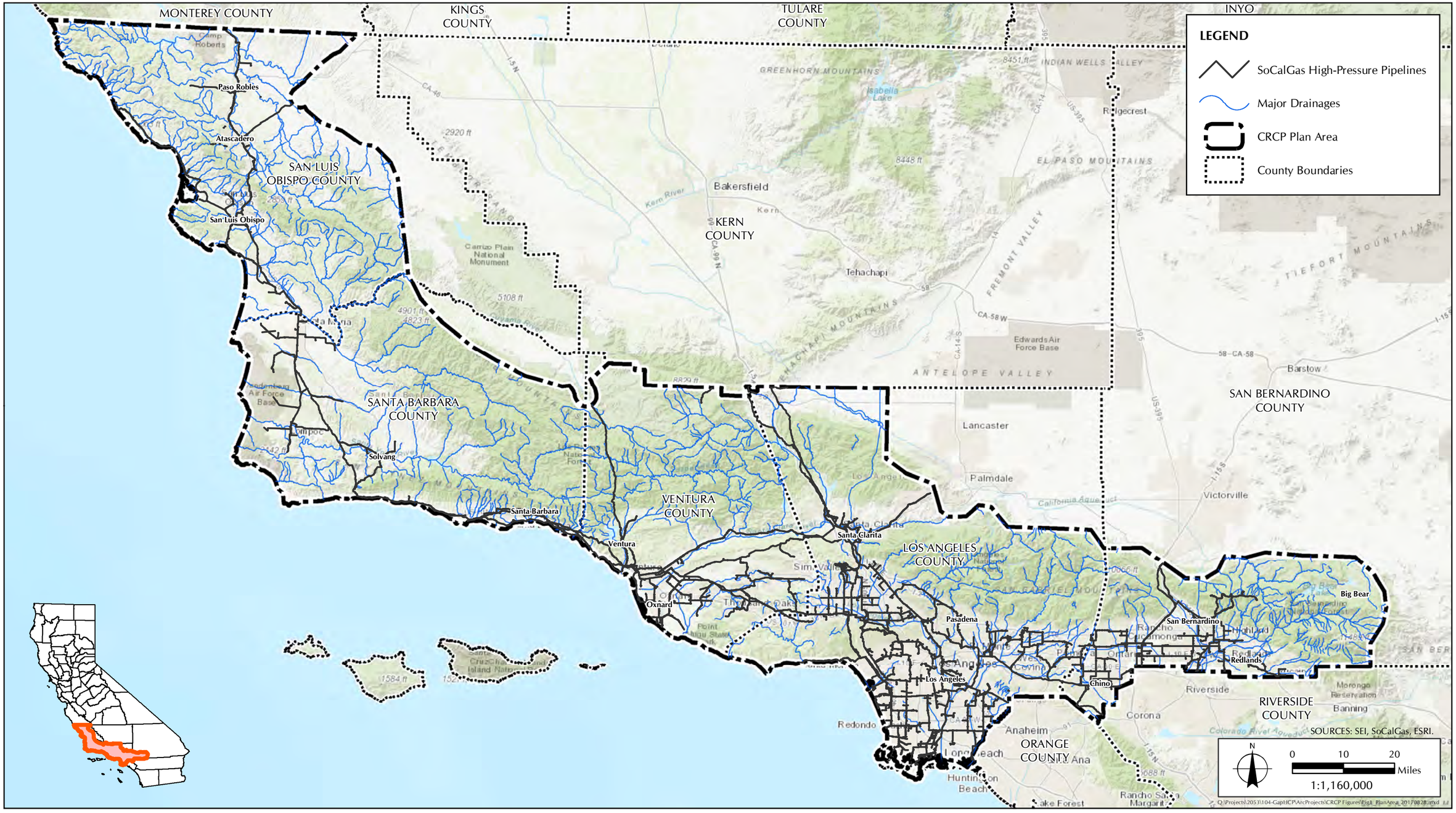

FIGURE 1.3-1

CRCP Plan Area

1.4 Permit Duration and Holder

SoCalGas prepared this CRCP MSHCP in support of an application for an ITP from the USFWS pursuant to Section 10(a)(1)(B) of the ESA of 1973, as amended (16 U.S. Code [USC] 1531 et seq.). SoCalGas will be the permit holder and is requesting that this MSHCP and its associated ITP be in effect for a period of 30 years from the date of issuance, with an option for renewal every 10 years thereafter. This allows SoCalGas or their successors, subject to an amendment to the MSHCP, to take the Covered Species within the project action area boundaries identified in the CRCP Plan Area over the duration of the permit. However, the term and conditions contained in the permit do not expire and would be covered by the enforcement authority of Section 11(b) of the ESA.

1.5 Consultation and Coordination

Maintenance of the existing SoCalGas system is required by CPUC General Order 112-E, which incorporates the Federal Pipeline Safety Regulations under 49 CFR 190–193 and 199. In support of their application for an ITP pursuant to Section 10(a)(1) of the ESA, the applicant coordinated with the USFWS, CDFW, USFS, NMFS, the California Office of Historic Preservation, the Native American Heritage Commission, the Regional Water Quality Control Boards (RWQCBs), the Air Quality Management Districts, and other local public agencies. Pursuant to the coordination with NMFS, SoCalGas determined to pursue a programmatic agreement for operations and maintenance activities that occur in known and historical habitat of Southern California steelhead trout pursuant to Section 404 of the Clean Water Act (CWA) with the USACE.

1.6 Summary of Relevant Statutes and Regulations

As a public utility, SoCalGas is regulated by the state and federal agencies listed below:

- CPUC—As the primary regulating agency, the CPUC establishes natural gas rates, approves major construction projects, and provides general oversight of utility facility O&M programs and financial/accounting practices.

- U.S. Department of Transportation (DOT)—The DOT Office of Pipeline Safety issues regulations addressing the construction, operation, and maintenance of all natural gas pipelines and compressor stations.

SoCalGas activities also fall within the purview of USFWS, CDFW, USACE, the State Water Resources Control Board (SWRCB), and the RWQCBs, among others. A number of federal laws require protections for certain fish, terrestrial wildlife, and plant species and their habitats. A basic understanding of these laws and their ramifications is valuable in integrating the various compliance processes. Some parameters of these laws that overlap extensively with those of the ESA may directly or peripherally apply to this MSHCP. In addition to federal protections, California has enacted its own legislation to protect sensitive species and habitats. This section provides a summary of the key federal and California statutes and regulations considered during the development of this MSHCP.

1.6.1 Federal

Federal Endangered Species Act

Section 9 of the ESA and federal regulations pursuant to Section 4(d) of the ESA as applicable to species currently under consideration for coverage under this HCP, prohibit the take of endangered and threatened wildlife species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury to listed wildlife species by significantly impairing essential behavioral patterns, including 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.

Individuals and state and local agencies proposing an action that is expected to result in the take of federally listed wildlife species can apply for an ITP under Section 10(a)(1)(B) of the ESA that would authorize such incidental take. Such permits are issued by the USFWS when take is not the intention of, and is incidental to, otherwise legal activities. An application for an ITP must be accompanied by an HCP. Section 7 of the ESA requires federal agencies to ensure, in consultation with USFWS or NMFS, that their actions, including issuing permits, are not likely to jeopardize the continued existence of listed species or destroy or adversely modify listed species' critical habitat. "Jeopardize the continued existence of…" pursuant to 50 CFR Part 402.2, means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. Issuance of an ITP under Section 10(a)(1)(B) of the ESA by the USFWS is a federal action subject to Section 7 of the ESA. As a federal agency issuing a discretionary permit, the USFWS is required to consult with itself (i.e., conduct an internal consultation).

The requirements of Section 7 and Section 10 substantially overlap. Elements unique to Section 7 include analyses of impacts on designated critical habitat, analyses of impacts on listed plant species, if any, and analyses of indirect and cumulative impacts on listed species. Cumulative effects are effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area, pursuant to Section 7(a)(2) of the ESA. These additional analyses are included in this MSHCP to meet the requirements of Section 7 and to assist the USFWS with its internal consultation (Table 1.6.1-1 for the CRCP MSHCP list of Covered Species).

TABLE 1.6.1-1
COVERED SPECIES

Common Name	Scientific Name	Federal Status*	State Status**	Critical Habitat***
Invertebrates (3)				
Delhi sands flower-loving fly	*Rhaphiomidas terminatus abdominalis*	E	-	N/A
El Segundo blue butterfly	*Euphilotes battoides allyni*	E	-	Proposed
Morro shoulderband (banded dune) snail	*Helminthoglypta walkeriana*	E	-	Designated
Fish (1)				
Santa Ana sucker	*Catostomus santaanae*	T	-	Designated
Amphibians (4)				
Arroyo toad	*Anaxyrus californicus*	E	SSC	Designated
California red-legged frog	*Rana draytonii*	T	SSC	Designated
California tiger salamander	*Ambystoma californiense*	E	T	Designated
Mountain yellow-legged frog	*Rana muscosa*	E	E	Designated
Reptiles (2)				
Southern rubber boa	*Charina bottae umbratica*	-	T	N/A
Southwestern pond turtle	*Actinemys pallida marmorata*	-	SSC	N/A
Birds (6)				
Belding's savannah sparrow	*Passerculus sandwishensis beldingi*	-	E	N/A
Burrowing owl	*Athene cunicularia*	BCC	SSC	N/A
Coastal California gnatcatcher	*Polioptila californica californica*	T	SSC	Designated
Least Bell's vireo	*Vireo bellii pusillus*	E	E	Designated
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	E	Designated
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	T/BCC	E	N/A
Mammals (3)				
San Bernardino kangaroo rat	*Dipodomys merriami parvus*	E	SSC	Designated
San Joaquin kit fox	*Vulpes macrotis mutica*	E	T	N/A
Stephens' kangaroo rat	*Dipodomys stephensi*	E	T	N/A
Plants (22)				
Braunton's milk-vetch	*Astragalus brauntonii*	E	-	Designated
California seablite	*Suaeda californica*	E	-	NCH
Chorro Creek bog thistle	*Cirsium fontinale* var. *obispoense*	E	E	NCH
Conejo dudleya	*Dudleya abramsii* spp. *parva*	T	-	NCH
Gambel's water cress	*Nasturtium gambelii*	E	T	NCH
Gaviota tarplant	*Deinandra increscens* ssp. *villosa*	E	E	Designated
Indian Knob mountainbalm	*Eriodictyon altissimum*	E	E	NCH
Lompoc yerba santa	*Eriodictyon capitatum*	E	R	Designated
Lyon's pentachaeta	*Pentachaeta lyonii*	E	E	Designated
Marcescent dudleya	*Dudleya cymosa* ssp. *marcescens*	T	R	NCH
Morro manzanita	*Arctostaphylos morroensis*	T	-	NCH
Nevin's barberry	*Berberis nevinii*	E	E	Designated
Nipomo Mesa lupine	*Lupinus nipomensis*	E	E	NCH
Pismo clarkia	*Clarkia speciosa* ssp. *immaculata*	E	R	NCH
San Fernando Valley spineflower	*Chorizanthe parryi* var. *fernandina*	-	E	NCH
Santa Ana River woollystar	*Eriastrum densifolium* ssp. *Sanctorum*	E	E	NCH
Santa Monica Mountains dudleya	*Dudleya cymosa ssp. ovatifolia*	T	-	NCH
Seaside bird's beak	*Cordylanthus rigidus* ssp. *littoralis*	-	E	NCH
Slender-horned spineflower	*Dodecahema leptoceras*	E	E	NCH
Vandenberg monkey flower	*Diplacus vandenbergensis*	E	-	Designated
Ventura Marsh milk-vetch	*Astragalus pycnostachyus* var. *lanosissimus*	E	E	Designated
Verity's dudleya	*Dudleya verityi*	T	-	NCH

* Federal Status: Endangered (E); Threatened (T); Bird of Conservation Concern (BCC).
** State Status: Species of Special Concern (SSC); Threatened (T); Endangered (E); Rare (R).
*** Critical Habitat: Not applicable (N/A); No Critical Habitat Designated or Proposed (NCH).

Section 10(a)(1)(B) Process

An HCP submitted in support of an ITP application must include the following information:

- Impacts to listed species which will likely result from the proposed project implementation, for which permit coverage is requested;
- Measures that will be implemented to monitor, minimize, and mitigate impacts; funding that will be made available to undertake such measures; and procedures to deal with unforeseen circumstances;
- Alternative actions considered that would not result in take;[2] and
- Additional measures the USFWS may require as necessary or appropriate for purposes of the HCP.

Statutory criteria for issuance of the permit specify that:

- The taking will be incidental;
- The impacts of incidental take will be minimized and mitigated to the maximum extent practicable;
- The applicant will ensure that adequate funding for the plan will be provided prior to the initiation of the proposed project;
- The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild; and
- The applicant will provide additional measures that the USFWS requires as being necessary or appropriate.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the MBTA, taking, killing, or possessing migratory birds is unlawful, as is taking of any parts, nests, or eggs of such birds. "Taking" is defined more narrowly under the MBTA than under the ESA and includes only the death or injury of individuals of a migratory bird species or their eggs. The MBTA defines migratory birds broadly; all covered birds in this MSHCP are listed as migratory birds under the MBTA.

The USFWS requires an ITP only when project activities are likely to result in injury or death of a listed bird species.[3] As of December 22, 2017, the MTBA only prohibits any action where the purpose is to take or kill a migratory bird.[4] Incidental take is no longer prohibited.[5]

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[2] After consultation with USFWS, it has been determined that there are no viable alternatives that would accomplish reduced take and allow SoCalGas to meet their requirements for maintaining gas pipelines, and therefore alternative actions will not be provided.

[3] U.S. Fish and Wildlife Service. 26 April 2018. Guidance on Trigger for an Incidental Take Permit Under Section 10(a)(1)(B) of the Endangered Species Act. Available at: https://www.fws.gov/endangered/esa-library/pdf/Guidance-on-When-to-Seek-an-Incidental-Take-Permit.pdf

[4] U.S. Fish and Wildlife Service, 11 April 2018. Guidance on the Recent M-Opinion Affecting the Migratory Bird Treaty Act. Available at: http://src.bna.com/ynP

[5] U.S. Department of the Interior, Office of the Solicitor. 22 December 2017. The Migratory Bird Treaty Act Does Not Prohibit Incidental Take. Available at: https://www.doi.gov/sites/doi.gov/files/uploads/m-37050.pdf

National Environmental Policy Act

The purpose of the NEPA is twofold: to ensure that federal agencies examine environmental impacts of their actions (in this case deciding whether to issue an ITP) and to utilize alternative analysis and public participation in the decision-making process. NEPA serves as an analytical tool on direct, indirect, and cumulative impacts of the proposed project alternatives to help the USFWS decide whether to issue a Section 10(a)(1)(B) ITP. A NEPA analysis must be completed by the USFWS for each HCP as part of the ITP application process.

Clean Air Act

The federal Clean Air Act (CAA), originally passed in 1970 (42 U.S. Code [USC] Sections 7401 et seq.) and amended twice thereafter, established the framework for modern air pollution control. The CAA mandates that the U.S. Environmental Protection Agency (EPA) develop rules and regulations to preserve and improve air quality, delegates specific responsibilities to state and local agencies, and directs the EPA to establish National Ambient Air Quality Standards for the six most common air pollutants to protect public health and public welfare: particulate matter, fine particulate matter, ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. Primary standards are set to protect human health within an adequate margin of safety, such as sensitive populations including asthmatics, children, and the elderly. Secondary standards are set to protect environmental values, such as decreased visibility, plant and animal life, and buildings. The CAA requires states to submit a State Implementation Plan for areas in nonattainment of federal air quality standards, which must be submitted to and approved by the EPA prior to adoption. State Implementation Plans demonstrate how the federal air quality standards will be achieved, and may contain narrative objectives, rules, and future commitments associated with attaining federal air quality standards. A maintenance designation entails an area that was previously designated as nonattainment but is currently designated as attainment.

The 1990 amendments to the CAA included a provision to address air toxics. Under Title III of the CAA, EPA establishes and enforces National Emission Standards for Hazardous Air Pollutants, which are nationally uniform standards oriented towards controlling particular hazardous air pollutants. Section 112(b) of the CAA identifies 189 “Air Toxics” (hazardous air pollutants), directs EPA to identify sources of the 189 pollutants, and establishes a 10-year time period for EPA to issue technology-based emissions standards for each source category. Title III of the CAA provides for a second phase under which EPA is to assess residual risk after the implementation of the first phase of standards and impose new standards, when appropriate, to protect public health.

Clean Air Act Section 112. Under the authority of Section 112 of the CAA, the Chemical Accident Prevention Provisions require facilities that produce, handle, process, distribute, or store more than a “threshold quantity” of any extremely hazardous toxic and flammable substance listed at 40 CFR Part 68.130, to develop and implement a risk management program, prepare a risk management plan, and submit the risk management plan to the EPA. Although a federal program, the Risk Management Program is intended to reduce hazards at the local level. The program is applicable to companies of all sizes that use certain flammable and toxic substances. The Risk Management Program is intended to help local fire, police, and emergency response personnel (first responders) in the event of an accidental spill or exposure event. The Risk Management Program is contained in the CAA (42 USC 7401 et seq.).

Greenhouse Gases Action

On April 2, 2007, in *Massachusetts v. EPA*, 549 U.S. 497 (2007), the Supreme Court found that greenhouse gases (GHGs) are air pollutants covered by the CAA. The Court held that the EPA Administrator must determine whether or not emissions of GHG from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. On December 7, 2009, the EPA Administrator signed a final action, under Section 202(a) of the CAA, finding that six key well-mixed GHG constitute a threat to public health and welfare, and that the combined emissions from motor vehicles cause and contribute to the climate change problem. This action was a prerequisite for implementing GHG emissions standards. On February 18, 2010, the White House Council on Environmental Quality (CEQ) released draft guidance regarding the consideration of GHG in NEPA documents for federal actions. CEQ issued revised draft guidance in December 2014 and final guidance in August 2016. The 2016 guidance encouraged agencies to draw from their experience and expertise to determine the appropriate level (broad, programmatic, or project- or site-specific) and type (quantitative or qualitative) of analysis required to comply with NEPA. The guidance also discussed methods to appropriately analyze reasonably foreseeable direct, indirect, and cumulative GHG emissions and climate effects. Effective April 5, 2017, the CEQ withdrew its "Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews."

National Forest Land Management Plans

The CRCP Plan Area overlaps with three national forests, the Angeles National Forest, Los Padres National Forest, and San Bernardino National Forest. A final environmental impact statement was developed to implement the four Southern California national forest plan revisions that were started under the 1982 planning regulation.[6] Each forest has an individual three-part plan to establish the primary management direction for natural resource activities following the National Forest Management Act of 1976. The documents to support these plans include *Part 1 Southern California National Forests Vision*, *Part 2 Angeles National Forest*, *Part 2 Los Padres National Forest Strategy*, *Part 2 San Bernardino National Forest,* and *Part 3 Design Criteria for the Southern California National Forests*.[7,8,9,10,11] Part 1 outlines the future of each national forest, their role within the community, and the desired conditions that the U.S. Forest Service strives to meet. Part 2 outlines the strategies that will be used to accomplish the objectives specific to the individual forests. It defines each land use zone, includes current and future performance, and addresses monitoring to be done to assess implementation of these strategies. The final portion, Part 3, involves the design criteria and outlines the rules that the forest service uses to implement projects.

Revision Record of Decision for Los Padres National Forest, San Bernardino National Forest, and Angeles National Forest were implemented due to public comments addressing the draft

[6] U.S. Forest Service. September 2005. Final Environmental Impact Statement, Volume 1 Land Management Plans.

[7] U.S. Forest Service. September 2005. Part 1 Southern California National Forests Vision.

[8] U.S. Forest Service. September 2005. Part 2 Angeles National Forest Strategy

[9] U.S. Forest Service. September 2005. Part 2 Los Padres National Forest Strategy.

[10] U.S. Forest Service. September 2005. Part 2 San Bernardino National Forest Strategy.

[11] U.S. Forest Service. September 2005. Part 3 Design Criteria for Southern California National Forests.

environmental impact statement. The revisions include program emphasis and active management strategies to conserve and restore the health of each forest.[12,13,14]

National Historic Preservation Act of 1966

Enacted in 1966 and amended most recently in 2006, the National Historic Preservation Act (NHPA) declared a national policy of historic preservation and instituted a multifaceted program, administered by the Secretary of the Interior, to encourage the achievement of preservation goals at the federal, state, and local levels. The NHPA authorized the expansion and maintenance of the National Register of Historic Places (NRHP), established the position of State Historic Preservation Officer and provided for the designation of State Review Boards, set up a mechanism to certify local governments to carry out the purposes of the NHPA, assisted Native American Tribes to preserve their cultural heritage, and created the Advisory Council on Historic Preservation. Its implementing regulations, 36 Code of Federal Regulations (CFR) 800, are described below as Section 106.

Section 106 of the NHPA requires that federal agencies with direct or indirect jurisdiction over federally funded, assisted, or licensed undertakings "take into account the effects of their undertakings on historic properties" (i.e., any property that is included in, or eligible for inclusion in, the National Register of Historic Places). The Advisory Council on Historic Preservation may choose to participate in the Section 106 process if the undertaking would have substantial impacts on important historic properties, presents important questions of policy or interpretation, has the potential for presenting procedural problems, or presents issues of concern to Native American tribes. The Section 106 process involves establishing if the proposed action constitutes an undertaking; identification of historic properties within an Area of Potential Effect; determination if the undertaking will cause an adverse effect on historic resources; and resolution of those adverse effects through consultation, avoidance, proposed action redesign, and the execution of a Memorandum of Agreement or Programmatic Agreement.

The National Register of Historic Places was established by the NHPA as an authoritative guide to be used by federal, state, and local governments, private groups, and citizens to identify the nation's cultural resources and to indicate what properties (sites, districts, objects, buildings, and structures) should be considered for protection from destruction or impairment.

All federal agencies are required to examine the cultural impacts of their actions (e.g. issuance of a permit). This may require consultation with the State Historic Preservation Officer and appropriate American Indian tribes. All ITP applicants are requested to submit a Request for Cultural Resources Compliance form to the USFWS. To complete compliance, the applicants may be required to contract for cultural resource surveys and possibly to implement mitigation (National Historic Preservation Act of 1966 as Amended (16 USC 470 et seq.).

Native American Graves Protection and Repatriation Act of 1990

The Native American Graves Protection and Repatriation Act of 1990 sets provisions for the intentional removal and inadvertent discovery of human remains and other cultural items from federal and tribal lands. It clarifies the ownership of human remains and sets forth a process for repatriation of human remains and associated funerary objects and sacred religious objects to the

[12] U.S. Forest Service. September 2005. Record of Decision Los Padres National Forest Land Management Plan.

[13] U.S. Forest Service. April 2006. Record of Decision Angeles National Forest Land Management Plan.

[14] U.S. Forest Service. April 2006. Record of Decision San Bernardino National Forest Land Management Plan.

Native American groups claiming to be lineal descendants or culturally affiliated with the remains or objects. It requires any federally funded institution housing Native American remains or artifacts to compile an inventory of all cultural items within the museum or with its agency and to provide a summary to any Native American Tribe claiming affiliation.

American Antiquities Act

The American Antiquities Act of 1906 (16 USC 431-433) was enacted with the primary goal of protecting cultural resources in the United States. It explicitly prohibits appropriation, excavation, injury, and destruction of "any historic or prehistoric ruin or monument, or any object of antiquity" located on lands owned or controlled by the federal government, without permission of the secretary of the federal department having jurisdiction. It also establishes criminal penalties, including fines and/or imprisonment, for such acts. The American Antiquities Act represents the foundation of modern regulatory protection for cultural resources.

American Indian Religious Freedom Act of 1978

The American Indian Religious Freedom Act was enacted to protect and preserve the traditional religious rights and cultural practices of Native Americans. These rights include, but are not limited to, access of sacred sites, freedom to worship through ceremonial and traditional rights and use, and possession of objects considered sacred. The act requires that federal agencies evaluate their actions and policies to determine if changes are needed to ensure that Native American religious rights and practices are not disrupted by agency practices. Such evaluations are made in consultation with native traditional religious leaders.

Executive Order 13007 (Indian Sacred Sites)

In managing federal lands, agencies shall, to the extent practicable, permitted by law, and not inconsistent with agency functions, accommodate Indian religious practitioners' access to and ceremonial use of Indian sacred sites. Agencies are to avoid adversely affecting the physical integrity of these sites, maintaining the confidentiality of such sites, and informing tribes of any proposed actions that could restrict access to, ceremonial use of, or adversely affect the physical integrity of, sacred sites.

Federal Land Policy and Management Act of 1976

Legislation establishes public land policy and guidelines for the administration, management, protection, development, and enhancement of public lands. Regulations under the Federal Land Policy and Management Act (43 USC 1701 et seq.) established the procedures followed in managing public lands. These lands are to be managed in a manner that protects the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archaeological values that, where appropriate, will preserve and protect certain public lands in their natural conditions, provide food and habitat for fish and wildlife and domestic animals, and provide for outdoor recreation and human occupancy and use by encouraging collaboration and public participation throughout the planning process.

Archeological Resources Protection Act

The Archeological Resources Protection Act (16 USC 470aa–470mm; Public Law 96-95 and amendments to it) was enacted to secure, for the present and future benefit of the American people,

the protection of archaeological resources and sites which are on public lands and Indian lands, and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals (Sec. 2(4)(b)). The reasons behind enactment include recognition that archaeological resources are an irreplaceable part of America's heritage and that they were endangered increasingly because of the escalating commercial value of a small portion of the contents of archeological sites. Section 4 of the statute and Sections 16.5–16.12 of the uniform regulations describe the requirements that must be met before federal authorities can issue a permit to excavate or remove any archeological resource on federal or Indian lands. The curation requirements of artifacts, other materials excavated or removed, and the records related to the artifacts and materials are described in Section 5 of the act. This section also authorizes the Secretary of the Interior to issue regulations describing in more detail the requirements regarding these collections. These regulations, which affect all federally owned or administered archeological collections, were issued in 1990 as 36 CFR 79.

Executive Order 12898

The concept of environmental justice is rooted in the Civil Rights Act of 1964, which prohibited discrimination in federally assisted programs, and in Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*), issued February 11, 1994. Executive Order 12898 was intended to ensure that federal actions and policies do not result in disproportionately high adverse effects on minority or low-income populations. It requires each federal agency to take "appropriate and necessary" steps to identify and address any such disproportionate effects resulting from its programs, policies, or activities, including those it implements directly and those for which it provides permitting or funding. Additional guidance from the CEQ clarifies that environmental justice concerns may arise from effects on the natural or physical environment that produce human health or ecological outcomes or from adverse social or economic changes. Environmental justice issues are mandated and regulated at the federal level, and compliance with NEPA requires analysis of environmental justice effects.

The Clean Water Act (CWA) regulates stormwater discharges under the National Pollutant Discharge Elimination System (NPDES) program (Section 402[p]). A 1987 amendment to the CWA required that municipal and industrial stormwater discharges be addressed in two phases under the NPDES program. The EPA implemented the NPDES Phase II program in 2003. Phase II requires construction projects disturbing 1 acre or more to obtain a General Permit for Storm Water Discharges Associated with Construction Activity. The purpose of the Phase II rule is to avoid or mitigate for the impacts of construction activities, including earthwork, on surface waters. The state of California is authorized by the EPA to implement the NPDES program.

Earthquake Hazards Reduction Act

The Earthquake Hazards Reduction Act (Public Law 95-124) was enacted in 1977 to "reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program." It established the National Earthquake Hazards Reduction Program, which establishes measures for earthquake hazards reduction and promotes the adoption of earthquake hazards reduction measures by federal, state, and local governments.

Disaster Mitigation Act of 2000

The Disaster Mitigation Act of 2000 (Public Law 106-390) amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 to establish a Pre-Disaster Mitigation program and new requirements for the federal post-disaster Hazard Mitigation Grant Program. The Act encourages and rewards local and state pre-disaster planning. It promotes sustainability and seeks to integrate state and local planning with an overall goal of strengthening statewide hazard mitigation. This enhanced planning approach enables local, tribal, and state governments to identify specific strategies for reducing probable impacts of natural hazards such as floods, fire, and earthquakes. In order to be eligible for hazard mitigation funding after November 1, 2004, local governments are required to develop a Hazard Mitigation Plan that incorporates specific program elements of the Act.

Paleontological Resources Preservation Act

The Paleontological Resources Preservation Act of 2002 was specifically intended to codify the generally accepted practice of limiting collection of vertebrate fossils and other rare and scientifically significant fossils to qualified researchers who obtain a permit from the appropriate state or federal agency and agree to donate any materials recovered to recognized public institutions where they will remain accessible to the public and to other researchers. The Paleontological Resources Preservation Act incorporates the following key findings of a recent report issued by the Secretary of the Interior with input from staff of the Smithsonian Institution, the U.S. Geological Survey, various federal land management agencies, paleontological experts, and the public (Society of Vertebrate Paleontology 2006).

Universal Building Code

The Universal Building Code (UBC) is published by the International Conference of Building Officials and forms the basis for California's building code, as well as approximately half of the state building codes in the United States. It has been adopted by the California Legislature to address the specific building conditions and structural requirements for California, as well as provide guidance on foundation design and structural engineering for different soil types. The UBC defines and ranks the regions of the United States according to their seismic hazard potential. There are four types of regions defined by Seismic Zones 1 through 4, with Zone 1 having the least seismic potential and Zone 4 having the highest.

Clean Water Act

Increasing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. As amended in 1977, this law became commonly known as the CWA (33 USC 1251 et seq.). The CWA established basic guidelines for regulating discharges of pollutants into the Waters of the United States. The CWA requires that states adopt water quality standards to protect public health, enhance the quality of water resources, and ensure implementation of the CWA.

Section 401: Certification. Section 401 of the CWA requires an applicant for a federal permit, such as for the construction or operation of a facility that may result in the discharge of a pollutant, to obtain certification of those activities from the state in which the discharge originates. This process is known as Water Quality Certification.

Section 402: National Pollutant Discharge Elimination System. The NPDES permit program, as authorized by Section 402 of the CWA, was established to control water pollution by regulating point sources that discharge pollutants into Waters of the United States. In the State of California, the EPA has authorized the SWRCB as permitting authority to implement the NPDES program. In general, the SWRCB issues two baseline general permits: one for industrial discharges and one for construction activities. Attachment A in the current California General Construction Permit (2009-0009-DWQ, as amended) is applicable to Linear Underground/Overhead Projects, which are a majority of the type of projects that SoCalGas conducts. Under certain conditions, routine maintenance activities are not considered construction activities. Routine maintenance projects include, but are not limited to, projects that are conducted to (1) maintain the original purpose of the facility, or hydraulic capacity; (2) update existing lines (includes replacing existing lines with new materials or pipes) and facilities to comply with applicable codes, standards and regulations regardless if such projects result in increased capacity; and (3) repairing leaks.[15] In addition, discharges from construction and hydrostatic testing for natural gas utility construction, operations and maintenance activities are regulated under NPDES No. CAG670001, Order WQ 2017-0029-DWQ.

Section 404: Permitting Discharges of Dredge or Fill Material. Section 404 of the CWA established a permitting program to regulate the discharge of dredged or filled material into waters of the United States, which include wetlands adjacent to national waters. This permitting program is administered by the U.S. Army Corps of Engineers (USACE) and enforced by the EPA.

Section 10 of the Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) requires the USACE to authorize construction of any structure in or over navigable Waters of the United States or obstruction or alteration in a navigable water. A structure or work outside the limits defined for navigable waters of the United States requires a Section 10 permit if the structure or work affects the course, location, condition, or capacity of the water body. Navigable waters are defined as waters that are subject to the ebb and flow of the tide.

National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program under the U.S. Department of Homeland Security. The program encourages the adoption and enforcement by local communities of floodplain management ordinances that reduce flood risks. In support of the program, FEMA identifies flood hazard areas throughout the United States on FEMA flood hazard boundary maps.

Noise Control Act of 1972

The adverse impacts of noise were officially recognized by the federal government in the Noise Control Act of 1972, which serves three purposes:

- Promulgating noise emission standards for interstate commerce
- Assisting state and local abatement efforts
- Promoting noise education and research

[15] NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities; Order No. 2009-0009-DWQ, NPDES No. CAS000002; Attachment A.2

The Office of Noise Abatement and Control was initially tasked with implementing the Noise Control Act. However, the Office of Noise Abatement and Control has since been eliminated, leaving the development of federal noise policies and programs to other federal agencies and inter-agency committees. For example, OSHA agency prohibits exposure of workers to excessive sound levels. The U.S. Department of Transportation assumed a significant role in noise control through its various operating agencies, such as with the Federal Aviation Administration, which regulates noise generated by aircraft and airports. Surface transportation system noise is regulated by a host of agencies, including the Federal Transit Administration, which requires that all rail systems receiving federal funding be constructed and operated in accordance with its regulations and specifications. The Federal Railroad Administration sets forth and enforces safety standards, including noise emissions within railroad locomotive cabs. Transit noise is regulated by the Federal Transit Administration, while freeways that are part of the interstate highway system are regulated by the Federal Highway Administration. The Federal Highway Administration has adopted and promulgated noise abatement criteria for highway construction projects. The federal government encourages local jurisdictions to use their land use regulatory authority to site new development to minimize potential noise impacts.

49 CFR Part 192, Transportation of Natural Gas by Pipeline

This regulation addresses the following areas: classification of pipeline, pipe type and marking of pipe, pipeline materials and design issues, pipeline fittings and connections, inspection of pipelines, compressor stations and vaults, installation of pipelines, corrosion control, and emergency plans.

Occupational Safety and Health Act of 1970

The Occupational Safety and Health Act (29 CFR Parts 70 to 2400), which is implemented by the Occupational Safety and Health Administration (OSHA), contains provisions with respect to hazardous materials handling. Federal OSHA requirements, as set forth in 29 CFR Section 1910 et seq., are designed to promote worker safety, worker training, and a worker's right to know. In California, OSHA has delegated the authority to administer OSHA regulations to the State.

Hazardous Materials Transportation Act of 1975

The Hazardous Materials Transportation Act (49 USC Sections 5101–5127) is the principal federal law regulating the transportation of hazardous materials. Its purpose is to "protect against the risks to life, property, and the environment that are inherent in the transportation of hazardous material in intrastate, interstate, and foreign commerce" under the authority of the U.S. Secretary of Transportation.

Regulations implementing the Hazardous Materials Transportation Act of 1975 specify additional requirements and regulations with respect to the transport of hazardous materials. For example, the act requires that every employee who transports hazardous materials receive training to recognize and identify hazardous materials and become familiar with hazardous materials requirements. Drivers are also required to be trained in function and commodity specific requirements.

Toxic Substances Control Act of 1976

Congress enacted the Toxic Substance Control Act of 1976 (15 USC 26014 et seq.) to give the EPA the ability to track the thousands of industrial chemicals being produced in or imported into the

United States. The EPA routinely screens industrial chemicals and reports and tests those found to pose a potential health hazard to the environment and/or to human health. Through the Toxic Substances Control Act, the EPA can ban the manufacture and import of chemicals that pose an immediate risk. The EPA also can track and control new industry-developed chemicals to protect the environment and human health from potential risks.

Response Conservation and Recovery Act of 1976

The Response Conservation and Recovery Act of 1976 (42 USC 2) was the first major federal act regulating the potential health and environmental problems associated with hazardous and nonhazardous solid waste. The Act and the implementation regulations developed by the U.S. EPA provide the general framework for the national hazardous and nonhazardous waste management systems. This framework includes the determination of whether hazardous wastes are being generated, techniques for tracking wastes to eventual disposal, and the design and permitting of hazardous waste management facilities.

Response Conservation and Recovery Act amendments enacted in 1984 and 1986 began the process of eliminating land disposal as the principal hazardous waste disposal method. Hazardous waste regulations promulgated in 1991 address site selection, design, construction, operation, monitoring, corrective action, and closure of disposal facilities. Additional regulations addressing solid waste issues are contained in 40 CFR Part 258.

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 USC Sections 1906 et seq.), also known as the Superfund Act, outlines the potential liability related to the cleanup of hazardous substances; available defenses to such liability; appropriate inquiry into site status under Superfund, which is the federal government's program to clean up the nation's uncontrolled hazardous waste sites; statutory definitions of hazardous substances and petroleum products; and the petroleum product exclusion under the Act. The Act provides broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. It establishes requirements concerning closed and abandoned hazardous waste sites, provides for liability of persons responsible for releases of hazardous waste at these sites, and establishes a trust fund to provide for cleanup when no responsible party can be identified. It also establishes the National Contingency Plan, which provides guidelines and procedures necessary to respond to releases and threatened releases of hazardous substances.

Emergency Planning and Community Right-to-Know Act

The Emergency Planning and Community Right-to-Know Act of 1986 (42 USC 116, Sections 9601 et seq.) was created to help communities plan for emergencies involving hazardous substances. The Act requires hazardous chemical emergency planning by federal, state, and local governments; Native American tribes; and industry. It also requires industry to report on the storage, use, and releases of hazardous chemicals to federal, state, and local governments.

Superfund Amendment and Reauthorization Act, Title III

The Superfund Amendment and Reauthorization Act, Title III, of 1986 (40 CFR Parts 350–372) requires facilities to report the following items on EPA Form R, the Toxic Chemical Release Inventory

Reporting Form: facility identification, off-site locations where toxic chemicals are transferred in wastes, chemical-specific information, and supplemental information.

Form R requires a facility to list the hazardous substances that are handled on-site and to account for the total aggregate releases of listed toxic chemicals for the calendar year. Releases to the environment include emissions to the air, discharges to surface water, and on-site releases to land and underground injection wells.

Robert T. Stafford Disaster Relief and Emergency Assistance Act, as Amended, and Related Authorities

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 100-707), signed into law on November 23, 1988, amended the Disaster Relief Act of 1974 (Public Law 93-288). The Stafford Act constitutes the statutory authority for most federal disaster response activities especially as they pertain to FEMA and FEMA programs.

Disaster Mitigation Act of 2000

The Disaster Mitigation Act of 2000 (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for state, local and Indian Tribal governments as a condition of mitigation grant assistance. The Act amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions and replacing them with a new set of requirements that emphasize the need for state, local, and Indian Tribal entities to closely coordinate mitigation planning and implementation efforts. The requirement for a state mitigation plan is continued as a condition of disaster assistance, adding incentives for increased coordination and integration of mitigation activities at the state level through the establishment of requirements for two different levels of state plans. It also established a new requirement for local mitigation plans and authorized up to 7 percent of Hazard Mitigation Grant Program funds available to a state for development of state, local, and Indian Tribal mitigation plans.

Federal Emergency Management Agency Regulation

FEMA's mission is to reduce the loss of life and property and protect communities nationwide from all hazards, including natural disasters, acts of terrorism, and other man-made disasters. FEMA leads and supports the nation in a risk-based, comprehensive emergency management system of preparedness, protection, response, recovery and mitigation.

In March 2003, FEMA became a department of the U.S. Department of Homeland Security, pursuant to 44 CFR, Chapter 1, Part 201. The primary mission of FEMA is to reduce the loss of life and property and protect the nation from all hazards, including natural disasters, acts of terrorism, and other human-made disasters, by leading and supporting the nation in a risk-based, comprehensive emergency management system of preparedness, protection, response, recovery, and mitigation. The CRCP Plan Area is under the jurisdiction of FEMA Region 9, which covers Arizona, California, Hawaii, Nevada, Guam, American Samoa, Commonwealth of Northern Mariana Islands, Republic of Marshall Islands, Federated State of Micronesia, and more than 150 sovereign tribal entities.

Presidential Policy Directive 8: National Preparedness

The National Response Framework (NFR) is an essential component of the National Preparedness System mandated in Presidential Policy Directive 8: National Preparedness (PPD-8). Presidential

Policy Directive 8 is aimed at strengthening the security and resilience of the United States through systematic preparation for the threats that pose the greatest risk to the security of the Nation. It defines five mission areas—Prevention, Protection, Mitigation, Response, and Recovery—and mandates the development of a series of policy and planning documents to explain and guide the Nation's collective approach to ensuring and enhancing national preparedness. The NRF presents the guiding principles that enable all response partners to prepare for and provide a unified national response to disasters and emergencies. It establishes a comprehensive, national, all-hazards approach to domestic incident response. The National Response Plan was replaced by the NRF effective March 22, 2008, and updated May 2013.

The NRF defines the principles, roles, and structures that organize response protocols as a nation. The NFR

- Describes how communities, tribes, states, the federal government, private-sectors, and nongovernmental partners work together to coordinate national response
- Describes specific authorities and best practices for managing incidents
- Builds upon the National Incident Management System, which provides a consistent template for managing incidents.

Title 40 – Protection of Environment, Chapter I - Environmental Protection Agency CFR Part 68 – Chemical Accident Prevention Provisions

This part sets forth the list of regulated substances and thresholds, the petition process for adding or removing substances to the list of regulated substances, the requirements for owners or operators of stationary sources concerning the prevention of accidental releases, and the state accidental release prevention programs approved under Section 112(r).

Title 29 – Occupational Safety and Health Administration, Department of Labor, Part 1910, Subpart H, Section 1910.119 – Process Safety Management

29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals, specifically requires prevention program elements to protect workers at facilities that have toxic, flammable, reactive, or explosive materials. Prevention program elements are aimed at preventing or minimizing the consequences of catastrophic releases of chemicals and include process hazard analyses, formal training programs for employees and contractors, investigation of equipment mechanical integrity, and an emergency response plan.

1.6.2 State

California Endangered Species Act

CESA is part of the California Fish and Game Code (Section 2050 et seq.) and is administered by CDFW as the trustee for fish and wildlife resources in the State of California. The State Legislature further establishes a policy of the State to conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat. CESA also authorizes the California Fish and Game Commission to establish a list of endangered and threatened species in the State of California (see Table 1.7.1-1 for the CRCP MSHCP list of Covered Species).

Section 2080. Section 2080 prohibits the take of State-listed and State candidate species, except as provided under Sections 2080, 2080.1, 2081, 2835, and the Native Plant Protection Act.

Section 2081. Section 2081(b) of CESA authorizes the CDFW to allow, by permit, the take of an endangered, threatened or candidate species. Such a "Section 2081 permit" may be issued only if the following permit issuance criteria are met:

1. The take is incidental to an otherwise lawful activity;

2. The impacts of the authorized take shall be minimized and fully mitigated;

3. The permit is consistent with regulations adopted pursuant to Sections 2112 and 2114 of the Fish and Game Code; and

4. The applicant shall ensure adequate funding to implement the measures required by paragraph (2), and for monitoring compliance with, and effectiveness of, those measures.

CESA further requires that no permit may be issued if issuance of the permit would jeopardize the continued existence of the species.

Fully Protected Species. Fully protected species are described in Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the California Fish and Game Code. These protections state that "no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected [bird], [mammal], [reptile or amphibian], or [fish]." CDFW may issue permits authorizing take pursuant to the Natural Community Conservation Planning Act (Table 1.6.2-1, *Fully Protected Species*).

TABLE 1.6.2-1
FULLY PROTECTED SPECIES

Common Name	Scientific Name	Federal Status*	State Status**
Fish (1)			
Unarmored threespine stickleback	*Gasterosteus aculeatus williamsoni*	E	E, FP
Birds (5)			
American peregrine falcon	*Falco peregrinus anatum*	-	FP
California condor	*Gymnogyps californianus*	E/CH	E, FP
California least tern	*Sterna antillarum browni*	E	E, FP
Golden eagle	*Aquila chrysaetos*	-	WL, FP
White-tailed kite	*Elanus leucurus*	-	FP
Mammals (1)			
Morro Bay kangaroo rat	*Dipodomys heermanni morroensis*	E/CH	E, FP

* Federal Status: Endangered (E); Critical Habitat (CH).
** State Status: Fully Protected (FP); Endangered (E); Watch List (WL).

Sections 3503 (Birds in General) and 3503.5 (Birds of Prey). Section 3503 of the Fish and Game Code makes it unlawful to take, possess, or needlessly destroy the nests or eggs of any bird. Section 3503.5 expressly prohibits the take, possession, or destruction of any birds of prey or their nests or eggs.

Native Plant Protection Act (Sections 1900–1913). The Native Plant Protection Act prohibits taking of endangered and rare plants from the wild except that the removal of such plants from a canal,

lateral ditch, building site, or road, or other ROW by the owner of the land or his agent, or the performance by a publicly or privately owned public utility of its obligation to provide service to the public, shall not be restricted because of the presence of such plants, except where the owner of land has been notified by the CDFW that a rare or endangered native plant is growing on such land, and the landowner notifies the CDFW at least 10 days in advance of changing the land use to allow for salvage of such plant. The failure by CDFW to salvage such plant within 10 days of notification entitles the owner of the land to proceed without regard to the NPPA. If impacts to Covered plants cannot be avoided and SoCalGas owns the land, CDFW shall be notified (consistent with Fish and Game Code, Section 1913) at least 10 days in advance of commencing the activity in the occupied area to allow for salvage of the plants.

Lake or Streambed Alteration Agreement (Section 1600 et seq.). CDFW has jurisdictional authority over streams and lakes and the fish, wildlife and native plant resources associated with these aquatic systems. CDFW has the authority to regulate work that will:

> *Substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.*

California Environmental Quality Act

CEQA is modeled after NEPA and functions only within the boundaries of the State of California. It is similar to, but more extensive than NEPA, in that it requires that significant environmental impacts of proposed projects be reduced to a less-than-significant level through the adoption of feasible avoidance, minimization, or mitigation measures unless overriding considerations are identified and documented.

California Clean Air Act

The California Clean Air Act of 1988 (Chapter 1568, Statutes of 1988) requires nonattainment areas to achieve and maintain the state ambient air quality standards by the earliest practicable date and local air districts to develop plans for attaining the state ozone, CO, SO_2, and NO_2 standards. The California Air Resources Board (CARB) sets the California Ambient Air Quality Standards, which are more protective of public health than respective federal standards. California has also set standards for some pollutants that are not addressed by federal standards. Under the CCAA, areas not in compliance with the standard must prepare plans to reduce ozone. Non-compliance with the state ozone standard does not affect the ability to proceed with any transportation plan, program, or project.

Global Warming Solutions Act of 2006

In September 2006, Governor Arnold Schwarzenegger signed the California Global Warming Solutions Act of 2006, also known as Assembly Bill (AB) 32 (Núñez, Chapter 488, Statutes of 2006), into law. AB 32 focuses on reducing GHG emissions in California and requires the CARB to adopt rules and regulations that would achieve GHG emissions equivalent to statewide levels in 1990 by 2020. To achieve this goal, AB 32 mandates that the CARB establish a quantified emissions cap, institute a schedule to meet the cap, implement regulations to reduce statewide GHG emissions from stationary sources, and develop tracking, reporting, and enforcement mechanisms to ensure that reductions are achieved. Because the intent of AB 32 is to limit 2020 emissions to the equivalent of

1990, it is expected that the regulations would affect many existing sources of GHG emissions and not just new general development projects. Senate Bill (SB) 1368, a companion bill to AB 32, requires the CPUC and the California Energy Commission to establish GHG emission performance standards for the generation of electricity. These standards will also apply to power that is generated outside of California and imported into the state.

AB 32 charges CARB with the responsibility to monitor and regulate sources of GHG emissions in order to reduce those emissions. On June 1, 2007, CARB adopted three discrete early action measures to reduce GHG emissions. These measures involved complying with a low carbon fuel standard, reducing refrigerant loss from motor vehicle air conditioning maintenance, and increasing methane capture from landfills.[16]

On October 25, 2007, CARB tripled the set of previously approved early action measures. The approved measures include improving truck efficiency (i.e., reducing aerodynamic drag), electrifying port equipment, reducing perfluorocarbons from the semiconductor industry, reducing propellants in consumer products, promoting proper tire inflation in vehicles, and reducing sulfur hexafluoride emission from the non-electricity sector. CARB has determined that the total statewide aggregated GHG 1990 emissions level and 2020 emissions limit is 427 million metric tons of carbon dioxide equivalent ($MTCO_2e$). The 2020 target reductions are currently estimated to be 174 million $MTCO_2e$.

The CARB AB 32 Scoping Plan contains the main strategies to achieve the 2020 emissions cap. The Scoping Plan was developed by the CARB with input from the Climate Action Team and proposes a comprehensive set of actions designed to reduce overall carbon emissions in California, improve the environment, and reduce oil dependency. The GHG reduction strategies contained in the Scoping Plan include direct regulations, alternative compliance mechanisms, monetary and nonmonetary incentives, voluntary actions, and market-based mechanisms such as a cap-and-trade system. Key approaches for reducing GHG emissions to 1990 levels by 2020 include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards
- Achieving a statewide renewable electricity standard of 33 percent
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system
- Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets
- Adopting and implementing measures to reduce transportation sector emissions, including California's

CARB has also developed the GHG mandatory reporting regulation, which required reporting beginning on January 1, 2008, pursuant to requirements of AB 32. The regulations require reporting for certain types of facilities that make up the bulk of the stationary source emissions in California. The regulation language identifies major facilities as those that generate more than 25,000 $MTCO_2e$ per year. Cement plants, oil refineries, electric generating facilities/providers, co-generation facilities, and hydrogen plants and other stationary combustion sources that emit more than 25,000 $MTCO_2e$ per year make up 94 percent of the point source CO_2 emissions in California.

[16] California Air Resources Board. 20 April 2007. Proposed Early Action Measures to Mitigate Climate Change in California.

California Cap and Trade Program

Authorized by AB 32, the cap-and-trade program is one of several strategies that California uses to reduce GHG emissions. CARB adopted the California Cap and Trade Program final regulations on October 20, 2011, and adopted amended regulations on September 12, 2012, with the first auction for GHG allowances on November 14, 2012.[17] Funds received from the program are deposited into the Greenhouse Gas Reduction Fund and appropriated by the Legislature. Greenhouse Gas Reduction Funds are administered by state and local agencies for a variety of greenhouse-gas cutting programs, including energy efficiency, public transit, low-carbon transportation, and affordable housing.[18] On June 20, 2014, Governor Brown signed the Fiscal Year 2014–2015 California State Budget, which included a cap and trade expenditure plan for cap-and-trade revenues in the Greenhouse Gas Reduction Fund. The Cap and Trade Program is a market-based mechanism to reduce GHG emissions in a cost-effective and economically efficient manner. California is the first multisector cap and trade program in North America following the northeast Regional Greenhouse Gas Initiative and the European Union Emission Trading Scheme. It set a GHG emissions limit that decreased by 2 percent each year until 2015, and then by 3 percent from 2015 to 2020 to achieve the goals in AB 32. The program initially applied to large electric power plants and large industrial plants, but included fuel distributors as of 2015. By 2015, these rules encompassed 85 percent of all of California's GHG emissions.

Executive Order S-3-05 GHG Reduction Targets

On June 1, 2005, Executive Order S-3-05 set the following GHG emission reduction targets: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80 percent below 1990 levels.[19] The 2010 and 2020 goals were codified into law through AB 32.

It calls for the Secretary of the California EPA to be responsible for coordination of state agencies and progress reporting. A recent California Energy Commission report concludes, however, that the primary strategies to achieve this target should be major "decarbonization" of electricity supplies and fuels, and major improvements in energy efficiency.[20]

In response to the Executive Order, the Secretary of the California EPA created the Climate Action Team. California's Climate Action Team originated as a coordinating council organized by the Secretary for Environmental Protection. It included the Secretaries of the Natural Resources Agency and the Department of Food and Agriculture and the Chairs of the CARB, California Energy Commission, and CPUC. The original council was an informal collaboration between the agencies to develop potential mechanisms for reductions in GHG emissions in the state. The council was given formal recognition in Executive Order S-3-05.

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[17] California Air Resources Board. Accessed 15 October 2015. Cap and Trade Program. Available at: http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm.

[18] California Environmental Protection Agency. Accessed 9 February 2015. Greenhouse Gas-Reduction Investments to Benefit Disadvantaged Communities. Available at: http://www.calepa.ca.gov/EnvJustice/GHGInvest/.

[19] Executive Department, State of California. 1 June 2005. Governor Issues Executive Order S-3-05. Available at: http://cetesb.sp.gov.br/proclima/wp-content/uploads/sites/36/2014/08/governor_state_california.pdf. Accessed 16 May 2018.

[20] California Energy Commission. May 2011. California's Energy Future – The View to 2050.

SB 32 / AB 197

SB 32 was signed into law by Governor Jerry Brown on September 8, 2016. SB 32 requires California to reduce GHG emissions by 40 percent below 1990 levels by 2030. SB 32 is a continuation of AB 32, signed in 2006, which set a GHG reduction target of reducing GHG emissions to 1990 levels by 2020. The passing of SB 32 is tied to another bill, AB 197. AB 197 mandates the CARB to prioritize disadvantaged communities in climate change related regulations and to prepare a scoping plan that uses the maximum technologically feasible and cost-effective reductions in GHG emissions.

First Update to the Climate Change Scoping Plan

This First Update to California's Climate Change Scoping Plan was developed by the CARB in collaboration with the CAT and reflects the input and expertise of a range of state and local government agencies. The Update reflects public input and recommendations from business, environmental, environmental justice, and community-based organizations provided in response to the release of prior drafts of the Update, a Discussion Draft in October 2013 and a draft Proposed Update in February 2014.

This report highlights California's success to date in reducing its GHG emissions and lays the foundation for establishing a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050. The First Update includes recommendations for establishing a mid-term emissions limit that aligns with the State's long-term goal of an emissions limit 80 percent below 1990 levels by 2050 and sector-specific discussions covering issues, technologies, needs, and ongoing State activities to significantly reduce emissions throughout California's economy through 2050. The focus areas include energy, transportation, agriculture, water, waste management, and natural and working lands.[21] With respect to the transportation sector, California has outlined several steps in the State's Zero-Emission Vehicle Action Plan to further support the market and accelerate its growth. Committed implementation of the actions described in the plan will help meet Governor Brown's 2012 EO B-16-2012, which—in addition to establishing a more specific 2050 GHG target for the transportation sector of 80 percent from 1990 levels—called for 1.5 million zero-emission vehicles on California's roadways by 2025.

Achieving such an aggressive 2050 target will require innovation and unprecedented advancements in energy demand and supply.[22] Emissions from 2020 to 2050 will have to decline at more than twice the rate of that needed to reach the 2020 statewide emissions limit. In addition to climate objectives, California also must meet federal clean air standards. Emissions of criteria air pollutants, including ozone precursors (primarily oxides of nitrogen, or NOx) and particulate matter, must be reduced by, a currently estimated, 90 percent by 2032 to comply with federal air quality standards. The scope and scale of emission reductions necessary to improve air quality is similar to that needed to meet long-term climate targets. Achieving both objectives will align programs and investments to leverage limited resources for maximum benefit.

[21] California Air Resources Board. May 2014. First Update to the Climate Change Scoping Plan. Available at: http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.

[22] California Air Resources Board. May 2014. First Update to the Climate Change Scoping Plan. Available at: http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.

Sustainable Communities and Climate Protection Act of 2008 (SB 375, Chapter 728, Statutes of 2008)

The Sustainable Communities and Climate Protection Act of 2008 (SB 375), adopted in September 30, 2008, provides an additional means for achieving AB 32 GHG emissions reduction goals. As part of the state's overall strategy to reduce GHG emissions as set forth by Executive Orders S-03-05 and B-30-15 and AB 52, SB 375 seeks to coordinate land use strategies with transportation planning. By coordinating these planning efforts, it is envisioned that vehicle congestion and travel can be reduced resulting in a corresponding reduction in passenger vehicle emissions. SB 375 directed CARB to set regional targets to reduce emissions; regional plans are required to identify how they will meet these targets.

Attorney General's Addressing Climate Change at the Project Level

In January 2010, the California Attorney General's Office published a document called "Addressing Climate Change at the Project Level." This document contains a list of example measures addressing energy efficiency, renewable energy and energy storage, water conservation and efficiency, solid waste measures, land use measures, transportation and motor vehicles, and agriculture and forestry. Measures can be included as design features of a project, required as changes to the project, or imposed as mitigation.[23]

Governor's Office of Planning and Research Technical Advisory

On June 19, 2008, the Governor's Office of Planning and Research issued a Technical Advisory on addressing climate change impacts of a proposed project under CEQA (OPR Climate Change Advisory). The OPR Climate Change Advisory recommends that lead agencies quantify, determine the significance of, and (as needed) mitigate the cumulative climate change impacts of a proposed project. The OPR Climate Change Advisory identifies that each lead agency is required, under CEQA, to exercise its own discretion in choosing how to determine significance in the absence of adopted thresholds or significance guidelines from California, CARB, or the applicable local air district.

On January 20, 2016, the OPR issued a Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA.[24] Public Resources Code (PRC) Section 21099 directs OPR to recommend criteria for evaluating transportation impacts that promote the reduction of GHG emissions, the development of multimodal transportation networks, and a diversity of land uses. This advisory provides guidance on implementing SB 743. SB 743 changes the transportation impact analysis to focus on vehicle miles traveled instead of level of service when analyzing project level impacts.

[23] California Attorney General Office. January 2010. Addressing Climate Change at the Project Level. Available at: http://ag.ca.gov/globalwarming/pdf/GW_mitigation_measures.pdf.

[24] Office of Planning and Research. 20 January 2016. Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA. Available at: https://www.opr.ca.gov/docs/Revised_VMT_CEQA_Guidelines_Proposal_January_20_2016.pdf.

The 2017 Climate Change Scoping Plan Update[25]

The 2017 Climate Change Scoping Plan Update establishes a framework for California to reduce GHGs by 40 percent by 2030 compared to 1990 levels. Continuing the efforts made since 2006 under AB 32, the Plan focuses on programs including Cap-and-Trade Regulation, Low Carbon Fuel Standard, cleaner cars, trucks, and freight movement, renewable energy, and reducing methane emissions from agriculture and waste. While AB 32 justified the State's climate action until 2020, SB 32 extends those actions until 2030.

California Register of Historic Resources Program

Created in 1992 and implemented in 1998, the California Register of Historic Resources is a state government program to be used by state and local agencies, private groups, and citizens to identify the state's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change (PRC Section 5024.1(a)).[26] Certain properties, including those listed in, or formally determined eligible for listing in, the National Register of Historic Places and California Historical Landmarks numbered 770 and higher, are automatically included in the California Register. Other properties recognized under the California Points of Historical Interest program, identified as significant in historical resources surveys, or designated by local landmarks programs may be nominated for inclusion in the California Register. A resource, either an individual property or a contributor to a historic district, may be listed in the California Register if the State Historical Resources Commission determines that it meets one or more of the following criteria, which are modeled on National Register criteria (PRC Section 5024.1(c)):[27]

> **Criterion 1:** It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
>
> **Criterion 2:** It is associated with the lives of persons important in our past.
>
> **Criterion 3:** It embodies the distinctive characteristics of a type, period, region, or method of construction; represents the work of an important creative individual; or possesses high artistic values.
>
> **Criterion 4:** It has yielded, or may be likely to yield, information important in history or prehistory. Resources nominated to the CRHR must retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance.[28]

It is possible that a resource whose integrity does not satisfy National Register criteria may still be eligible for listing in the California Register. A resource that has lost its historic character or appearance may still have sufficient integrity for the California Register if, under Criterion 4, it

[25] California Air Resources Board. 20 January 2017. The 2017 Climate Change Scoping Plan Update. Available at: https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf.

[26] California Public Resources Code, Section 5024.1.

[27] California Public Resources Code, Section 5024.1.

[28] Office of Historic Preservation. 14 March 2006. Technical Assistance Bulletin 6: California Register and National Register, A Comparison (for Purposes of Determining Eligibility for the California Register). Available at: http://www.ohp.parks.ca.gov.

maintains the potential to yield significant scientific or historical information or specific data.[29] Resources that have achieved significance within the past 50 years may be also eligible for inclusion in the CRHR provided that enough time has lapsed to obtain a scholarly perspective on the events or individuals associated with the resource.[30]

Public Resources Code Section 5097.5

PRC Section 5097.5 defines a misdemeanor as the unauthorized disturbance or removal of archaeological, historic, or paleontological resources located on public lands. It prohibits "knowing and willful" excavation, removal, destruction, injury, and defacement of any paleontologic feature on public lands (lands under state, county, city, district, or public authority jurisdiction, or the jurisdiction of a public corporation), except where the agency with jurisdiction has granted express permission.

Native American Heritage Act

The Native American Heritage Act of 1976 established the Native American Heritage Commission and protects Native American religious values on state property (PRC Section 5097.9). Duties of the Commission include the inventory of places of religious or social significance to Native Americans and the identification of known graves and cemeteries of Native Americans on private lands. PRC Section 5097.98 specifies a protocol to be followed when the Commission receives notification of a discovery of Native American human remains from a county coroner.

Native American Graves Protection and Repatriation Act

Health and Safety Code Section 8010-8011 establishes a state repatriation policy intent that is consistent with and facilitates implementation of the federal Native American Graves Protection and Repatriation Act. The Act strives to ensure that all California Indian human remains and cultural items are treated with dignity and respect. It encourages voluntary disclosure and return of remains and cultural items by publicly funded agencies and museums in California. It also states the intent for the state to provide mechanisms for aiding California Indian tribes, including non-federally recognized tribes, in filing repatriation claims and getting responses to those claims.

Government Code Sections 6254(r) and 6254.10

These sections of the California Public Records Act were enacted to protect archaeological sites from unauthorized excavation, looting, or vandalism. Section 6254(r) explicitly authorizes public agencies to withhold information from the public relating to "Native American graves, cemeteries, and sacred places maintained by the Native American Heritage Commission." Section 6254.10 specifically exempts from disclosure requests for "records that relate to archaeological site information and reports maintained by, or in the possession of, the California Department of Parks and Recreation, the State Historical Resources Commission, the State Lands Commission, the Native American Heritage Commission, another state agency, or a local agency, including the records that the agency obtains through a consultation process between a Native American tribe and a state or local agency."

[29] Office of Historic Preservation. 4 September 2002. Technical Assistance Series #3, California Register of Historical Resources: Questions and Answers. Available at: http://www.ohp.parks.ca.gov.

[30] Office of Historic Preservation. 14 March 2006. Technical Assistance Bulletin 6: California Register and National Register, A Comparison (for Purposes of Determining Eligibility for the California Register). Available at: http://www.ohp.parks.ca.gov.

Health and Safety Code, Sections 7050.5 and 7052

Health and Safety Code Section 7050.5 declares that, in the event of the discovery of human remains outside a dedicated cemetery, all ground disturbances must cease, and the county coroner must be notified. Section 7052 establishes a felony penalty for mutilating, disinterring, or otherwise disturbing human remains, except by relatives.

Penal Code, Section 622.5

Penal Code Section 622.5 provides misdemeanor penalties for injuring or destroying objects of historic or archaeological interest located on public or private lands but specifically excludes the landowner.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Act (California Code of Regulations [CCR] Section 3603(f)) provides policies and criteria to assist cities, counties, and State agencies in the development of structures for human occupancy across the trace of active faults. The Alquist-Priolo Act was intended to provide the citizens of the state with increased safety and to minimize the loss of life during and immediately following earthquakes by facilitating seismic retrofitting to strengthen buildings, including historical buildings, against ground shaking. The Alquist-Priolo Act requires that special geologic studies be conducted to locate and assess any active fault traces in and around known active fault areas prior to development of structures for human occupancy. The Alquist-Priolo Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. This act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 (PRC Chapter 7.8, Sections 2690–2699.6) addresses nonsurface fault rupture earthquake hazards, including liquefaction and seismically induced landslides. The purpose of the act is to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure; and other hazards caused by earthquakes. The program and actions mandated by the Seismic Hazards Mapping Act closely resemble those of the Alquist-Priolo Act.

California Building Code

The California Building Code has been codified in the 24 CCR Part 2, which is a portion of the California Building Standards Code. Title 24 is assigned to the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in Title 24 or they are not enforceable. Published by the International Conference of Building Officials, the UBC is a widely-adopted model building code in the United States. The California Building Code incorporates by reference the UBC with necessary California amendments. Approximately one-third of the text within the California Building Code has been tailored for California earthquake hazards.

Surface Mining and Reclamation Act of 1975

The Surface Mining and Reclamation Act (PRC 2710–2796) requires that the State Department of Mines and Geology Board map areas throughout the state that contain regionally significant mineral resources. Construction aggregate resources (sand and gravel) deposits were the first commodity selected for classification by the Board. Once mapped, the Mines and Geology Board is required to designate for future use those areas that contain aggregate deposits that are of prime importance in meeting the region's future need for construction-quality aggregates. The primary objective of the Act is for each jurisdiction to develop policies that would conserve important mineral resources, where feasible, that might otherwise be unavailable when needed. It requires that once policies are adopted, local agency land use decisions must be in accordance with its mineral resource management policies. These decisions must also balance the mineral value of the resource to the market region as a whole, not just their importance to the local jurisdiction.

Government Code Section 65302(d)

Government Code Section 65302(d) states that a conservation element of the general plan shall address minerals and other natural resources.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1967 (California Water Code, Section 13000 et seq.) requires the SWRCB and the nine RWQCBs to adopt water quality criteria to protect state waters. These criteria include the identification of beneficial uses, narrative and numerical water quality standards, and implementation procedures. The criteria for the project area are contained in the basin plans for the Central Coast, Central Valley, Colorado River, Lahontan, Los Angeles, and Santa Ana RWQCBs that have regulatory authority within the project area.

California Government Code Section 65300

California Government Code Section 65300 et seq. requires cities and counties to prepare and adopt a comprehensive, long-term general plan for the physical development of the county or the city. Section 65302 of this code requires cities and counties to include a variety of elements in their general plan, each of which must describe policies to guide development relative to the issue area characterized in the element. One of the required elements is the "noise element." Section 65302 requires this element to recognize noise guidelines established by the Office of Noise Control and to analyze the current and projected noise levels from a variety of sources (Government Code Section 65302(f)(1)). As comprehensive planning documents, the general plans recognize construction noise and noise between property boundaries as important planning issues; however, these general plans refer to their respective city or county municipal code noise ordinance as the relevant source for specific noise standards or limitations.

Hazardous Waste Control Law of 1972

The Hazardous Waste Control Act (California Health and Safety Code Sections 25100 et seq.) created the state hazardous waste management program. The Act is implemented by regulations contained in 26 CCR, Title 22, Division 4.5, which describe the following required aspects for the proper management of hazardous waste: identification and classification; generation and transportation; design and permitting of recycling, treatment, storage, and disposal facilities; treatment standards; operation of facilities and staff training; and closure of facilities and liability requirements. These

regulations list more than 800 materials that may be hazardous and establish criteria for identifying, packaging, and disposing of such waste. Under the Hazardous Waste Control Act and Title 26, the generator of hazardous waste must complete a manifest that accompanies the waste from generator to transporter to the ultimate disposal location. Copies of the manifest must be filed with the California Department of Toxic Substances Control.

Hazardous Materials Release Response Plans and Inventory Law of 1985

The Hazardous Materials Release Response Plans and Inventory Law of 1985 (Business Plan Act; Health and Safety Code Division 20, Chapter 6.95, 25500–25547.8) governs hazardous materials handling, reporting requirements, and local agency surveillance programs.

California Disaster Assistance Act

The California Disaster Assistance Act (CCR Title 19, Chapter 6) authorizes the Director of the California Governor's Office of Emergency Services to administer a disaster assistance program that provides financial assistance from the state for costs incurred by local governments as a result of a disaster event. Funding for the repair, restoration, or replacement of public real property damaged or destroyed by a disaster is made available when the Director concurs with a local emergency proclamation requesting state disaster assistance.

Hazardous Substances Account Act (State Superfund)

Chapter 6.8 of the Health and Safety Code requires the Department of Toxic Substances Control to include "the largest manageable number" of potentially responsible parties in any cleanup order that applies to a multiple potentially responsible parties site after considering certain factors, including the adequacy of the evidence of each party's liability, the financial viability of each party, and the degree to which each party contributed to the release of hazardous substances at the site.

California Vehicle Code

The California Vehicle Code (13 CCR) establishes regulations for motor carrier transport of hazardous materials. For example, all motor carrier transporters of hazardous materials are required to have a Hazardous Materials Transportation license issued by the California Highway Patrol. In addition, placards identifying that hazardous materials are being transported must be displayed on the vehicle.

California Health and Safety Code

The transport of hazardous waste materials is further governed by Health and Safety Code Section 25163 and 22 CCR Chapter 13. Specifically, Section 25163 of the Health and Safety Code requires transporters of hazardous waste to hold a valid registration issued by the Department of Toxic Substances Control in his or her possession while transporting hazardous waste. Additionally, 22 CCR Chapter 13 includes a number of requirements, which include, but are not limited to, the following:

- Transporters shall not transport hazardous waste without first receiving an identification number and a registration certificate from the Department of Toxic Substances Control.
- Registration as a hazardous waste transporter expires annually, on the last day of the month in which the registration was issued.

- To be registered as a hazardous waste transporter, an application must be submitted.
- Hazardous waste shall not be accepted for transport without a Uniform Hazardous Waste Manifest that has been properly completed and signed by generator and transporter.
- Hazardous waste shall be delivered to authorized facilities only.

California Emergency Services Act (AB 38)

AB 38 gave the California Emergency Management Agency responsibility for overseeing and coordinating emergency preparedness, response, recovery, and homeland security activities in the state. The California Governor's Office of Emergency Services' mission statement is "Protect lives and property, build capabilities, and support our communities for a resilient California."

2013 State Hazard Mitigation Plan

Approved by FEMA on September 30, 2013, as an Enhanced State Mitigation Plan, the 2013 State Hazard Mitigation Plan update continues to build upon California's commitment to reduce or eliminate the impacts of disasters caused by natural, technological, accidental, and adversarial/human-caused hazards, and further identifies and documents progress made in hazard mitigation efforts, new or revised state and federal statutes and regulations, and emerging hazard conditions and risks that affect the State. Resilience depends on the whole community and is a shared responsibility for all levels of government, private and nonprofit sectors, and individuals.

Hazardous Materials Release Cleanup (AB 440 Chapter 588)

AB 440 Chapter 588, passed into law in 2013, authorizes a local agency to take clean up action similar to that under the Polanco Redevelopment Act that the local agency determines is necessary, consistent with other state and federal laws, to remedy or remove a release of hazardous substances within the boundaries of the local agency. AB 440 allows the local agency to designate another agency, in lieu of the department or the regional board, to review and approve a cleanup plan and to oversee the cleanup of hazardous material from a hazardous material release site, under certain conditions. It also provides immunity to the local agency as long as the action is in accordance with a cleanup plan prepared by a qualified independent contractor, and approved by the department, a regional board, or the designated agency, and the cleanup is undertaken and properly completed. Finally, AB 440 authorizes the local agency to recover cleanup costs from the responsible party.

Unified Hazardous Waste and Hazardous Materials Management Regulatory Program

The Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program) required the administrative consolidation of six hazardous materials and waste programs (Program Elements) under one agency, a Certified Unified Program Agency (CUPA). The Program Elements consolidated under the Unified Program are: Hazardous Waste Generator and On-Site Hazardous Waste Treatment Programs (aka Tiered Permitting); Aboveground Petroleum Storage Tank Spill Prevention Control and Countermeasure Plan; Hazardous Materials Release Response Plans and Inventory Program (aka Hazardous Materials Disclosure or "Community-Right-to-Know"); California Accidental Release Prevention Program; Underground Storage Tank Program; and Uniform Fire Code Plans and Inventory Requirements. The Unified Program is intended to provide relief to businesses complying with the overlapping and sometimes conflicting requirements of formerly independently managed programs. The Unified Program is implemented at the local government level by CUPAs. Most CUPAs have been established as a function of a local

environmental health or fire department. Some CUPAs have contractual agreements with another local agency, a participating agency, which implements one or more Program Elements in coordination with the CUPA.

California Accidental Release Prevention Program

The California Accidental Release Prevention Program was implemented on January 1, 1997, and replaced the California Risk Management and Prevention Program. The Program encompasses both the federal "Risk Management Program," established in 40 CFR Part 68, and the State of California program, in accordance with 19 CCR Division 2, Chapter 4.5.

The main objective of the Program is to prevent accidental releases of those substances determined to potentially pose the greatest risk of immediate harm to the public and the environment, and to minimize the consequences if releases do occur. These substances are called regulated substances and include both flammable and toxic hazardous materials listed on the Federal Regulated Substances for Accidental Release Prevention and on the State of California Regulated Substances lists. Businesses that handle regulated substances in industrial processes above threshold quantity levels are subject to Program requirements.

The Program requires businesses to have planning activities that are intended to minimize the possibility of an accidental release by encouraging engineering and administrative controls. It is further intended to mitigate the consequences of an accidental release, by requiring owners or operators of facilities to develop and implement an accident prevention program.

California Occupational Safety and Health Administration

The California OSHA is the primary agency responsible for worker safety in the handling and use of chemicals in the workplace. California OSHA standards are generally more stringent than federal regulations. The employer is required to monitor worker exposure to listed hazardous substances and notify workers of exposure (8 CCR 337–340). The regulations specify requirements for employee training, availability of safety equipment, accident prevention programs, and hazardous substance exposure warnings.

Cal/EPA oversees the program, and certifies 83 local government agencies, including 37 in the CRCP Plan Area. Local agencies administering one or more of the six program elements have the option to either apply for CUPA status within the CalEPA or retain their programs by becoming a participating agency under another CUPA's jurisdiction. Some examples of the agencies that are participating under the CUPA are fire departments, environmental and health branches, and departments of toxic substances controls within city and municipal governments.

California Fire Code

The California Fire Code is contained in 24 CCR Part 9. Based on the International Fire Code, the California Fire Code is created by the California Buildings Standards Commission and regulates the use, handling, and storage requirements for hazardous materials at fixed facilities. Similar to the International Fire Code, the California Fire Code and the California Building Code use a hazards classification system to determine the appropriate measures to incorporate to protect life and property.

14 CCR Sections 1250–1258, Fire Prevention Standards for Electric Utilities, provide specific exemptions from electric pole and tower firebreak and electric conductor clearance standards, and specify when and where standards apply. Section 1254 of Title 14 presents guidelines for minimum clearance requirements around utility poles.

California Public Utilities Commission General Order 95: Rules for Overhead Transmission Lines

CPUC General Order 95, adopted in 1941 and updated in January 2015, is the key standard governing the design, construction, operation, and maintenance of overhead electric lines in the state. The purpose of these rules is to formulate, for the State of California, requirements for overhead line design, construction, and maintenance, the application of which will ensure adequate service and secure safety to persons engaged in the construction, maintenance, operation or use of overhead lines and to the public in general. Overhead 12-kilovolt lines are utilized at storage fields such as Aliso Canyon. The rules include safety standards for overhead electric lines, including minimum distances for conductor spacing and minimum conductor ground clearance, standards for calculating maximum sag, electric line inspection requirements, and vegetation clearance requirements.

Rule 31.2, Inspection of Lines, requires that lines be inspected frequently and thoroughly to ensure they are in good condition, and that lines temporarily out of service be inspected and maintained as not to create a hazard.

Rule 35 of General Order 95, Tree Trimming, defines minimum vegetation clearance around power lines. Rule 35 guidelines, at the time of trimming, require the following:

- Four-foot radial clearances for any conductor of a line operating at 2,400 volts or more, but less than 72,000 volts
- Six-foot radial clearances for any conductor of a line operating at 72,000 volts or more, but less than 110,000 volts
- Ten-foot radial clearances for any conductor of a line operating at 110,000 volts or more, but less than 300,000 volts
- Fifteen-foot radial clearances for any conductor of a line operating at 300,000 volts or more

Under California Public Utilities Code, Section 1708.5, interested persons are permitted to petition the CPUC to adopt, amend, or repeal a regulation.

Public Resources Code Section 4291

PRC Section 4291 requires a reduction of fire hazards around buildings, requiring 100 feet of vegetation management around all buildings, and is the primary mechanism for conducting fire prevention activities on private property within the California Department of Forestry and Fire Prevention (CAL FIRE) jurisdiction.

Public Resources Code Section 4292

PRC Section 4292 states that a minimum firebreak of 10 feet in all directions from the outer circumference of such pole or tower be established around any pole that supports a switch, transformer, lightning arrester, line junction, or end or corner pole. All vegetation shall be cleared within the firebreak.

Public Resources Code Section 4293

PRC Section 4293 establishes the minimum vegetation clearance distances (between vegetation and energized conductors) required for overhead transmission line construction. Minimum clearances are discussed as follows:

- A minimum radial clearance of 4 feet shall be established for any conductor of a line operating at 2,400 or more volts but less than 72,000 volts.
- A minimum radial clearance of 6 feet shall be established for any conductor of a line operating at 72,000 or more volts but less than 110,000 volts.
- A minimum radial clearance of 10 feet shall be established for any conductor of a line operating at 110,000 or more volts but less than 300,000 volts.
- A minimum radial clearance of 15 feet shall be established for any conductor of a line operating at 300,000 or more volts.

Fire Hazard Severity Zones

CAL FIRE mapped Fire Hazard Severity Zones in the counties based on fuel loading, slope, fire weather, and other relevant factors as directed by PRC Sections 4201–4204, and Government Code Sections 51175–51189. Fire Hazard Severity Zones are ranked from moderate to very high and are categorized for fire protection within a Federal Responsibility Area, State Responsibility Area, or Local Responsibility Area under the jurisdiction of a federal agency, CAL FIRE, or local agency.

California Strategic Fire Plan

The 2010 Strategic Fire Plan for California is the statewide plan for adaptive management of wildfire as a cooperative effort between the State Board of Forestry and Fire Protection and CAL FIRE. The central goals that are critical to reducing and preventing the impacts of fire revolve around both suppression and fire prevention efforts. The key goals include the following:

1. Improved availability and use of information on hazard and risk assessment
2. Land use planning, including general plans, new development, and existing developments
3. Shared vision among communities and the multiple fire protection jurisdictions, including county-based plans and community-based plans such as Community Wildfire Protection Plans
4. Establishing fire resistance in assets at risk, such as homes and neighborhoods
5. Shared vision among multiple fire protection jurisdictions and agencies
6. Levels of fire suppression and related services
7. Post-fire recovery

While the plan puts emphasis on pre-fire adaptive management of risk, including measures such as fuel breaks, defensible space, and other fuel reduction strategies, it does not contain any specific requirements or regulations but rather acts as an assessment of current fire management practices and standards and makes recommendations on how best to improve the practices and standards in place.

California Code of Regulations Title 14, Sections 1252, 1253, and 1254

Regulations in 14 CCR Sections 1252 and 1253 state that power line hazard reduction standards are applicable year-round. Power line reduction strategies include pole brush clearing, and CAL FIRE is responsible for inspecting local implementation of these strategies.

Regulations in 14 CCR Section 1254 state that the fire break minimum clearance requirements of PRC Section 4292 are applicable within an imaginary cylindroid space surrounding each pole or tower on which a switch, fuse, transformer, or lightning arrester is attached. The radius of the cylindroid is 10 feet measured horizontally from the outer circumference of the specified pole or tower; the height is equal to the distance from the intersection of the imaginary vertical exterior surface of the cylindroid with the ground to an intersection with a horizontal plane passing through the highest point at which a conductor is attached to such pole or tower. Flammable vegetation and materials located wholly or partially within the firebreak space shall be treated as follows:

- At ground level: Remove flammable materials, including but not limited to ground litter, duff, and dead or desiccated vegetation that will allow fire to spread.
- From zero to eight feet above ground level: Remove flammable trash, debris, or other materials, including grass, herbaceous, and brush vegetation. All limbs and foliage of living trees shall be removed up to a height of eight feet.
- From eight feet above ground level to the horizontal plane of the highest point of conductor attachment: Remove dead, diseased, or dying limbs and foliage from living, sound trees and remove any dead, diseased, or dying trees in their entirety.

California Coastal Act of 1976

The California Coastal Act of 1976 (PRC Division 20) created the California Coastal Commission, with the responsibility of granting development permits for coastal projects and for determining consistency between Federal and State coastal management programs. Section 30232 of the Coastal Act addresses hazardous materials spills and states that "protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur."

California Education Code

The California Education Code has a number of minimum standards to minimize the potential for hazardous emissions within one-quarter mile of a school site:

- The property line of the school site, even if it is operated pursuant to a joint use agreement, shall be sited at specified distances from the edge of respective power line easements:
  - 1,100 feet for 50-133 kilovolt line
  - 2,150 feet for 220-230 kilovolt line
  - 3,350 feet for 500-550 kilovolt line
- If the proposed site is within 1,500 feet of a railroad track easement, a safety study shall be done by a competent professional trained in assessing cargo manifests, frequency, speed, and schedule of railroad traffic, grade, curves, type and condition of track need for sound or safety barriers, need for pedestrian and vehicle safeguards at railroad crossings, presence of high pressure gas lines near the tracks that could

rupture in the event of a derailment, preparation of an evacuation plan. In addition to the analysis, possible and reasonable mitigation measures must be identified.

- The site shall not be located near an above-ground water or fuel storage tank or within 1,500 feet of the easement of an above ground or underground pipeline that can pose a safety hazard as determined by a risk analysis study, conducted by a competent professional, which may include certification from a local public utility commission.
- Existing or proposed zoning of the surrounding properties shall be compatible with schools in that it would not pose a potential health or safety risk to students or staff in accordance with Education Code Section 17213 and Government Code Section 65402 and available studies of traffic surrounding the site.
- The district is required to consider environmental factors of light, wind, noise, aesthetics, and air pollution in its site selection process.
- If the proposed site is on or within 2,000 feet of a significant disposal of hazardous waste, the school district shall contact the Department of Toxic Substance Control for a determination of whether the property should be considered a Hazardous Waste Property or Border Zone Property.

1.6.3 Local

Through Article VII, Paragraph 5 of the California Constitution, the state legislature vests the CPUC with exclusive jurisdiction over the siting and design of gas and electrical facilities. California Public Utilities Code Section 1007.5 and other California statutes and case law detail the nature and extent of this sole discretionary permitting authority. Because state law has preempted the field, SoCalGas is not subject to local land use planning or zoning requirements. While SoCalGas' utility related activities are solely regulated by CPUC and are thus not subject to local zoning ordinances, SoCalGas consults with local cities and counties to ensure that local concerns and issues are considered during the project planning process; construction and O&M activities are developed and implemented in such a way as to comply with existing local zoning ordinances, when feasible.

At the local level, air quality is managed through air quality management districts, which are primarily responsible for implementing non-discretionary duties, including overseeing stationary source emissions, approving air quality permits, maintaining emission inventories, maintaining air quality monitoring stations, overseeing agricultural burn permits, and reviewing the air quality sections of CEQA documents. In 1988, the California Clean Air Act substantially added to the authority and responsibilities of local air quality management districts by designating local air districts as the lead agencies for air quality planning, required air districts to prepare air quality plans, granting authority to regulate indirect sources of air pollution and implement transportation control measures, and delegating authority to prepare State Implementation Plans. Six air districts (the San Luis Obispo County Air Pollution Control District, Santa Barbara County Air Pollution Control District, Ventura County Air Quality Management District, South Coast Air Quality Management District, Antelope Valley Air Quality Management District, and Mojave Desert Air Quality Management District) are responsible for enforcing air quality standards within the CRCP Plan Area.

Metropolitan planning organizations have developed Regional Transportation Plans/Sustainable Community Strategies (RTP/SCS) that are updated every four years to provide a vision for transportation investments throughout the region to qualify for federal and state funding and comply with SB 375 requirements to reduce greenhouse gas emissions from automobiles and light trucks through integrated transportation, land use, housing and environmental planning. Additionally, counties and cities also address air quality hazards by implementing land use, planning, and

development standards through mechanisms such as general plan policies, zoning ordinance standards, and development criteria. Projects that are consistent with the local General Plans are consistent with the air quality related regional plans.

Regional Transportation Plans/Sustainability Communities Strategies

RTP/SCSs are documents required by California SB 375 to provide a long-term vision for regional transportation investments, integrated with land use strategies. RTP strategies are shaped by the plan's vision, goals, guiding policies, performance measures, and regional changes since the adoption of the previous RTP. The SCS is a component of the RTP to demonstrate how the region will integrate transportation, housing, and land use planning to meet the GHG reduction targets set by the state.

San Luis Obispo Council of Governments

The Sal Luis Obispo Council of Governments' 2014 RTP/SCS is the region's blueprint for a transportation system that enhances quality of life and meets future mobility needs.[31] Major set goals include sustainability, efficiency, livability, and environmental protection. This RTP proposes to reduce dependence on automobile use by sustaining a more efficient local and regional land use development that enables more walking, biking, and transit use to meet congestion reduction goals and support health and obesity prevention objectives.

Santa Barbara County Association of Governments

The Santa Barbara County Association of Governments' Fast Forward 2040 was adopted on August 17, 2017. The objective for the environmental goal is to foster patterns of growth, development and transportation that protect natural resources and lead to a healthy environment. Including the SCS, other environmental objectives include encouraging affordable, workforce housing, and mixed-use development within urban boundaries; and promoting transit use and alternative transportation. It also aims to reduce vehicle miles traveled and preserve open space and agricultural land.[32]

Southern California Association of Governments

The Southern California Association of Governments' 2016-2040 SCAG RTP/SCS lays the framework for sustainable development within the region. Goals set forth include location efficiency, environmental quality, and transportation system sustainability. The plan serves to reduce greenhouse gas emission levels, improving regional air quality, and reducing overall vehicle miles traveled. The plan seeks to minimize transportation-related impacts on wildlife and better integrate transportation infrastructure into the environment with mitigation strategies.[33]

County General Plans and Ordinances

Local governments are required to prepare County General Plans as a guide for future development per requirements of state planning and zoning law (Government Code Sections 65000 et seq.).

[31] San Luis Obispo Council of Governments. 2014. San Luis Obispo 2015 Regional Transportation Plan.

[32] Santa Barbara County Association of Governments. August 2017. Fast Forward 2040, SBCAG Regional Transportation plan and Sustainable Communities Strategy.

[33] Southern California Association of Governments. April 2016. The 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy.

General plans contain goals, objectives, and policies concerning topics mandated by state law or that the jurisdiction has chosen to include. The CRCP Plan Area encompasses all or portions of five counties: Los Angeles, San Luis Obispo, San Bernardino, Santa Barbara, and Ventura. The five counties must take into consideration the individual general plans developed by the individual cities in the region.[34] Each city's respective general plans and policies contained therein influence the goals and policies of the county plans and thus influence regional planning goals, policies, and standards. While O&M activities are not subject to these plans, they have been considered to demonstrate compatibility with goals and policies related to the protection of biological resources. Rather than specifically addressing all general plans, the regulatory framework captures general plan goals and policies from the five counties as a general characterization of the CRCP Plan Area.

County of San Luis Obispo

Title 22 of the San Luis Obispo County Code – Land Use Ordinance. The San Luis Obispo County Inland Land Use Ordinance was established and adopted to protect and promote the public health, safety and welfare, and specifically:

A. To implement the General Plan and to guide and manage the future growth of the county in compliance with the General Plan;
B. To regulate land use in a manner that will encourage and support the orderly development and beneficial use of lands within the county;
C. To minimize adverse effects on the public resulting from the inappropriate creation, location, use or design of building sites, buildings, land uses, parking areas, or other forms of land development by providing appropriate standards for development;
D. To protect and enhance the significant natural, historic, archaeological and scenic resources within the county as identified by the county General Plan; and
E. To assist the public in identifying and understanding regulations affecting the development and use of land.

This ordinance addresses instances where biological resources or biological habitat may be impacted by potential development projects within the inland areas San Luis Obispo County.[35]

Title 22, Section 22.58 of the San Luis Obispo County Code – Oak Woodland Ordinance. On April 11, 2017, the Board of Supervisors adopted an ordinance to amend Title 22 of the Land Use Ordinance, establishing Chapter 22.58 (Oak Woodland Ordinance) and amending Section 22.06.020 and Table 2-2 to regulate the clear-cutting of oak woodlands. The ordinance took effect May 11, 2017.[36] The County of San Luis Obispo Oak Woodland Ordinance establishes criteria to limit the clear-cutting of oak woodland. The intent of this ordinance is to maintain the character of the existing landscape and promote oak woodland management independent of regulation.[37]

[34] California Department of Forestry and Fire Prevention. 2017. CalFire FRAP GIS Data, Incorporated Cities, 2017. Available at: http://frap.fire.ca.gov/data/frapgisdata-sw-incorporated_download.

[35] County of San Luis Obispo Planning and Building. 2017. County of San Luis Obispo Lan Use Ordinance, Title 22 of the County Code. Available at: http://www.slocounty.ca.gov/getattachment/6d93f812-df15-4203-b033-7d802c5c9cf0/Inland-Land-Use-Ordinance-(Title-22).aspx.

[36] County of San Luis Obispo Planning and Building. 2017. Oak Woodland Ordinance. Available at: https://www.slocounty.ca.gov/Departments/Planning-Building/Long-Range-Planning/Services/Oak-Woodland-Ordinance.aspx.

[37] County of San Luis Obispo. 2017. Ordinance No. 3346 (Oak Woodland Ordinance). Available at: https://www.slocounty.ca.gov/Departments/Clerk-Recorder/Forms-Documents/County-Code/County-Ordinances-Adopted-But-Not-Yet-Codified/Oak-Woodland-Ordinance.aspx.

Title 23 of the San Luis Obispo County Code – Coastal Zone Land Use Ordinance. The San Luis Obispo County Coastal Zone Land Use Ordinance was established and adopted to protect and promote the public health, safety and welfare, and specifically:

a. To implement the San Luis Obispo County General Plan and the San Luis Obispo County Local Coastal Program, and to guide and manage the future growth of the county in accordance with those plans;
b. To regulate land use in a manner that will encourage and support the orderly development and beneficial use of lands within the county;
c. To minimize adverse effects on the public resulting from the inappropriate creation, location, use or design of building sites, buildings, land uses, parking areas, or other forms of land development by providing appropriate standards for development;
d. To protect and enhance the significant natural, historic, archeological and scenic resources within the county as identified by the county general plan; and
e. To assist the public in identifying and understanding regulations affecting the development and use of land.

This ordinance specifies that a biological report would need to be completed as part of an environmental impact report for minor use permits for potential projects located in the coastal zone of San Luis Obispo County. This ordinance also has sections which address issues regarding Environmentally Sensitive Habitats (23.07.170), Wetlands (23.07.172), and Terrestrial Habitat Protection (23.07.176) within the coastal zone of San Luis Obispo County.[38]

Historic Preservation Ordinances, San Luis Obispo Municipal Code 14.1. Discusses the CHC, its duties and describes procedures, historic listing criteria and procedures for demolition and relocation of historic structures, and economic hardship provisions.

Archaeological Resources Preservation Program Guidelines. Establishes procedures to be used for the protection of sub-surface cultural resources, both historic and pre-historic features.

San Luis Obispo County General Plan

The Noise Element of the San Luis Obispo County General Plan provides a policy framework for addressing potential and existing noise impacts during project review and long-range planning. Its purpose is to minimize future and existing noise conflicts. Among the most significant polices found in the Noise Element are numerical noise standards that limit noise exposure within noise-sensitive land uses (i.e., residential, offices, outdoor recreation) resulting from stationary and transportation noise sources.[39] Generally daytime maximum noise is limited to 70 dBA and nighttime maximum noise is limited to 65 dBA (Table 4.12-1).

[38] County of San Luis Obispo Planning and Building. 2009. County of San Luis Obispo Coastal Zone Land Use Ordinance Title 23 of the San Luis Obispo County Code. Available at: http://www.slocounty.ca.gov/getattachment/06db8004-8227-4723-b066-377e1c86ca55/Coastal-Land-Use-Ordinance-(Title-23).aspx.

[39] County of San Luis Obispo. N.d. San Luis Obispo County General Plan, Noise Element. Available at: http://www.slocounty.ca.gov/getattachment/16c8da3e-c51b-4134-8cff-0ed21a577d2e/Noise-Element.aspx. Accessed 11 February 2018.

The County of San Luis Obispo General Plan[40] includes a Conservation and Open Space Element, which was adopted by the San Luis Obispo County Board of Supervisors on May 11, 2010. This element lists the following six goals for water resources for the County: (1) a reliable and secure regional water supply; (2) collaboratively manage groundwater resources to ensure sustainable supplies for all beneficial uses; (3) excellent water quality will be maintained for the health of people and natural communities; (4) per capita potable water use in the county will decline by 20 percent by 2020; (5) the best possible tools and methods available will be used to manage water resources; and (6) damage to life, structures, and natural resources from flooding will be avoided.[41]

The San Luis Obispo County General Plan Conservation and Open Space Element Energy section contains procedures for dealing with toxic and hazardous releases. Additionally, there are procedures for dealing with hazards associated with transmission lines.

The County of San Luis Obispo General Plan includes requirements for the identification and treatment of cultural resources:

County of Santa Barbara

Santa Barbara County Comprehensive Plan. Projects within Santa Barbara County are subject to plans and policies intended to protect biological resources contained in elements of the Santa Barbara County Comprehensive Plan, including the Conservation Element, Land Use Element, and Coastal Land Use Plan. These documents identify sensitive habitats and species, and provide measures to direct project design and policies to protect biological resources.

Conservation Element. Santa Barbara County's natural and cultural resources are the subject of the Conservation Element. This element is required by State Planning Law as part of the Comprehensive Plan, "for the conservation, development, and utilization of natural resources including water and its hydraulic force, forests, soils, and rivers and other waters, harbors, fisheries, wildlife, minerals, and other natural resources" (Government Code, Section 65302 (d)). Furthermore, the Conservation Element identifies "species and ecological communities of particular value." Species and ecological communities of particular value in the Conservation Element are considered to be locally important. Ecological communities of greatest interest listed in the Conservation Element include high montane coniferous forest (mixed coniferous forest); mixed evergreen forest; closed cone pine forest; Douglas fir forest; southern oak woodland; coastal dune and strand; coastal salt marsh; coastal bluff; native grassland; interior cypress forest; canyon oak – big cone spruce; Coulter pine forest; rare freshwater habitats; and rare freshwater habitats.

The Santa Barbara County Comprehensive Plan[42] has a conservation element that was adopted in 1979 and amended in August 2010. This element has a section on water resources and the County has determined that the County and cities' decisions on land use and development projects should be based on the following water resources policies:

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[40] County of San Luis Obispo. N.d. County of San Luis Obispo General Plan. Available at: http://www.slocounty.ca.gov/Departments/Planning-Building/Forms-Documents/Plans/General-Plan.aspx.

[41] County of San Luis Obispo. N.d. County of San Luis Obispo General Plan, Conservation and Open Space Element. Available at: http://www.slocounty.ca.gov/getattachment/ba01754b-50ac-4c13-ba16-1a9eb9d56a01/Conservation-and-Open-Space-Element.aspx.

[42] County of Santa Barbara. August 2010. Santa Barbara County Comprehensive Plan. Available at: http://longrange.sbcountyplanning.org/general_plan.php.

- The County and the cities should support the RWQCB in its establishment of discharge requirements for point source waste discharges, in order to protect surface and groundwater supplies.
- Use of streams from which groundwater recharge takes place should be regulated to ensure that the recharge capability of the channels is not impaired.
- Land use and development upstream from surface reservoirs should be regulated and monitored by the County Department of Public Works and the County Planning Department to order to minimize the production of water polluting wastes.
- The County should initiate a study of land development in areas relying on septic tanks to assess the impact of alternate densities on water quality.
- On the basis of the adopted Water Quality Control Plan for the Central Coastal Region, the County and cities should review their policies for protection of local water resources to determine what changes may be necessary."[43]

Oak Tree Protection in the Inland Rural Areas of Santa Barbara County: Supplement to the Mapped Areas and Communities Section of the Conservation Element. This section of the County Comprehensive Plan Conservation Element provides for the protection of native oak trees in the inland rural areas of Santa Barbara County, such as where the Project is located. Oak species discussed in this section include coast live oak (*Quercus agrifolia*), valley oak (*Q. lobata*), blue oak (*Q. douglasii*), canyon live oak (*Q. chrysolepis*), black oak (*Q. kelloggii*), and interior live oak (*Q. wislizenii*).

Development Standard 1 for protection of all species of mature oak trees (other than valley oaks) states:

> All development shall avoid removal of or damage to mature oak trees, to the maximum extent feasible. Mature oak trees are considered to be live oak trees six inches or greater diameter at breast height and blue oak trees four inches or greater diameter at breast height, or live and blue oaks six feet or greater in height. Native oak trees that cannot be avoided shall be replanted on site. When replanting oak trees on site is not feasible, replanting shall occur on receiver sites known to be capable of supporting the particular oak tree species, and in areas contiguous with existing woodlands or savannas where the removed species occurs. Replanting shall conform to the County's Standard Conditions and Mitigation Measures.

Land Use Element. The purpose of the Land Use Element is to interrelate all of the different factors that affect population growth, urban development and open land preservation and to represent the county's policy on land use.

The Hillside and Water Protection Policies state:

> All developments shall be designed to fit the site topography, soils, geology, hydrology, and any other existing conditions and be oriented so that grading and other site preparation is kept to an absolute minimum. Natural features, landforms, and native vegetation, such as trees, shall be preserved to the maximum extent feasible. Areas of the site which are not suited to development because of known soil, geologic, flood, erosion or other hazards shall remain in open space.

[43] County of Santa Barbara. August 2010. Santa Barbara County Comprehensive Plan. Conservation Element. Available at: http://longrange.sbcountyplanning.org/programs/genplanreformat/PDFdocs/Conservation.pdf.

> Temporary vegetation, seeding, mulching, or other suitable stabilization method shall be used to protect soils subject to erosion that have been disturbed during grading or development. All cut and fill slopes shall be stabilized as rapidly as possible with planting of native grasses and shrubs, appropriate non-native plants, or with accepted landscaping practices.
>
> Degradation of the water quality of groundwater basins, nearby streams, or wetlands shall not result from development of the site. Pollutants, such as chemicals, fuels, lubricants, raw sewage, and other harmful waste, shall not be discharged into or alongside coastal streams or wetlands either during or after construction.

Streams and Creeks Policies state:

> All permitted construction and grading within stream corridors shall be carried out in such a manner as to minimize impacts from increased runoff, sedimentation, biochemical degradation, or thermal pollution.

Coastal Land Use Plan. The County Coastal Land Use Plan is the Santa Barbara County Local Coastal Program, a local implementation of the California Coastal Act. The Coastal Land Use Plan establishes land uses within the coastal zone and includes numerous policies applicable to development projects. Pursuant to the Coastal Land Use Plan, the State Coastal Commission exercises permit jurisdiction over development projects within the California Coastal Zone. Other elements of the County's Comprehensive Plan are applicable within the Coastal Zone; however, where conflicts exist, the Coastal Land Use Plan takes precedence. A portion of the CRCP Plan Area is located within the Coastal Zone.

The Coastal Land Use Plan designates Environmentally Sensitive Habitat Areas (ESHAs) within the County's Coastal Zone, which are defined by Section 30107.5 of the Coastal Act as "any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments." The proposed project does not fall within any mapped ESHA. However, according to Section 3.9.4 of the Coastal Land Use Plan, native plant communities are considered a county-wide ESHA that "are not designated on the land use maps because they occur in so many areas," and as such, "the policies will have to be applied on a case-by-case basis as projects are reviewed." Native plant communities include coastal sage scrub, chaparral, California native oak woodland and individual oak trees, and endangered, rare, or endemic plant species.

On oak trees in particular, Policy 9-35 of the Coastal Land Use Plan states:

> Oak trees, because they are particularly sensitive to environmental conditions, shall be protected. All land use activities, including cultivated agriculture and grazing, should be carried out in such a manner as to avoid damage to native oak trees. Regeneration of oak trees on grazing lands should be encouraged.

In addition, Policy 9-36 states:

> When sites are graded or developed, areas with significant amounts of native vegetation shall be preserved. All development shall be sited, designed, and constructed to minimize impacts of grading, paving, construction of roads or structures, runoff, and erosion on native

vegetation. In particular, grading and paving shall not adversely affect root zone aeration and stability of native trees.

Santa Barbara County Deciduous Oak Tree Protection and Regeneration Ordinance. The County of Santa Barbara Deciduous Oak Tree Protection and Regeneration Ordinance (Article IX of Chapter 35 of Santa Barbara County Code) regulates the removal of deciduous oak trees (valley oaks and blue oaks) in inland rural areas of the County.

Noise Element. The Noise Element of the County of Santa Barbara General Plan has adopted noise policies in its Comprehensive Plan Noise Element.[44] These policies establish both interior and exterior noise limits for noise compatibility, which are identified in the County of Santa Barbara Environmental Thresholds and Guidelines Manual.[45] Generally daytime maximum noise is limited to 65 dBA (Table 4.12-1). The Noise Element of the City General Plan[46] specifies exterior and interior noise levels for noises sensitive land uses, such as residential uses, educational facilities, hospitals, hotels/motels, and commercial and other land uses.

Safety Element. The Safety Element of the Santa Barbara General Plan addresses several issues regarding hazards and hazardous material including hazards associated with hazardous material use, public safety risk resulting from aircraft operation, the use of local highways and rail lines for the transport of hazardous materials, natural gas pipelines, electrical transmission lines, and electromagnetic fields.

County of Santa Barbara Land Use Plan. The County of Santa Barbara Land Use Plan includes the following:

35.60.040. Land Use and Development Code, Archaeological Resources.[47] The Santa Barbara County Land Use and Development Code, published August 2011, provides standards for the management of archaeological resources during project planning.

Environmental Thresholds and Guidelines Manual (Section 8, Cultural Resources Guidelines, Archaeological, Historical, and Ethical Elements).[48] Santa Barbara County's Environmental Thresholds and Guidelines Manual discussed the general cultural resources review process guidelines to identify, evaluate and mitigate impacts to cultural resources, incorporating mandates specified in CEQA Guidelines Sections 15064.5 and 15126.4. It also includes significance criteria for evaluating historic architectural resources identified in the County Cultural Resources Guidelines.

[44] County of Santa Barbara. June 2015. Santa Barbara County General Plan, Energy Element. Available at: http://longrange.sbcountyplanning.org/programs/genplanreformat/PDFdocs/Energy.pdf. Accessed February 11, 2018.

[45] County of Santa Barbara Department of Planning and Development. July 2015. Environmental Thresholds and Guidelines Manual. Available at: http://www.countyofsb.org/plndev/permitting/environmentalreview.sbc.

[46] County of Santa Barbara Department of Planning and Development. June 2015. Santa Barbara County General Plan, Noise Element. Available at: https://www.santabarbaraca.gov/gov/plan.asp. Accessed 11 February 2018.

[47] Santa Barbara County Department of Planning and Development. December 2016. Zoning Ordinance Article II of Chapter 35, Zoning, of the County Code. Available at: www.sbcountyplanning.org.

[48] County of Santa Barbara Planning and Development. 2015. Environmental Thresholds and Guidelines Manual. Available at www.sbcounty.org.

Section 3.10.5 Historical Resources.[49] The County of Santa Barbara Comprehensive Plan (inclusive of all mandatory and optional Elements) contains policies which address historical and archeological sites.

Ventura County

Section 8107-025 of Ventura County Non-Coastal Zoning Ordinance – Tree Protection Regulations. In 1992, Ventura County adopted the Ventura County Tree Protection Ordinance. The ordinance applies to the pruning (beyond specified limits), removal, trenching, excavation, or other encroachment into the protected zone (five feet outside the canopy's edge and a minimum of 15 feet from the trunk) of protected trees in unincorporated areas (land outside of cities).

Protected trees include all oaks and sycamores 9.5 inches in circumference or larger (measured 4.5 feet above ground), trees of any species with a historical designation, trees of any species 90 inches in circumference or larger, and most 9.5-inch native trees in the Scenic Resources Protection Zone.

Before any protected tree is trimmed, removed, or encroached upon, property owners should contact the Planning Division to ensure these activities are conducted in compliance with the Tree Protection Ordinance. A permit is required for many of these activities.

Ventura County General Plan

The goal of the Noise Element of the Ventura County General Plan is to protect the health, safety and general welfare of County residents by elimination or avoidance of adverse noise impacts on existing and future noise sensitive uses.[50] Section 2.16.2 identifies the noise limits for the various noise sensitive uses. Section 7 of Ventura City General Plan covers safety, noise and land use.[51] Generally daytime maximum noise is limited to 55 dBA, evening noise is limited to 50 dBA, nighttime maximum noise levels are limited to 45 dBA or 3dBA above ambient noise levels, whichever is greater (Table 4.12-1).

The Safety Element of the Ventura County General Plan contains specific goals to minimize the risk of loss of life, injury, serious illness, damage to property, and economic and social dislocations resulting from the use, transport, treatment and disposal of hazardous materials and hazardous wastes. Additionally, specific goals are identified to locate potentially hazardous facilities and operations in areas that would not expose the public to a significant risk of injury, loss of life, or property damage. The plan identifies five policies and 13 programs related to the management of hazards and hazardous materials.

The Ventura County 2040 General Plan[52] is currently under revision. The Draft Background Report, Chapter 10, Water Resources, found that "adequate water supply is a current and ongoing concern in Ventura County due to climate change and drought, the related declines in river flows and reservoir levels, historic overdraft of several local groundwater basins, curtailment of groundwater

[49] County of Santa Barbara. August 1982. Comprehensive Plan. Land Use Element.

[50] County of Ventura. December 2016. Ventura County General Plan – Goals, Policies & Programs. Available at http://vcrma.org/planning/pdf/plans/Goals-Policies-and-Programs.pdf. Accessed 11 February 2018.

[51] County of Ventura. 2005. 2005 Ventura General Plan. Available at: https://www.cityofventura.ca.gov/DocumentCenter/View/1805. Accessed 11 February 2018.

[52] County of Ventura. December 2016. Ventura County 2040 General Plan. County of Ventura Resource Management Agency Planning Division. Available at: http://vcrma.org/planning/plans/general-plan/index.html.

supplies in southern Ventura County, new groundwater well prohibitions, and reduced deliveries of imported water. More than 850,000 residents and 156 square miles (995,802 acres) of irrigated farmland in Ventura County experienced direct impacts from the drought that began in 2012."

Section 1.8.1, Goals, Policies and Programs, of the County General Plan establishes guidelines for cultural resources in regard to inventories, maintenance, preservation, treatment, and community benefit.[53]

Los Angeles County

Local Coastal Programs. There are five coastal areas within the unincorporated County of Los Angeles, three of which have certified Local Coastal Programs: Marina del Ray, Santa Catalina Island, and the Santa Monica Mountains. The Programs regulate development and natural resource use within the Coastal Zone and are the basic planning tools to carry out the tandem responsibility of state and local governments for the California coast.

Los Angeles County Municipal Code Title 22, Sections 22.56.2050–2260 – Oak Tree Ordinance. The County Oak Tree Ordinance requires a permit prior to the cutting, removing, destroying, relocating, inflicting damage on, or encroaching into a protected zone of any tree within the oak genus. The oak tree permit is established (1) to recognize oak trees as significant historical, aesthetic and ecological resources, and as one of the most picturesque trees in Los Angeles County, lending beauty and charm to the natural and manmade landscape, enhancing the value of property, and the character of the communities in which they exist; and (2) to create favorable conditions for the preservation and propagation of this unique, threatened plant heritage, particularly those trees which may be classified as heritage oak trees, for the benefit of current and future residents of Los Angeles County.

Los Angeles County Municipal Code Title 22, Section 22.56.215 – Significant Ecological Areas Ordinance. Title 22, Section 22.56.215 of the Los Angeles County Municipal Code regulates development within Significant Ecological Areas (SEAs). SEAs are officially designated areas within Los Angeles County identified as having irreplaceable biological resources. These areas represent the wide-ranging biodiversity of the County and contain some of the County's most important biological resources. Each individual SEA was configured to support sustainable populations of it component species, and includes undisturbed to lightly disturbed habitat along with linkages and corridors that promote species movement. Conditional use permits are required prior to granting a building permit or grading permit within an SEA, subject to review by the Significant Ecological Areas Technical Advisory Committee (SEATAC) and a public hearing.

County of Los Angeles Historic Preservation Ordinance (Title 22 – Planning and Zoning of the Los Angeles County Code, Part 29 of Chapter 22.52.3010-3060). The County of Los Angeles Historic Preservation Ordinance establishes the basic purpose of preservation and the criteria for designation of Landmarks and Historic Districts.

[53] County of Ventura. 1995. County of Ventura General Plan. Available at: www.vcma.org.

Los Angeles County General Plan 2035

The Conservation and Natural Resources Element of the Los Angeles County General Plan 2035 has established two goals and 12 policies related to biological resources.[54]

Los Angeles County Noise goals and policies are set forth in the General Plan 2035, Chapter 11.[55] The Noise Control Ordinance of the County of Los Angeles (County Noise Ordinance Section 12.08.010, et seq., of the Los Angeles County Code) identifies exterior noise standards for any source of sound.[56] Generally daytime maximum noise is limited to 70 dBA and nighttime maximum noise levels are limited to 55 dBA (Table 4.12-1).

The Safety Element of the Los Angeles County General Plan 2035, in conjunction with the All-Hazard Mitigation Plan prepared by the Chief Executive Office, Office of Emergency Management, sets strategies for natural and man-made hazards in Los Angeles County. The All-Hazard Mitigation Plan, which has been approved by FEMA and Cal EMA, includes a compilation of known and projected hazards in Los Angeles County.

The County of Los Angeles General Plan[57] has a Water and Wastewater Element that was adopted in 1980. The objectives of this element are:

- To mitigate hazards and avoid adverse impacts in providing water and waste services and to protect the health and safety of all residents;
- To develop improved systems of resource use, recovery and reuse;
- To provide efficient water and waste management services; and
- To maintain the high quality of our coastal, surface, and ground waters.

San Bernardino County

San Bernardino County Development Code – Plant Protection and Management. Chapter 88.01 of the San Bernardino County Development Code provides regulations and guidelines for the management of plant resources in the unincorporated areas of the County on property or combinations of property under private or public ownership. The intent of the regulations is to promote and sustain the health, vigor, and productivity of plant life and aesthetic values within the County through appropriate management techniques. Section 88.01.060 provides regulations for the removal or harvesting of specified desert native plants in order to preserve and protect the plants and to provide for the conservation and wise use of desert resources. The following desert native plants or any part of them, except the fruit, shall not be removed except under a Tree or Plant Removal Permit in compliance with Section 88.01.050 (Tree or Plant Removal Permits):

[54] County of Los Angeles Department of Regional Planning. Adopted 6 October 2015. Los Angeles County General Plan. Chapter 9: Conservation and Natural Resources Element. Available at: planning.lacounty.gov/assets/upl/project/gp_final-general-plan-ch9.pdf.

[55] County of Los Angeles Department of Regional Planning. Adopted 6 October 2015. Los Angeles County General Plan. Chapter 11: Noise Element. Available at: http://planning.lacounty.gov/assets/upl/project/gp_2035_Chapter11_2014.pdf. Accessed 11 February 2018.

[56] County of Los Angeles. N.d. County Noise Ordinance Section 12.08.010, et seq. Available at: http://lacounty-ca.elaws.us/code/coor_title12_ch12.08. Accessed 11 February 2018.

[57] County of Los Angeles Department of Regional Planning. November 1980. County of Los Angeles General Plan.

1) The following desert native plants with stems two inches or greater in diameter or six feet or greater in height:
   a) *Dalea spinosa* (smoketree)
   b) All species of the genus *Prosopis* (mesquites)
2) All species of the family Agavaceae (century plants, nolinas, yuccas)
3) Creosote rings, 10 feet or greater in diameter
4) All Joshua trees
5) Any part of any of the following species, whether living or dead:
   a) *Olneya tesota* (desert ironwood)
   b) All species of the genus *Prosopis* (mesquites)
   c) All species of the genus *Parkinsonia* (palos verdes)

County Ordinance 3.3-4.[58] Establishes a program to preserve the information and heritage of value of cultural and historical resources.

San Bernardino County 2007 General Plan

San Bernardino County has specified goals and policies pertaining to noise in its General Plan, Section VII, Noise Element.[59] The noise limits are articulated in Chapter 83.01 of the Development Code, Sections 83.01.080, Noise, and 83.01.080, Vibration.[60] Generally daytime maximum noise is limited to 70 dBA and nighttime maximum noise levels are limited to 55 dBA (Table 4.12-1).

The Safety Element of the San Bernardino County General Plan contains implementation programs related to reduction of household hazardous waste.

The County of San Bernardino 2007 General Plan[61] has a Circulation and Infrastructure Element that includes water, wastewater and stormwater. The goals for these issues include the following:

> The County will coordinate and cooperate with governmental agencies at all levels to ensure safe, reliable, and high-quality water supply for all residents and ensure prevention of surface and groundwater pollution. (Goal CI 11.) The County will ensure adequate wastewater collection, treatment, and disposal consistent with the protection of public health and water quality. (Goal CI 12.) The County will minimize impacts to stormwater quality in a manner that contributes to improvement of water quality and enhances environmental quality. (Goal CI 13.) The County will protect and preserve water resources for the maintenance, enhancement, and restoration of environmental resources. (Goal CO 5.)

[58] County of San Bernardino. 2007. County of San Bernardino 2007 General Plan. County of San Bernardino Land Use Services Division. Available at: http://sbcounty.gov/Uploads/lus/GeneralPlan/FINALGP.pdf.

[59] County of San Bernardino. April 2007. San Bernardino County General Plan, Section V Conservation Element. Available at: http://www.sbcounty.gov/Uploads/lus/GeneralPlan/FINALGP.pdf. Accessed 1 September 2017.

[60] County of San Bernardino. N.d. Development Code, Sections 83.01.080, Noise, and 83.01.080, Vibration. Available at: http://www.sbcounty.gov/Uploads/lus/DevelopmentCode/DCWebsite.pdf. Accessed 11 February 2018.

[61] County of San Bernardino. 2007. County of San Bernardino 2007 General Plan. County of San Bernardino Land Use Services Division. Available at: http://sbcounty.gov/Uploads/lus/GeneralPlan/FINALGP.pdf.

Basin Plans

Water Quality Control Plans for Basins (Basin Plans) designate beneficial uses for water bodies in the various water regions and establish water quality objectives and implementation plans to protect those beneficial uses. The following describes the Basin Plan adopted by each of the RWQCBs with regulatory authority within the project area as it relates to the 2081 ITP. The potential consequences of the ITP are that some habitat restoration and revegetation may need to occur.

Central Coast RWQCB Basin Plan

The Central Coast RWQCB jurisdiction includes Santa Clara (south of Morgan Hill), San Mateo (southern portion), Santa Cruz, San Benito, Monterey, Kern (small portions), San Luis Obispo, Santa Barbara, and Ventura (northern portion) Counties.

The Central Coast Basin Plan identifies how the quality of the surface and groundwaters in the Central Coast Region should be managed to provide the highest water quality reasonably possible. This Basin Plan lists the various beneficial water uses, describes the water quality standard that must be maintained to allow those uses and then describes the actions that are necessary to achieve the standards. The RWQCB implements the Basin Plan by issuing and enforcing waste discharge requirements, NPDES permits, or waivers.[62]

Central Valley RWQCB Basin Plan[63]

The Central Valley Region includes about 40 percent of the land in California and stretches from the Oregon border to the Kern County/Los Angeles County line. The region is divided into three basins: the Sacramento River Basin, the San Joaquin River Basin, and the Tulare Lake Basin, with the Tulare Lake Basin located within CRCP Plan Area. The Tulare Lake Basin comprises the drainage area of the San Joaquin Valley south of the San Joaquin River. Urban development is generally confined to the foothill and eastern valley floor areas. Major concentrations of population occur in or near the metropolitan areas of Bakersfield, Fresno, Porterville, Hanford, Tulare, and Visalia. The Basin is one of the most important agricultural centers of the world. Surface water supplies tributary to or imported for use within the Basin are inadequate to support the present level of agricultural and other development. Therefore, groundwater resources within the valley are being mined to provide additional water to supply demands. Water produced in extraction of crude oil is used extensively to supplement agricultural irrigation supply in the Kern River sub-basin.

[62] California Regional Water Quality Control Board, Central Coast Region. September 2017. Water Quality Control Plan for the Central Coastal Basin Plan. Available at: https://www.waterboards.ca.gov/centralcoast/publications_forms/publications/basin_plan/docs2017/2017_basin_plan_r3_complete.pdf

[63] California Regional Water Quality Control Board, Central Valley Region. July 2016. Water Quality Control Plan for Tulare Lake Basin, Second Edition. Available at: https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/2016july_tlbp.pdf

Colorado River RWQCB Basin Plan

The Colorado River RWQCB jurisdiction includes Imperial, San Bernardino, Riverside, and San Diego Counties**.** The intent of the Basin Plan[64] is to provide definitive guidelines and give direction to the full scope of Regional Board activities that serve to optimize the beneficial uses of the State waters within the Colorado River Basin Region by preserving and protecting the quality of these waters. The Basin Plan lists and defines the various beneficial water uses and describes the water quality objectives that must be maintained to support such uses. The Colorado River RWQCB Basin Plan implements these objectives through the use of waste discharge requirements, NPDES permits, and waivers.

Lahontan RWQCB Basin Plan

The jurisdiction of the Lahontan RWQCB extends from the Oregon border to the northern Mojave Desert and includes all of California east of the Sierra Nevada crest, including San Bernardino County and northeastern Los Angeles County. [65]

This Basin Plan for the Lahontan Region sets forth water quality standards for the surface and groundwaters, that include both designated beneficial uses of water and the narrative and numerical objectives which must be maintained or attained to protect those uses. The Basin Plan lists and defines the various beneficial water uses and describes the water quality objectives that must be maintained to support such uses. The Lahontan RWQCB Basin Plan implements these objectives through the use of Waste Discharge Requirements, NPDES permits, and waivers.

Los Angeles RWQCB Basin Plan

The Los Angeles RWQCB jurisdiction includes the coastal watersheds of Los Angeles and Ventura Counties, along with very small portions of Kern and Santa Barbara Counties.[66] The Basin Plan assigns beneficial uses to surface and groundwater to all waters in the basin. It also sets water quality objectives, intended to protect designated beneficial uses. The Basin Plan lists and defines the various beneficial water uses and describes the water quality objectives that must be maintained to support such uses. The Los Angeles RWQCB Basin Plan implements these objectives through the use of Waste Discharge Requirements, NPDES permits, and waivers.

Santa Ana RWQCB Basin Plan

The Santa Ana RWQCB jurisdiction includes Orange, Riverside, and San Bernardino Counties.[67] Their Basin Plan establishes water quality standards for the ground and surface waters of the region. The term "water quality standards," as used in the CWA, includes both the beneficial uses of specific

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[64] California Regional Water Quality Control Board, Colorado River Region. August 2017. Water Quality Control Plan Colorado River Basin – Region 7. Available at: https://www.waterboards.ca.gov/coloradoriver/water_issues/programs/basin_planning/docs/bp032014/foreword.pdf.

[65] California Regional Water Quality Control Board, Lahontan Region. March 1995. Water Quality Control Plan for the Lahontan Region. Available at: https://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/references.shtml.

[66] California Regional Water Quality Control Board, Los Angeles Region. September 2014. Water Quality Control Plan Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties. Available at: https://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/basin_plan_documentation.shtml.

[67] California Regional Water Quality Control Board, Santa Ana Region. February 2016. Water Quality Control Plan Santa Ana River Basin. Available at: https://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/.

waterbodies and the levels of quality that must be met and maintained to protect those uses. The Basin Plan includes an implementation plan necessary to achieve and maintain the water quality standards. The Regional Board regulates waste discharges to minimize and control their effects on the quality of the region's ground and surface water. Permits are issued under a number of programs and authorities. The terms and conditions of these discharge permits are enforced through a variety of technical, administrative, and legal means. Water quality problems in the region are listed in the Basin Plan, along with the causes, where they are known. For waterbodies with quality below the levels necessary to allow all the beneficial uses of the water to be met, plans for improving water quality are included.

Chapter 2.0
PROJECT DESCRIPTION/ACTIVITIES COVERED BY PERMIT

The purpose of the CRCP MSHCP is to address the gap in take coverage between SoCalGas' proposed San Joaquin Valley Programmatic HCP, California Desert Conservation Area Programmatic BO, SDG&E NCCP, Western Riverside County MSHCP, the Rancho Palos Verdes NCCP/HCP, San Luis Obispo County proposed Los Osos Communitywide HCP, the OCTA Measure M2 NCCP/HCP, and the County of Orange (Central/Coastal) NCCP/HCP.

This MSHCP addresses potential impacts to Covered Species from the use, maintenance, and repair of existing natural gas facilities including Inspection, Above Ground Repair or Replacement, Vegetation Management, Below Ground Construction, Storage Facilities, and Time-Sensitive Repairs (Emergency Response Activities).

2.1 Project Description

SoCalGas operates approximately 4,232 acres of natural gas storage facilities and 2,435 linear miles of interconnecting pipelines within the 10,603-square-mile CRCP Plan Area that encompasses facilities in five counties: San Luis Obispo, Santa Barbara, Ventura, and the non-desert portions of Los Angeles and San Bernardino Counties (Figure 2.1-1, *SoCalGas Facilities in CRCP Plan Area*). SoCalGas facilities transport natural gas to residential, commercial, industrial, and utility electric generating customers throughout Central and Southern California. The system consists of high-, medium-, and low-pressure natural gas pipelines and includes appurtenant and support facilities, such as compressor stations, natural gas storage fields, numerous valve and metering stations, cathodic protection equipment, producer receipt sites, and aerial and ground markers, as well as telecommunications equipment and access roads. SoCalGas facilities are located on a mosaic of lands in public and private ownership.

To ensure that the pipeline system operates in compliance with environmental and safety regulations, SoCalGas performs routine O&M activities and upgrades throughout the system. Maintenance of the existing system is required by the CPUC General Order 112-F, FF, which also incorporates the Federal Pipeline Safety Regulations under 49 CFR Parts 190, 191, 192, 193, and 199. Additionally, SoCalGas must perform compliance activities within the constraints of California Senate Bill (SB) 1371; California Assembly Bill (AB) 32, Subpart W; and the California Air Resources Board (CARB) Oil and Gas regulations.

This MSHCP addresses potential impacts to Covered Species from the use, maintenance, and repair of existing natural gas facilities including the following Covered Activities: Inspection, Above Ground Repair or Replacement, Vegetation Management, Below Ground Construction, Storage Facilities, and Time-Sensitive Repairs (Emergency Response Activities) (Section 2.2, *Activities Covered by Permit*). SoCalGas conducts maintenance and repair activities on existing facilities to maintain uniform, adequate, safe, and reliable gas service.

FIGURE 2.1-1

SoCalGas Facilities in CRCP Plan Area

2.2 Activities Covered by Permit

SoCalGas is seeking incidental take coverage of Covered Activities that occur within its facilities and along and adjacent to its ROWs. These activities have been grouped into five general categories and include activities that are performed on a regular basis at any time during the year at a given location ("regularly reoccurring activities") as well as those that are rarely, if ever, repeated at a given location ("nonrecurring activities") (Table 2.2-1, *Covered Activities*). Routine and emergency O&M activities, and construction of small capital improvements to existing facilities, are completed with a combination of on-road and off-road equipment including trucks, cranes, tractors, bulldozers, backhoes, excavators, forklifts, graders, pipe-layers, pipe-benders, compressors, welding machines, boring machines, water trucks, jack hammers, grinding machines, paving machines, rollers, generators, cement and mortar mixers, and street sweepers. Mechanized and nonmechanized hand tools are also used for vegetation management. These include hand pruning devices, chainsaws, mechanized soil compactors, and vegetation chippers. SoCalGas is presently experimenting with drone technology in an effort to determine if there are cost-effective applications to support SoCalGas operations. Thus, the use of drones remains in the research and development phase. SoCalGas has begun utilizing manned helicopters to accommodate mandated increases in frequency of pipeline patrols and leakage surveys.

TABLE 2.2-1
COVERED ACTIVITIES

Covered Activities				
Category	**Activity**		**Regularly Recurring**	**Nonrecurring**
A. Inspection	A-1	Pipeline Inspection	X	
	A-2	Underground Facility Location, Identification, and Vault Inspections		X
	A-3	Telemeter and Power Supply Equipment	X	
	A-4	Fuel and Gas Flow Meters	X	
	A-5	Leakage Surveys	X	
	A-6	Pipeline Span Inspections*	X	
	A-7	Cathodic Protection Surveys	X	
B. Above Ground Repair or Replacement	B-1	Line Break Control	X	
	B-2	Valve Inspection and Lubrication	X	
	B-3	Modulating (Pressure Limiting) Valves	X	
	B-4	Chart and Sample Bottle Changing	X	
	B-5	Install, Replace and Modify Odorant System		X
	B-6	Collecting Pipeline Condensate		X
	B-7	Cathodic Protection Test Station Maintenance and Inspection	X	
	B-8	Valve Operation Repairs		X
	B-9	Span Repair		X
	B-10	Span Painting	X	
	B-11	Rectifier Maintenance	X	
	B-12	Anode Irrigation	X	
	B-13	Discharge of Vault Water to Land		X
	B-14	Telecommunication Sites		X
	B-15	Advanced Metering Monitoring Initiative Sites		X
	B-16	Install, Replace, or Upgrade Regulator Stations	X	
C. Vegetation Management	C-1	Pesticide and Herbicide Application	X	
	C-2	Vegetation Trimming	X	
	C-3	Brush Clearance	X	
	C-4	Roadway and Pipeline Weeding	X	
	C-5	Vegetation Control Using Livestock		X
D. Below Ground Construction	D-1	Access Road Grading	X	
	D-2	Access Road Crossing Maintenance		X
	D-3	Repair, Installation, and Abandon Pipeline Components		X
	D-4	Pipeline Segment Replacement		X
	D-5	Tap Installation		X
	D-6	Hydrostatic Testing		X
	D-7	Leak Excavation and Repair		X
	D-8	Conduit Trenching		X
	D-9	Installation of Magnesium Anodes		X
	D-10	Installation of Deep Well Anodes		X
	D-11	Installation of Replacement Horizontal Anodes		X
	D-12	Buried Pipe and Coating Inspections		X
	D-13	Valve and Pipeline Segment/Span Excavation and Recoating		X

TABLE 2.2-1
COVERED ACTIVITIES

Covered Activities				
Category	**Activity**		**Regularly Recurring**	**Nonrecurring**
	D-14	External Corrosion Direct Assessment		X
	D-15	Close Internal Survey	X	
	D-16	In-Line Inspection: Pigging, Including Installation/Removal for Temporary Launchers/Receivers	X	
	D-17	In-Line Inspection: Pigging Span Supports	X	
	D-18	In-Line Inspection: Pigging AGM Setting and Tracking	X	
	D-19	In-Line Inspection: Pigging Retrofitting the Pipeline		X
	D-20	In-Line Inspection: Correlation/Validation Digs for Verification		X
	D-21	In-Line Inspection: Anomaly Inspections and/or Repairs		X
	D-22	Drip Leg Inspection, Removal and Installation		X
	D-23	Potholing and Line Marker Installation		X
	D-24	Bores		X
	D-25	Open-Trench Crossings		X
	D-26	Water Diversion		X
	D-27	Installation of New Facilities		X
	D-28	Pipeline Erosion Repair		X
	D-29	Coating Applications		X
	D-30	Geotechnical Investigation		X
	D-31	Removal of Abandoned Pipeline		X
	D-32	Install, Replace, or Upgrade Regulator Stations		X
E. Storage Facilities*	E-1	Well Maintenance Workover	X	
	E-2	Well Drilling		X
	E-3	Storm Drains, Culverts and Catch Basin Cleaning	X	
	E-4	Well Cellar Cleaning	X	
	E-5	Tank and Vessel Cleaning	X	
	E-6	Electric Pole Installation		X
	E-7	Roadway Repair, Guard Rails and Pipe Supports	X	
	E-8	Seismic Testing		X
	E-9	Water, Oil, Air and Gas Line Repairs and Replacement		X
	E-10	Sump Investigation and Remediation		X

* SoCalGas operates four natural gas storage facilities: Aliso Canyon, Honor Rancho, and Playa del Rey in Los Angeles County; and La Goleta in Santa Barbara County.

The Covered Activities are based on SoCalGas' best available knowledge and identify the current activities used to repair, maintain, operate, and construct gas pipelines and related facilities. However, due to the multitude of activities required to keep the SoCalGas system functioning safely and efficiently, there may be other activities that O&M personnel must perform. In addition, the technology for safely moving and storing natural gas is evolving. As a result, these new technologies may create new activity types not in use in 2018. It will be the responsibility of SoCalGas to

demonstrate to the satisfaction of the USFWS that activities that are not explicitly described in the list of Covered Activities would be in substantial conformance to, or of less intensity than, the impacts for the Covered Activities addressed in this MSHCP, such that the implementation of the new activity would not exceed the level of take authorized under the permit.

Certain operation and maintenance activities included in the MSHCP are not anticipated to result in impacts because all impacts are anticipated to be able to be avoided through the implementation of BMPs. However, these activities have been included in this MSHCP for the anticipated rare occurrence where one of these activities results in impacts. Additionally, including these activities in the MSHCP will eliminate the need for SoCalGas to request clearance from the USFWS for each activity as it occurs on an individual basis as is currently necessary. Additionally, in the rare case that one of these activities does result in impacts to covered species, mitigation for impacts to the species will be in place.

The descriptions that follow identify key components of the Covered Activities and may include associated actions such as clearing of work areas, digging shallow trenches, and removal of waste materials. Access to a SoCalGas activity site generally occurs via paved roads within urban areas, unpaved dirt patrol roads within natural areas, and on foot where vehicular access is prohibited. Cross-country travel will be prohibited unless there is no feasible alternative access to the site where O&M activities are required. Ground inspections are augmented with helicopter surveys and drones along existing pipeline easements, conducted consistent with federal, state, and local statutes related to general aviation and Federal Aviation Administration for Unmanned Aircraft Systems. For all activities, the areal extent of disturbance will be as small as feasible.

A. Inspection

A-1 Pipeline Inspection

Pipeline inspection is regularly conducted over all portions of the pipeline system using on-the-ground visual and instrumented inspections while driving a truck or on foot. Inspections include the pipelines, maintenance roads, and appurtenant facilities. Personnel check and record the ROW conditions, replace missing or damaged pipeline markers and aerial patrol signs, ensure that pipeline markers are clearly visible, perform minor maintenance activities, and record conditions that may impact pipeline operations. Pipeline patrols are conducted throughout the year and are completed once to four times annually. Vegetation clearing activities, as described in Section C.2, below, may be identified or completed in conjunction with these inspections.

A-2 Underground Facility Location, Identification, and Vault Inspections

State law requires that every person planning an excavation must first advise a regional notification center of the excavation location. The regional notification center then requires operators of underground pipelines and other underground facilities in the area to locate and mark their facilities to avoid damage during excavation (California Government Code Section 2416 et seq.). In compliance with this law, SoCalGas uses a four-wheel-drive, rubber-tired pickup truck, and one operator on existing paved or dirt roads to conduct inspections.

A-3 Telemeter and Power Supply Equipment

Telemeters are used for remote sensing of pipelines. Telemeters and power supply equipment are located at main line valve stations, which are typically 10 miles apart. Both the telemeter and the power supply equipment require monthly inspections to ensure that they are functioning properly. These activities are conducted using a four-wheel-drive, rubber-tired pickup truck, and one operator on existing paved or dirt roads to conduct inspections.

A-4 Fuel and Gas Flow Meters

Fuel and flow meters measure the flow of gas through the pipeline. These meters must be inspected each month to ensure that they maintain their integrity and accuracy. Fuel and gas flow meters are located at main line valve stations. These activities are conducted using a four-wheel-drive, rubber-tired pickup truck, and one operator on existing paved or dirt roads to conduct inspections.

A-5 Leakage Surveys

Gas leak surveys are conducted on pipelines and on active and abandoned storage field wells. Leaking gas from pressurized pipelines or storage fields can present hazardous conditions that must be avoided. These surveys are required to occur twice annually, or more if needed. These activities are conducted using a four-wheel-drive, rubber-tired pickup truck, and one operator on existing paved or dirt roads to conduct inspections. SoCalGas has also begun conducting leak surveys using manned helicopters. Helicopters used for these surveys are equipped with infrared sensors that are capable of both locating and assessing the magnitude of any leaks emanating from aboveground or buried pipelines within a 40- by 40-foot footprint. The helicopter is flown at a speed of approximately 60 miles per hour along pipeline ROWs at elevations ranging from 300 to 500 feet. The flight path is determined and guided by the use of global positioning system (GPS) coordinates that are preprogrammed into navigation software.

A-6 Pipeline Span Inspections

Above-ground pipelines and appurtenant facilities are inspected and maintained on an ongoing basis and are inspected at least once every two years. Vegetation clearing activities, as described in Section C.2, below, may be identified or completed in conjunction with these inspections. Herbicides may be used near equipment, below pipeline spans, and inside the fences on disturbed or previously cleared land. Herbicides approved for use near water are also used. Herbicides are typically sprayed in early to late spring when weeds are actively growing for maximum effectiveness. All herbicides are used minimally, only in accordance with the manufacturer's product label, and as recommended by a State Certified Pest Control Advisor, per SoCalGas Company Operations Standard No. 104.0250, Pesticide Management. Maintenance may also require touch-up painting of the piping using lead-free paint. Span painting is accomplished by brush or roller applications to avoid overspray, and tarps are hung below the area being painted to avoid loose or wet paint from dropping to the ground. Tarps may also be temporarily placed on the ground under pipeline spans to catch any debris associated with a repair within waterways. At a creek crossing, scaffolding may be placed along creek bottom for several days or man-lifts may be required to drive equipment into the creek to access pipe anchored to the bottom of a bridge or suspected over drainage. These activities are conducted using one or more four-wheel-drive, rubber-tired pickup trucks and one to two operators on existing paved or dirt roads.

A-7 Cathodic Protection Surveys

Cathodic protection surveys are completed bimonthly and determine pipe and soil electrical potentials. Cathodic protection prevents metal corrosion by making the pipeline surface a cathode in an electrochemical cell. Surveys are performed to ensure that the system is operating effectively. Simple testing instruments are needed, and typical surveys require 10 days to complete. Surveys are conducted bimonthly. These activities are conducted using a four-wheel-drive, rubber-tired pickup truck, and one operator on existing paved or dirt roads.

B. Above Ground Repair or Replacement

B-1 Line Break Control

Line break controllers are located at most main line valve stations, and they are typically 10 miles apart. Line break controls on valve actuators are inspected and calibrated twice annually. Line break controller inspections and calibrations are normally completed within five to 10 days for the entire pipeline system each year. A small crew in a four-wheel drive, rubber-tired pickup truck using various test instruments completes the work.

B-2 Valve Inspection and Lubrication

Valve inspection, lubrication, and general maintenance are completed annually but can occur more frequently depending upon a particular valve's classification as critical or noncritical. General maintenance includes annual weed removal from valve station enclosures, and touch-up painting of valves and related equipment using lead-free paint. Annual weed removal would be primarily conducted with herbicide application. Herbicides are only used near equipment and inside fences on disturbed or previously cleared land. Herbicides are used minimally, in accordance with the manufacturer's product label, and as recommended by a State Certified Pest Control Advisor, per SoCalGas Company Operations Standard No. 104.0250, Pesticide Management (see also C-1, below). These activities are conducted using a four-wheel-drive, rubber-tired pickup truck, and one operator on existing paved or dirt roads.

B-3 Modulating (Pressure Limiting) Valves

Modulating valves regulate the flow of gas through a pipeline. These valves are inspected and lubricated every two weeks throughout the year to ensure that they are functioning properly. Equipment used for this activity includes a three-ton, six-wheeled, rubber-tired truck and lubricating equipment. One operator typically completes this task.

B-4 Chart and Sample Bottle Changing

Pressure and temperature charts and sample bottles are located at valve and regulator stations. These charts and bottles are changed weekly. These activities are conducted using a four-wheel-drive, rubber-tired pickup truck, and one operator on existing paved or dirt roads.

B-5 Install, Replace and Modify Odorant System

Natural gas is odorless. Therefore, an odorant is added to the pipeline so that leaking gas can be more readily detected. Odorant systems are regularly monitored to ensure that they are working properly. Odorant systems are replaced once every 40 to 50 years. As new technologies develop, crews may replace, enhance, or modify odorant systems and/or their components. These activities are conducted using one or more four-wheel-drive, rubber-tired pickup trucks, and one to two operators on existing paved or dirt roads.

B-6 Collecting Pipeline Condensate

Pipeline condensate is created as natural gas travels through the pipeline under differing pressure and temperature conditions. Most of the condensate is produced from the transmission lines, although small amounts may be collected from distribution lines. This condensate may be hazardous (e.g., contain hydrocarbon distillates) and is collected in drums attached to collection valves along the transmission and distribution lines. Crews collect the condensate at intervals dependent upon the rate of liquid accumulation in the particular pipeline. The condensate is disposed of in accordance with state and federal regulations. These activities are conducted using a four-wheel-drive, rubber-tired pickup truck, and two crew members on existing paved or dirt roads.

B-7 Cathodic Protection Test Station Maintenance and Inspection

Cathodic protection is a method of preventing metal corrosion by rendering the pipeline surface a cathode in an electrochemical cell. Inspections are needed to ensure that the system is operating effectively. The Cathodic Protection Test Stations (or Electrolysis Test Stations) are exposed to the elements and require ongoing repair and maintenance due to finite lifespans and following natural events such as earthquake, fire, and wildlife damage to wires (chewing through lines). Human-caused damage includes vandalism, reckless four-wheel-drive use, and farming activities. Crews routinely inspect and maintain Cathodic Protection Test Stations by conducting pipe to soil surveys and bond reads. Maintenance and inspection typically take seven days to complete for each pipeline, but may require up to 30 days in some cases. Surveys are conducted bimonthly. These activities are conducted using two four-wheel-drive, rubber-tired pickup trucks, and two crew members on existing paved or dirt roads.

B-8 Valve Operation Repairs

Valve operators are inspected annually. If deficiencies are detected, they are repaired within one to six days. Excavation is not necessary. Repairs may include paving within and around an existing valve station with asphalt or site drainage. Upgrades to security at these locations may be required; including fence line and camera systems. Steps are taken to ensure that oil spills are avoided during the repair of valves that are operated by pneumatic hydraulic action (e.g., tarps or buckets are placed under the valve). These activities are conducted using one or more four-wheel-drive, rubber-tired pickup trucks, and one to two crew members on existing paved or dirt roads.

B-9 Span Repair

Damage to pipelines is detected during pipeline span inspections. Damage to the pipelines usually occurs from debris flows, vandalism, or wildfires. Pipeline spans must be repaired to maintain the

integrity of the line and to comply with pipeline safety codes. Repairs can vary depending on whether the line has been vandalized or damaged through degradation of materials. Installation of pipe supports may involve replacement of eroding or failing support with a concrete caisson within riparian habitat or channel to support pipe span; metal supports are often in a concrete-poured foundation. Vegetation clearing activities, as described in Section C.2, below, may be required to provide access to pipeline spans needing repair. Crews repair pipeline spans throughout the year. Typical repairs range from debris removal and span painting to welding bands and fittings to the pipeline. The types of vehicles and number of crew needed to complete span repairs vary based on the size and complexity of the job, but generally these activities are conducted using two or more four-wheel-drive, rubber-tired pickup trucks, and two to four crew members on existing paved or dirt roads. Wherever possible, work requiring vegetation clearing is scheduled outside the breeding season (October to January). Where vegetation clearing must be undertaken during the breeding season, surveys are undertaken by a Project biologist or biological monitor to determine if there are any nests protected pursuant to the MBTA. Where nests afforded protection are identified, they are marked as a no-work area with a buffer of up to 250 feet. Buffers and work permitted near nests are dependent on the species behavior observed, and the discretion of the biologist present. (See Section 6.2.7 for more on the Nesting Birds Policy). A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species.

B-10 Span Painting

A pipeline span inspection may determine that a section of pipeline needs to be painted. Span painting is completed using a brush or roller to avoid overspray, and tarps are hung below the area being painted to avoid degraded paint or wet paint from dropping to the ground. Span painting normally requires up to three days by a crew of three. Impacts may include foot traffic through stream channels, and tree trimming and brush clearing may be necessary to properly access the pipeline prior to painting, as described in Section C.2, below. These activities are conducted using one to three four-wheel-drive, rubber-tired pickup trucks, and three crew members on existing paved or dirt roads. Wherever possible, work requiring vegetation clearing is scheduled outside the breeding season (October to January). Where vegetation clearing must be undertaken during the breeding season, surveys are undertaken by a Project biologist or biological monitor to determine if there are any nests protected pursuant to MBTA. Where nests afforded protection are identified, they are marked as a no-work area with a buffer of up to 250 feet. Buffers and work permitted near nests are dependent on the species behavior observed, and the discretion of the biologist present. (See Section 6.2.7 for more on the Nesting Birds Policy). A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species.

B-11 Rectifier Maintenance

An alternating current (AC) rectifier provides direct current for cathodic protection systems. Rectifiers must be serviced to ensure they are in good operating condition. Crews maintain and service rectifiers annually, and maintenance activities typically require 10 days to complete. Maintenance is conducted annually. The types of vehicles and number of crew needed to complete rectifier maintenance vary based on the size and complexity of the job, but generally these activities are conducted using one to two four-wheel-drive, rubber-tired pickup trucks, and two crew members on existing paved or dirt roads.

B-12 Anode Irrigation

Anode irrigation uses a water-tank truck to irrigate the anode of a cathodic protection system in order to increase the efficiency of the AC rectifier. Approximately 200 to 2,400 gallons of water are directed into a vent tube to irrigate the anodes. All of the water remains underground. Irrigation takes 16 to 20 days and is performed as necessary on the pipeline system. These activities are conducted using a water tank truck, and one to two four-wheel-drive, rubber-tired pickup trucks on existing paved or dirt roads. The number of crew varies based on the size and complexity of the job.

B-13 Discharge of Vault Water to Land

SoCalGas underground utility vaults house meters, pressure regulators, and valves. These structures are not sealed tightly and thereby water collects from a variety of potential sources including storm water runoff and surface water drainage, groundwater infiltration, and infiltration from nearby wet utility structures (e.g., water from sewer or water line breaks and leaks). When the amount of water in the utility vaults interferes with the safety and quality of the maintenance work to be done within a vault, water must be pumped out. Vault water free of pollutants (e.g., oil, grease, waxes, floating debris) occurs with a generator operated pump and is discharged through a filtration system to land upon receiving landowner approval and when sufficient space for infiltration is available to avoid water ponding. This activity can occur at any time during the year and is accomplished with a crew of two-persons.

B-14 Telecommunication Sites

Telecommunication sites are used to relay information from equipment sensors and monitors to centralized maintenance yards throughout the CRCP Plan Area. There are eight telecommunication sites within the CRCP Plan Area (see Figure 2.1-1). The size of the telecom facilities ranges from less than 10 square feet to up to 6,000 square feet. A 100-foot wide fuel modification zone is maintained on each site of the telecommunication site that abuts natural open space. Crews maintain telecommunication sites annually and maintenance activities typically require 2-3 days to complete. This activity is conducted using a four-wheel drive, rubber-tired pickup truck, and two to three crew members on existing paved or dirt roads. All vegetation management activities are limited to the ROW. Whenever feasible, vegetation management will be completed outside the breeding season for birds that are listed as threatened or endangered under the federal or California ESAs, or afforded protection pursuant to the MBTA. Where it is infeasible to avoid the breeding season, all areas where vegetation management activities are proposed, will be surveyed by a Project biologist or biological monitor. The purpose of the survey will be to assess the presence or absence of birds afforded protection under the federal or California ESAs, or afforded protection pursuant to the MBTA. Surveys shall occur within one working day of the vegetation management activity. Where nests afforded protection are identified, they are marked as a no-work area with a buffer of up to 250 feet. Buffers and work permitted near nests are dependent on the species behavior observed, and the discretion of the biologist present (see Section 6.2.7 for more on the Nesting Birds Policy). A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species.

B-15 Advanced Metering Initiative Sites

Advanced Metering Initiative devices are used to automatically and securely transmit data from residential, commercial, and industrial properties to SoCalGas service and billing centers. Poles with transmitters are installed at over 100 locations in the CRCP Plan Area to relay digital data from

individual properties to SoCalGas service and billing centers (see Figure 2.1-1). AMIs typically consist of utility pole and surrounding clear zone of 3 feet. Crews maintain AMI sites annually and maintenance activities typically requires less than a day to complete. All vegetation management activities are limited to the ROW. This activity is conducted using a four-wheel drive, rubber-tired pickup truck, and two to three crew members on existing paved or dirt roads. Whenever feasible, vegetation management will be completed outside the breeding season for birds that are listed as threatened or endangered under the federal or California ESAs, or afforded protection pursuant to the MBTA. Where it is infeasible to avoid the breeding season, all areas where vegetation management activities are proposed will be surveyed by a Project biologist or biological monitor. The purpose of the survey will be to assess the presence or absence of birds afforded protection under the federal or California ESAs, or afforded protection pursuant to the MBTA. Surveys shall occur within one working day of the vegetation management activity. Where nests afforded protection are identified, they are marked as a no-work area with a buffer of up to 250 feet. Buffers and work permitted near nests are dependent on the species behavior observed, and the discretion of the biologist present (see Section 6.2.7 for more on the Nesting Birds Policy). A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the ESA and CESA protected species.

B-16 Install, Replace, or Upgrade Regulator Stations

Pressures within natural gas pipelines are managed, brought from high to low pressure, utilizing regulator stations. Pressures not only govern the movement of gas through the system but the safety of the system as well. The federal Department of Transportation and the CPUC regulate and oversee the inspection and operations and maintenance of the regulator stations to ensure that pipeline pressures support safe and reliable demand. This requires that SoCalGas conduct inspections, repair and replacement, and installation of regulator stations throughout the system.

Regulator stations are fitted to the pipeline and only slightly exceed these dimensions. Above-ground repair and replacement can range from minor to small construction. Above-ground facilities include concrete pads supporting valves and instrumentation protected by a cage/fencing. An example for a 10-inch distribution supply line would require a 3-cubic-yard concrete pad, new fencing to secure the station, and a 4-inch blow-off.

Inspections are varied (e.g., 30-point or 70-point) and have a minimum of a one-time annual compliance inspection but may require unscheduled inspections multiple times throughout the year. These may include minimal vegetation clearing for access to facilities and instruments, two to three personnel, two 2.5-ton rubber-tired pickup trucks on existing paved or dirt roads with no ground disturbance.

Maintenance activities range from simple repairs to complete replacement of structures. Installation activities would include above-ground concrete pad, cage/fencing, instrumentation, and blow-off, as well as supporting valves and instrumentation. This small-scale construction would include grading using hand shovels or small bobcats to assist in road clearing as well as backhoes if some excavation is needed.

Crews inspect, repair and install regulator stations throughout the year. Wherever possible, work requiring vegetation clearing is scheduled outside the bird breeding season (October to January). Where vegetation clearing must be undertaken during the breeding season, surveys are undertaken by a Project biologist or biological monitor to determine if there are any nests protected pursuant to the MBTA. Where nests afforded protection are identified, they are marked as a no-work area with a

buffer of up to 250 feet. Buffers and work permitted near nests are dependent on the species behavior observed, and the discretion of the biologist present (see Section 6.2.7 for more on the Nesting Birds Policy). A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species. For ground disturbance, work areas would be surveyed for burrows and their potential to support wildlife.

C. Vegetation Management

Whenever feasible, vegetation management will be completed outside the breeding season for birds that are listed as threatened or endangered under the ESA or CESA, or afforded protection pursuant to Fish and Game Code. All vegetation management activities are limited to the existing ROW. Where it is infeasible to avoid the breeding season, all areas where vegetation management activities are proposed will be surveyed by a Project biologist or biological monitor. The purpose of the survey will be to assess the presence or absence of birds afforded protection under ESA or CESA, or afforded protection pursuant to Fish and Game Code. Surveys will occur within one working day of the vegetation management activity. Whenever feasible, vegetation management will be completed outside the breeding season for birds that are listed as threatened or endangered under the federal or California ESAs, or afforded protection pursuant to the MBTA. Where it is infeasible to avoid the breeding season, all areas where vegetation management activities are proposed will be surveyed by a Project biologist or biological monitor. The purpose of the survey will be to assess the presence or absence of birds afforded protection under the federal or California ESAs, or afforded protection pursuant to the MBTA. Surveys shall occur within one working day of the vegetation management activity. Where nests afforded protection are identified, they are marked as a no-work area with a buffer of up to 250 feet. Buffers and work permitted near nests are dependent on the species behavior observed, and the discretion of the biologist present (see Section 6.2.7 for more on the Nesting Birds Policy). A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species.

C-1 Pesticide and Herbicide Application

Herbicide applications typically occur on ROW areas that are one-quarter acre or greater in size. Herbicide applications are used to maintain access to pipeline facilities, while pesticides are used to maintain enclosed facilities. Application is conducted either by SoCalGas personnel or a contractor. Prior to application, a site- and product-specific recommendation is obtained from a State Certified Pest Control Advisor, which is then reviewed by the employees and contractors. Herbicides are used minimally, in accordance with the manufacturer's product label and as recommended by a State Certified Pest Control Advisor, per SoCalGas Company Operations Standard No. 104.0250, Pesticide Management. All pesticides and herbicides are applied per label directions and restrictions. This activity is conducted using a four-wheel-drive, rubber-tired pickup truck, and two to three crew members on existing paved or dirt roads. Where herbicide application must be undertaken during the bird breeding season (October to January), surveys will be undertaken by a Project biologist or biological monitor to determine if there are any nests protected pursuant to ESA, CESA, or Fish and Game Code. Where nests afforded protection are identified, they are marked as a no-work area with a buffer of up to 250 feet. Buffers and work permitted within them are dependent on the species behavior observed, and the discretion of the biologist present (see Section 6.2.7 for more on the Nesting Birds Policy). A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the ESA and CESA protected species.

C-2 Vegetation Trimming

Vegetation trimming and removal is necessary to provide access to pipeline ROWs and well sites within storage fields. Downed vegetation blocking pipeline and well site access is removed. Vegetation that has become diseased and could eventually fall in part or in its entirety is also removed to prevent damage to pipelines and/or facilities. Vegetation trimming or removal may also be conducted at the request of local agencies. Where vegetation clearing must be undertaken during the bird breeding season (October to January), surveys will be undertaken by a Project biologist or biological monitor to determine if there are any nests protected pursuant to ESA, CESA, or Fish and Game Code. Where nests afforded protection are identified, they are marked as a no-work area with a buffer of up to 250 feet. Buffers and work permitted within them are dependent on the species behavior observed, and the discretion of the biologist present (see Section 6.2.7 for more on the Nesting Birds Policy). A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species. Vegetation trimming normally involves the use of a stakebed truck, and two to four crew members on existing paved or dirt roads.

C-3 Brush Clearance

Clearing brush and other dense vegetation may be required as part of local fire ordinances to eliminate or minimize fire risk, and is particularly important on hillsides. Although brush removal may occur at any point during the year, it is typically conducted prior to the start of the spring fire season. Brush clearance is necessary to provide access to pipeline ROWs and well sites within storage fields. On the majority of facilities, two- to four-person crews typically conduct the work over several days using light weeding and clearing equipment, and one or more rubber-tired stakebed and/or four-wheel-drive, rubber-tired pickup trucks. Where brush clearance must be undertaken during the bird breeding season (October to January), surveys will be undertaken by a Project biologist or biological monitor to determine if there are any nests protected pursuant to ESA, CESA, or Fish and Game Code. Where nests afforded protection are identified, they are marked as a no-work area with a buffer of up to 250 feet. Buffers and work permitted near nests are dependent on the species behavior observed, and the discretion of the biologist present (see Section 6.2.7 for more on the Nesting Birds Policy). A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species.

C-4 Roadway and Pipeline Weeding

Weeding and brush removal is essential along roadways and pipelines so that they can be properly inspected and maintained. Additionally, regular roadside vegetation management is necessary to maintain access to well sites, pipelines, and production facilities, and to allow movement of equipment. Pipeline weeding and brush removal is typically conducted by two- to four-person crews using various hand tools and one or more rubber-tired stakebed and/or four-wheel-drive, rubber-tired pickup trucks. Where weeding must be undertaken during the bird breeding season (October to January), surveys will be undertaken by a Project biologist or biological monitor to determine if there are any nests protected pursuant to ESA, CESA, or Fish and Game Code. Where nests afforded protection are identified, they are marked as a no-work area with a buffer of up to 250 feet. Buffers and work permitted near nests are dependent on the species behavior observed, and the discretion of the biologist present (see Section 6.2.7 for more on the Nesting Birds Policy). A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species.

D. Below Ground Construction

Whenever feasible, below-ground construction, including alteration of drainages, will be completed outside the rainy season. Rain events in excess of one-half inch in the CRCP Plan Area normally occur between October and May. Where it is infeasible to avoid the rainy season, all ground-disturbing activities that are proposed within, or in close proximity to, suitable habitat for the Covered Species, including access and staging areas, will be surveyed by a Project biologist, approved by USFWS, using the appropriate protocols. The purpose of the protocol survey will be to assess the presence or absence of species afforded protection under the ESA or CESA. Protocol surveys shall occur within the appropriate timeframe for each covered species to maximize detectability. Where occupied habitat is encountered, the Project biologist approved by the USFWS will passively relocate the individual(s) prior to construction. Best management practices (BMPs) will be used to exclude species during construction.

Below-ground construction activities include brush clearance where site preparation activities necessitate clearing and grubbing. Grubbing removes root material from the top 12 inches of soil, while clearing involves cutting the vegetation at the ground surface, leaving the root material intact. In the case of grubbing for site preparation, larger equipment such as backhoes and dozers are used to push over and then remove vegetation material. Where vegetation clearing must be undertaken during the bird breeding season (October to January), surveys will be undertaken by a Project biologist or biological monitor to determine if there are any bird nests protected pursuant to ESA, CESA, or Fish and Game Code. Where nests afforded protection are identified, they are marked as a no-work area with a buffer of up to 250 feet. Buffers and work permitted near nests are dependent on the species behavior observed, and the discretion of the biologist present (see Section 6.2.7 for more on the Nesting Birds Policy). A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species.

D-1 Access Road Grading

Access roads are typically maintained by grading to a depth of one or two inches and without altering the road profile. Occasionally, additional actions are needed to repair erosional rills and other storm-related access road damage. This may include importation of fill to repair an access road that has eroded or gravel to repair steep hill slopes. The installation of streambank stabilizing structures, including gabions, riprap or other types of material not intended to be permanent, may be required to prevent bank erosion threatening a road or pipe. Access road surface maintenance occurs on an as-needed basis to keep the road in operational condition, generally every two to three years. This activity can occur at any time during the year and involves the use of a motor grader, front-end loader or backhoe, and one operator in addition to a small crew for support.

D-2 Access Road Crossing Maintenance

Regular maintenance is required to keep roads in operational condition at stream crossings. Maintenance structures or gravel may be installed to prevent erosion, including revetment mats, culverts, sandbags, or riprap. Ground disturbance associated with maintenance is typically 200 square feet or less. The time required for this activity will vary depending on the complexity of the crossing, the extent of the damage to the road, and the installation of new equipment to prevent future road damage (e.g., a culvert installation). This activity may require permitting from the appropriate resource agencies, including the USACE, CDFW, RWQCB, and local flood control

districts. All permits will be obtained prior to implementing any work at stream crossings, and all activities will be completed according to the conditions stipulated within the permits. This activity can occur at any time of the year, but is typically only conducted during the dry season to avoid flowing water. Equipment typically used may include one backhoe or front-end loader, one or more dump trucks, a small crane, multiple rubber-tired pickup trucks, and a small crew of four to six personnel. However, the equipment and crew size vary based on the size and complexity of the job.

D-3 Repair, Installation, Removal and Abandonment of Pipeline Components

Pipelines require regular maintenance to ensure that they are operating correctly and to maintain their integrity. Pipeline maintenance activities can involve installation, repair, removal, and abandonment of pipeline components. These pipeline components can include rectifiers, valve boxes, risers, producers, and drip legs. Depending on the nature of the repairs needed, several days or even weeks may be required to complete a single job. Equipment typically used may include one or more backhoes or front-end loaders, welding trucks, cranes, new components (e.g., rectifiers, valve boxes, risers, etc.), appropriate replacement tools, multiple rubber-tired pickup trucks, and a small crew of six to eight personnel. However, the equipment and crew size vary based on the size and complexity of the job.

D-4 Pipeline Segment Replacement

Severe corrosion or other damage to a pipeline may be revealed through a below-grade inspection or an in-line-inspection process or leaks, requiring replacement of the affected pipeline. A typical excavation is one to 1.5 feet below the bottom of the pipeline to allow line removal and replacement. To avoid shoring, the excavation usually has a slope of 18 inches of width per 12 inches of depth. As a pipeline usually has 30 to 36 inches of cover, the excavation for a 24-inch line would be approximately four to five feet deep. Excavated soil is staged in piles nearby until repairs are completed and is then used for backfill. Alternatively, imported soil may be utilized as backfill depending on native soil conditions. The disturbance area and time required to complete the job is dependent upon the pipeline segment length requiring replacement, but generally pipeline replacement requires more workspace than other O&M activities and may require use of the entire 50-foot ROW for staging of equipment and materials, particularly for large-diameter pipelines such as transmission lines. Equipment typically used may include one or more flatbed or dump trucks, a backhoe, trailer-mounted compressor, truck-mounted crane, side boom, welding and inspection equipment, multiple rubber-tired pickup trucks, and a crew of 10 to 12 personnel. However, the equipment and crew size vary based on the size and complexity of the job.

D-5 Tap Installation

Tap installations are common for new customer extensions. Tap installations may also be necessary for some types of maintenance activities, when installing a blow-down stack or a drip facility, or during internal inspection operations (see also In-Line Inspection: D-16 through D-21, below) when a pipeline is tapped into to obtain “kicker gas.” The excavation size for the tap installation operation can range from several square feet to over a hundred square feet. The crew and equipment required for this activity will depend on the size of the tap being installed, but generally involve the use of a crane truck, equipment and valve haul trucks, a rubber-tired crew truck, and other equipment as needed. The crew size is typically two to six personnel.

D-6 Hydrostatic Testing

Existing pipelines may need to be hydrostatically tested (also known as "hydrotesting") to comply with CPUC and the DOT Office of Pipeline Safety (OPS) gas pipeline integrity and safety regulations. The three primary purposes of hydrostatic testing include (1) qualify existing and new pipelines for operation, (2) increase the operating pressure rating of pipelines, and (3) provide a potential future alternative method to ensure proof of integrity and strength per DOT and the CPUC.

To conduct this activity, field crews cut and cap the pipeline at determined test breaks, fill the pipeline with water, conduct and monitor the testing, dewater, and tie the tested pipeline back into service. The number of locations and dimensions of the work spaces needed for the test breaks depend upon the size, length, and elevation changes of the pipeline segments to be tested. Although efforts are made to locate test breaks and laydown yards within previously disturbed areas, engineering factors ultimately dictate the parameters of the hydrotest. While test breaks are always located within the pipeline ROW, laydown yards needed to accommodate equipment and water tanks may be located in areas outside the ROW. Work spaces typically measure 100 feet by 100 feet at the launching and receiving sites. Equipment varies according to the type of activities and the amount of work necessary, but typically includes a "pig," branch/tap connections, pipeline supports, Baker tanks (or similar), crew trucks, and water filtration equipment. Crew size varies according to the size and complexity of the job. The following describes various aspects and components of conducting a hydrostatic pressure test:

- Monitoring of water injection testing and dewatering by SoCalGas and contract personnel along the ROW.

- A "smart pig" (see D-16, below, for more information) is typically pushed by the water to purge air from the line.

- Branch or tap connections are excavated and isolated from the test section. It may be necessary to install new taps to maintain some customer supply. These taps may be installed on an adjacent line not involved in the test.

- Pipeline spans may require temporary supports due to excessive weight in the line (see also D-17, below).

- A supply of water is trucked or temporarily piped to the fill site. A pump is set up if temporary piping is used. Filtration equipment may be set up to filter the incoming water.

- Baker tanks (or similar temporary liquid holding tanks) used for volume surge will be placed at the fill and dewatering sites.

- If water is to be disposed off-site, disposal will be subject to agency approval at approved disposal facilities.

- Where allowed by the SWRCB, hydrotest water may be discharged, used for dust control, and/or managed through or other beneficial uses. SoCalGas environmental staff assess each discharge activity on a case-by-case basis to determine whether a biologist will be assigned to monitor the discharge, and consult with the SWRCB as needed in order to ensure compliance during discharges to land and/or surface waters.

D-7 Leak Excavation and Repair

Pipeline inspections may detect signs of escaping gas. In these instances, that portion of the pipe would be excavated for visual inspection and confirmation of the leak. The pipe inspections for locating potential leaks would disturb 1,000 to 2,000 square feet of pipeline ROW, and typical excavation is one to 1.5 feet below the bottom of the line to allow thorough inspection and repairs. To avoid shoring, the excavation usually has a slope of 18 inches of width per 12 inches of depth. As a pipeline usually has 30 to 36 inches of cover, the excavation for a 24-inch line would be approximately four to five feet deep. Typical repairs are by welding bands or replacing the corroded pipeline segment. Excavated soil is staged in piles near the hole until the inspection is complete and then used for backfill. This activity can occur at any time of the year and typically requires five to 10 days to complete. Equipment typically used may include multiple rubber-tired pickup trucks, a flatbed truck and trailer or a dump truck with a trailer, one backhoe, a trailer-mounted compressor, and trucks with welding machines. Work crews typically consist of 10 to 12 personnel.

D-8 Conduit Trenching

Trenches are dug to install conduits, which provide a protective casing for the power and telephone cables that service existing valve stations. A small crew digs the trenches by hand using hand tools. One to two rubber-tired pickup trucks are needed to transport crew members and equipment and tools.

D-9 Installation of Magnesium Anodes

Magnesium anodes are installed when cathodic protection surveys indicate pipeline segments with low pipe-to-soil electrical potentials. After the anodes are installed, a shallow trench is excavated between the pipeline and the anodes. Connecting wires are placed within the trench and welded into place around the pipeline. Small crews typically install anodes in a single day, and conduct three to six installations annually. Equipment required typically includes multiple rubber-tired crew trucks, one backhoe, shovels, and various other trenching and installation equipment.

D-10 Installation of Deep Well Anodes

Deep well anodes are installed 200 to 600 feet below the surface. During drilling, mud is removed by a vacuum truck and disposed of off-site in designated areas. After the anodes are installed, a shallow trench is excavated between the pipeline and the anodes. Connecting wires are placed within the trench and welded into place around the pipeline. Installation typically requires four days to complete. These activities are conducted using various drilling equipment, one vacuum truck, and multiple rubber-tired pickup trucks. Crew size varies according to the size and complexity of the job, but typically consists of 10 to 12 personnel.

D-11 Installation of Replacement Horizontal Anodes

Horizontal anodes are installed when shallow-depth cathodic protection units do not maintain the desired pipe-to-soil electrical potentials. Horizontal anodes parallel the pipeline 400 to 800 feet from the ROW centerline and are installed at approximately the same depth as the pipeline. Shallow trenches are excavated to connect the anodes to the pipeline with connecting wires, which are cad welded around the pipe. Typically, horizontal anode installation requires a crew of five, takes five

to seven days to complete, and disturbs approximately 20,000 to 25,000 square feet of soil. Although this activity can occur at any time during the year, the installation of horizontal anodes occurs on a very limited basis (one to two per year) due to space requirements. Equipment typically used includes multiple rubber-tired pickup trucks, one welding truck, one flatbed truck and trailer or a dump truck with trailer, one backhoe, one lowboy trailer, one tracked cat-loader, and one water truck.

D-12 Buried Pipe and Coating Inspections

Pipelines are excavated and inspected when cathodic protection surveys indicate low pipe-to-soil electrical potentials, or vulnerable areas of the pipeline are identified through the SoCalGas Pipeline Integrity Program (PIP). Pipe inspection disturbs 1,000 to 2,000 square feet of pipeline ROW, and a typical excavation is one to 1.5 feet below the bottom of the line to allow thorough inspection. To avoid shoring, the excavation usually has a slope of 18 inches of width per 12 inches of depth. As a pipeline usually has 30 to 36 inches of cover, the excavation for a 24-inch line would be approximately four to five feet deep. Excavated soil is staged in piles near the hole until the inspection is complete and then used for backfill. Visual inspection of buried pipelines involves excavation, inspection, repair if necessary, and backfill. These activities are conducted by a small crew of four personnel using one flatbed truck and trailer or a dump truck with trailer, one backhoe, and one trailer-mounted compressor.

D-13 Valve and Pipeline Segment/Span Excavation and Recoating

At times, a buried pipeline inspection may reveal that the protective coating on the pipeline has deteriorated and fails to provide adequate protection. Inspection of pipeline spans may also reveal damaged coating at the "bank" location where the span enters the ground. In these instances, the pipeline segment is excavated and recoated. The area disturbed and the time required to complete this activity would depend upon the length of the pipeline segment that needs to be repaired. In the case of spans, only light excavation with hand tools is needed to expose and recoat the failed coating. Valve and pipeline segment excavation and recoating involves the use of one flatbed truck and trailer or a dump truck with trailer, one backhoe, a trailer-mounted compressor, and a portable sandblaster. Four- to five-person crews are typically required to complete the work.

D-14 External Corrosion Direct Assessment

Assessments of pipeline integrity are conducted to ensure that the pipe is not showing signs of degradation. Crews conduct this assessment by excavating along a pipeline and visually inspecting the pipe and protective wraps. Inspection locations by this method are randomly selected. These activities are conducted any time of year by a small crew using rubber-tired pickup trucks and one or more excavators.

D-15 Close Internal Survey

A close internal survey is conducted in order to ascertain the condition of the pipeline wrap. This method involves a small crew, typically consisting of two to four personnel, walking along the ROW directly over the pipeline. Rubber-tired pickup trucks are used to transport the crew to various areas requiring surveys. A small electrical device is used to measure the pipe-to-soil potential. This activity typically precedes an external corrosion direct assessment. The integrity of the pipeline wrap is important in order to protect the pipe and prevent degradation through corrosion.

D-16 In-Line Inspection: Pigging, Including Installation/Removal of Temporary Launchers/Receivers

SoCalGas' PIP consists of in-line inspections in accordance with CPUC requirements, the Federal Pipeline Safety Improvement Act of 2002 (49 CFR Section 195.452), and DOT Pipeline Hazardous Materials Safety Administration regulations. SoCalGas internally inspects its natural gas transmission lines once every five to seven years to ensure pipeline integrity. The inspection involves several phases to prepare the pipeline for an in-line inspection by a device known as a "smart pig." The phases may include replacement and retrofit of valves, ells, tees, and other fittings; installation of span supports; a temporary or permanent gas bypass line; and in-line inspection launcher and receiver sites. These activities are conducted any time of year by a crew of five to 10 personnel using one backhoe, one welding truck, one or more rubber-tired crew trucks, and one crane/boom truck.

D-17 In-Line Inspection: Pigging Span Supports

SoCalGas may determine that a particular pipeline span is too long to support the weight of a smart pig. In these cases, the span will require either temporary or permanent supports to decrease the unsupported length of the span. Temporary supports may consist of a crisscross stack of four-inch by four-inch wood skids (cribbing) placed under the span or installation of vertical shoring jacks with cradle supports for the pipeline. Both support types are usually removed within several days of the completion of the pigging operation. Permanent supports are installed when constraints are absent. These supports consist of a steel pipe/cradle apparatus under the pipeline. The equipment required for this activity will depend on the length of the span and type of support being installed, but generally involves one crane truck, equipment haul trucks, one or more rubber-tired crew trucks, and other equipment as needed. The crew size is typically two to six personnel. This activity can occur any time of the year.

D-18 In-Line Inspection: Pigging AGM Setting and Tracking

During a pigging operation, the smart pig's progress through the pipeline is tracked as it passes above ground marker (AGM) locations where above-ground cables identify a connection feature on the buried pipeline. The markers occur at approximately one- to three-mile intervals. Trackers will utilize these markers to install a listening device (geophone) and/or transmitter receivers that pick up the passing pig. The pigging vendor personnel will drive along the patrol road or a maintained road closest to the pipeline, to have easy access to the area directly above the pipeline to install the geophone and/or transmitter receiver. This activity requires three to four rubber-tired pickup trucks and pipeline inspection device listening tools and/or transmitter receivers. Crew size is typically three to four personnel.

D-19 In-Line Inspection: Pigging Retrofitting the Pipeline

Pipeline facilities may require retrofitting in order to prepare older pipelines for pigging operations. This may include retrofitting main line valves, replacing open tees with barred tees, installing launcher and receiver barrels and associated main line valves and tees, and replacing sharp radius ells (pipe bends) with long smooth radius ells. These retrofits involve excavating the pipeline, removing the old facility from the pipeline, and then tying in a new fitting. This retrofit work is typically only required once per pipeline segment, as once the pipeline is retrofitted to be "piggable," future pigging operations will not require the same additional retrofitting. Equipment and personnel vary based on the type and amount of retrofitting required, but these activities are generally

conducted by a crew of four to eight personnel using one backhoe, one welding truck, one or more rubber-tired crew trucks, and one crane/boom truck. The activity can occur any time of the year.

D-20 In-Line Inspection: Correlation/Validation Digs for Verification

Once a pipeline is inspected, correlation digs are required to validate the inspection results, even if no anomalies are reported. At least three to five correlation digs are required to validate the data from the internal inspection. A visual inspection is required if an anomaly is detected by the smart pig. Correlation digs consist of excavating the pipeline, pipeline inspection, and backfill. These activities are conducted any time of year after a pig run by a small crew (four to eight personnel) using rubber-tired pickup trucks and one or more excavators.

D-21 In-Line Inspection: Anomaly Inspections and/or Repairs

If inspection data identifies pipeline anomalies, the correlation digs are used to validate inspection data and ensure that anomaly severity is accurately identified. Anomaly repairs typically consist of a band repair or segment replacement. Anomalies are usually repaired during the same excavation period as the correlations/validation digs. The location of the correlation digs and subsequent repairs are not known until the smart pig data are received. Correlation digs to inspect an anomaly consist of excavating the pipeline, pipeline inspection, repairs, and backfill. Equipment used varies based on the size and complexity of the job, but generally these activities are conducted any time of year after a pig run using one flatbed truck and trailer or a dump truck with trailer, one backhoe, and one trailer-mounted compressor. Crew size is typically four to eight personnel.

D-22 Drip Leg Inspection, Removal and Installation

Drip legs, which are collection points for hydrocarbon liquids, are not in-line with the pipeline. Instead, they are usually a separate section of pipe under the pipeline connected with a short section of smaller diameter pipe. Therefore, they cannot be inspected with smart pig. New drip legs have electronic devices attached, which provide constant corrosion monitoring. However, older drip legs require physical inspection, which involves excavating the drip leg and either visually inspecting the leg or using X-ray/ultrasonics to determine its integrity. At this time, old drip legs may be replaced with new legs that have the electronic monitoring device installed so that the need for further excavations may be minimized. Equipment typically used may include one or more excavators, multiple rubber-tired pickup trucks, inspection equipment, and, if necessary, a new drip leg. The work is done any time of year by a small crew typically of six to eight personnel. However, both the equipment and crew size vary based on the size and complexity of the job.

D-23 Potholing and Line Marker Installation

Prior to retrofitting a pipeline, several small excavations (called potholes) over the pipeline may be required to provide data on the amount of material covering the pipeline, and to determine the exact location and direction of pipeline fittings. These excavations are generally very small and only open for a short period of time. One method of potholing uses an air-knife, which is a vacuum truck using compressed air to create a hole over the pipeline. A vacuum is used to remove the excavated soil into a holding tank. The hole using this method is approximately 10 inches in diameter. Once the crew has obtained the required data, the soil in the holding tank is placed back in the excavated hole. Equipment typically used may include one vacuum truck, a holding tank, multiple rubber-tired pickup trucks, and small hand tools. The work is done any time of year by a small crew typically of

four to six personnel. However, both the equipment and crew size vary based on the size and complexity of the job.

D-24 Bores

Wherever feasible, boring is conducted when drainages do not contain flowing water. Project frac-out contingency plans are deployed where boring is required within 100 feet of a drainage. Boring techniques are used to install pipelines underground without trenching or excavation. Boring methods include jack and bore, Horizontal Directional Drilling (HDD) bore, and micro-tunnel. Boring may be used to cross highways, roads, railroads, rivers, or streams. HDD typically requires a shallow entry and exit pit for each bore. These pits are approximately 10 to 15 feet wide, up to 30 feet long, and 10 feet deep, but may depend on the size and depth necessary for the installation of the pipeline. The work area is usually about 400 feet by 200 feet for the entry pit and 100 feet by 200 feet for exit pit. Spoils from the excavation are placed alongside the pits. Spoils are used as backfill, and wet spoils are placed in detention basins if uncontaminated and otherwise suitable.

During HDD, drilling fluids may escape to the surface due to upward migration through fractures in overlying bedrock; this is known as "frac-out." Prior to HDD, geotechnical bores are typically conducted in order to provide information on the potential for frac-outs to occur. If the results show a possibility for frac-out, a frac-out plan is employed. In cases of high potential for frac-out, HDD activities are typically conducted when intersecting drainages are dry. Where perennial streams or waters known to support sensitive aquatic species require HDD, water diversions may be employed in order to mitigate risk by preventing a release to standing or flowing water. HDD are scheduled in ephemeral streams when flows are not present (anytime of year); frac-out contingency plans include visual observations of bore alignment to alert drill operator to cease activity at sign of frac-out as well as spill containment materials on site to prevent migration of drilling fluids.

When it is not feasible to avoid the breeding season for any of the Covered Species, drilling activities that are proposed within, or in close proximity to, suitable habitat for Covered Species, including access and staging areas, will be surveyed by a Project biologist using the appropriate protocols. The purpose of the protocol survey will be to assess the presence or absence of species afforded protection under the ESA or CESA. Protocol surveys shall occur within the appropriate timeframe for each covered species to maximize detectability. Where occupied habitat is encountered, the Project biologist approved by the USFWS will passively relocate the individual(s) prior to construction. A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species.

Bored crossings are also used under railroad rights-of-way, freeways, flood control channels, drainages, and some roadways depending on final design and on city and state planning review. Either a cased bore or a slick bore technique would be used for the bored crossings. In both types of crossings, a pit is excavated on each side of the facility to be crossed. These pits are typically 10 to 15 feet wide, up to 50 feet long, and 30 feet deep. The work area typically required is approximately 200 feet by 100 feet for the entry pit and 100 feet by 100 feet for the exit pit. Depth of the pits would depend on final pipeline depth.

Equipment typically used may include one boring machine, one or more flatbed trucks, welding trucks, truck-mounted cranes, sandblasting equipment, air compressors, multiple rubber-tired pickup trucks, and other tools and equipment as necessary (Table 2.2-2, *Equipment Requirements for HDD*). The work is done by a crew typically of eight to 12 personnel. However, both the equipment and crew size vary based on the size and complexity of the job.

TABLE 2.2-2
EQUIPMENT REQUIREMENTS FOR HDD

Equipment Type*	Number Required
Drill rig	1
Mud pumps	2–4
Mud mixing tanks	1–2
Power trailers (to drive rig hydraulics)	2
Hose rack	1
Generator	1
Control van	1
Modular drill pipe and storage rack set	1
Stores container	1
Baker tank	1
Crane	1
Backhoe	1

* Equipment needed may vary depending on length and soil and geotechnical characteristics.

D-25 Open-Trench Crossings

Open-trench crossings are used to install pipelines across waterways and vary according to local geology and the width, depth, and flow of the waterway. Earthen wildlife escape ramps are in place to avoid wildlife becoming entrapped. After completion of installation of pipeline using the open-trench crossing method, the pipeline trench is backfilled, and conditions, to the best extent feasible, usually are returned to pre-project conditions. Erosion of pipeline waterway crossings can result in pipeline exposures. Open trenches may also be necessary for direct inspection of pipelines. After inspection of exposed pipelines, the pipeline is covered and, to the best extent feasible, the area is usually restored to pre-erosion condition. This activity can occur at any time of the year, but is typically conducted during the dry season to avoid flowing water. Equipment typically used may include one or more excavators and multiple rubber-tired pickup trucks, with a crew of four to 10 personnel. However, both the equipment and crew size vary based on the size and complexity of the job.

Where it is not feasible to avoid the breeding season of any Covered Species, all ground-disturbing activities that are proposed within, or in close proximity to, suitable habitat for the Covered Species, including access and staging areas, will be surveyed by a Project biologist, approved by USFWS, using the appropriate protocols. The purpose of the protocol survey will be to assess the presence or absence of species afforded protection under the ESA or CESA. Protocol surveys shall occur within the appropriate timeframe for each covered species to maximize detectability. Where occupied habitat is encountered, the Project biologist approved by the USFWS will passively relocate the individual(s) prior to construction. A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species.

D-26 Water Diversion

Water diversions are typically used when construction occurs at pipeline crossings within streams, creeks, or other surface water bodies with flowing water. The diversion is used to isolate construction activities to minimize the potential for impacts to water quality and create a safe and dry work area. The type of water diversion used at each project site will vary according to local stream topography and geology and the width, depth, and flow of the waterway. Water diversions are either gravity fed

or mechanically pumped. Gravity diversions are created by blocking the flow at an upstream location and conveying the water around or through the site to a downstream discharge location using irrigation or polyvinyl chloride (PVC) pipe. Pumped diversions are similar but capture the water at the upstream location, and the water is pumped downstream through hoses or irrigation pipe to a discharge location. Both methods usually require the installation of energy dissipaters at the discharge location and sediment control devices to protect water quality. This activity can occur at any time during the year, depending on the urgency of a below-ground repair, but typically occurs outside the rainy season. Equipment typically used may include one or more excavators and multiple rubber-tired pickup trucks, with a crew of four to 10 personnel. However, both the equipment and crew size vary based on the size and complexity of the job.

Where it is not feasible to avoid breeding season for any Covered Species, all ground-disturbing activities that are proposed within, or in close proximity to, suitable habitat for the Covered Species, including access and staging areas, will be surveyed by a Project biologist, approved by USFWS, using the appropriate protocols. The purpose of the protocol survey will be to assess the presence or absence of species afforded protection under the ESA or CESA. Protocol surveys shall occur within the appropriate timeframe for each covered species to maximize detectability. Where occupied habitat is encountered during pre-construction surveys, the Project biologist approved by the USFWS will relocate the individual(s) of Covered Species to a segment of a channel designated as a relocation area on a project-by-project basis. A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species.

D-27 Installation of New Facilities

New construction may include the installation of pipelines and other natural gas infrastructure, such as pressure regulating stations, cathodic protection test stations, or other support facilities. To conservatively address new construction, one acre per year of temporary or permanent impact is anticipated for appurtenant facilities including replacement and upgrade of existing gas transmission and storage facilities, or O&M activities that may occur in the non-facilities area.

SoCalGas estimates that temporary and permanent impacts within the CRCP Plan Area will be 20.7 and 1.6 acres per year, respectively (Appendix D, *Effects Analysis Methods*). New pipelines and infrastructure may replace deteriorated facilities or upgrade the gas service to provide for more reliable gas deliveries. Additionally, when new customers are located in an area without existing natural gas service, SoCalGas is required by law to extend an existing pipeline to provide gas service. These “new customer extensions” are generally less than 10 miles in length, tend to be in existing public ROWs, and originate from existing supply or distribution pipelines. This activity can occur at any time during the year. Impacts to natural areas associated with new construction that occurs outside existing ROWs will be minimized in order to obtain incidental take coverage under this MSHCP (see Chapter 5, *Potential Biological Impacts and Take Assessment*). Equipment typically used for installation of new facilities includes multiple rubber-tired pickup and welding trucks, one flatbed truck with trailer or a dump truck with trailer, one backhoe, one trailer-mounted compressor, one truck-mounted crane, a side boom, pipe, barricades, and other tools and materials as necessary, with a crew of eight to 12 personnel. However, both the equipment and crew size vary based on the size and complexity of the job.

D-28 Pipeline Erosion Repair

Buried pipelines crossing beneath waterways can become exposed due to natural erosive forces that constantly change the composition and structure of creek bottoms. Storms can also move rocks

and/or boulders in the stream, which can cause substantial damage to the pipeline coating and can compromise the integrity of the pipeline, potentially leading to pipeline deterioration or failure. To protect the pipeline from additional external corrosion or possible failure, the preferred method is to use protective "articulated concrete block" mats. The installation of articulated mats, considered a discharge of fill material, within waters of the U.S. are subject to a USACE 404 permit. Coordination with the USACE may occur through the Section 7 consultation process. Concrete mats are installed on top of the pipeline to stabilize the stream bottom and reduce erosion above the pipeline. Typical pipeline exposure repairs often require cyclical maintenance or replacement after heavy rain events. In an effort to provide a more permanent solution, concrete mats provide a more proactive, long-term solution, and allow for vegetation to reestablish through the flexible concrete mats. This activity may include removing obstructions, installing creek diversions around work areas, and performing ground dewatering of the work area around the pipeline. This activity may also require performing full circumference excavations; removing the existing pipeline wrap, inspecting the pipeline for dents and external wall loss, and repairing the pipeline using bands of larger pipe welded in place (see also D-13, above); or replacement of the pipeline section. Upon completion of the inspection and repair, painting the pipeline surface, rewrapping the pipeline, performing grading operations within the creek to accommodate the protection mat installation, and installing a blanket of precast concrete revetment mats may be necessary. This activity typically occurs during the dry season (generally April–September). Equipment typically used for installation of new facilities includes multiple rubber-tired pickup and welding trucks, one excavator, one front end loader, one rubber-tired backhoe, gas-powered water pumps, welding equipment, with a crew of eight to 12 personnel. However, both the equipment and crew size vary based on the size and complexity of the job.

D-29 Coating Applications

Coatings are applied to pipelines and other appurtenances, such as tanks and vessels, in order to prevent corrosion. If necessary, old paint may be removed with high pressure equipment, chemicals, or by hand, prior to new coatings being applied. Ground tarps and other equipment are used to ensure that all the old paint is captured during removal. Although coatings can be applied at any time during the year, they are typically applied in the late spring and summer months. A small two- to three-person crew, one or more rubber-tired pickup trucks, and standard painting equipment are generally all that is necessary.

D-30 Geotechnical Investigation

Geotechnical investigations are used to determine suitability for directional bore replacement of pipe or to determine the stability of a slope below a pipeline. Equipment used varies based on the vertical and lateral extent of the required geotechnical investigation. Long or deep trenches are generally conducted by a crew of four to eight personnel using one backhoe, or an auger, and one or more rubber-tired crew trucks. The activity can occur any time of the year.

D-31 Removal of Abandoned Pipeline

SoCalGas may be required by new landowners or a previous landowner to remove an abandoned pipeline. Abandoned pipeline may exist in areas classified as open space or natural habitat. This activity may require performing full circumference excavations, removing the abandoned pipeline section. Where removal of abandoned pipelines requires boring within 100 feet of a natural drainage, the work would be undertaken as described for D-24, Bores. Where pipeline removals encroach in Waters of the US or waters of the State, coordination and notification of USACE and CDFW would

be completed as required pursuant to Section 404 of the federal Clean Water Act and Section 1600 of the State Fish and Game Code. Where abandoned pipelines cross under stream crossings, removal activities may include removing obstructions, installing creek diversions around work areas, and performing ground dewatering of the work area around the pipeline. This activity typically occurs during the dry (generally April–September) season. Equipment typically used for removal of abandoned pipelines typically includes multiple rubber-tired pickup and welding trucks, one excavator, one front end loader, one rubber-tired backhoe, gas-powered water pumps, welding equipment, and a crew of eight to 12 personnel; however, both the equipment and crew size vary based on the size and complexity of the job.

D-32 Install, Replace, or Upgrade Regulator Stations

Pressures within natural gas pipelines are managed, brought from high to low pressure, utilizing regulator stations. Pressures not only govern the movement of gas through the system but the safety of the system as well. The federal Department of Transportation and the CPUC regulate and oversee the inspection and operations and maintenance of the regulator stations to ensure that pipeline pressures support safe and reliable demand. This requires that SoCalGas conduct inspections, repair and replacement, and installation of regulator stations throughout the system.

Regulator stations are fitted to the pipeline and only slightly exceed these dimensions. Below-ground facilities include concrete vaults that consist of two 6- by 6-foot or 6- by 8-foot concrete boxes utilizing an approximately 25-square-foot footprint.

Maintenance activities range from simple repairs to complete replacement of underground concrete vaults. The replacement of underground facilities would require excavation using two to three backhoes and upwards of 10 employees.

Installation activities would include above-ground concrete pad, cage/fencing, instrumentation, and blow-off, as well as the placement of underground vaults. This small-scale construction would include excavation and grading using hand shovels or small bobcats to assist in road clearing as well as backhoes in the case of excavation.

Crews inspect, repair and install regulator stations throughout the year. Wherever possible, work requiring vegetation clearing is scheduled outside the bird breeding season (October to January). Where vegetation clearing must be undertaken during the breeding season, surveys are undertaken by a Project biologist or biological monitor to determine if there are any nests protected pursuant to the MBTA. Where nests afforded protection are identified, they are marked as a no-work area with a buffer of up to 250 feet. Buffers and work permitted near nests are dependent on the species behavior observed, and the discretion of the biologist present (see Section 6.2.7 for more on the Nesting Birds Policy). A Project biologist or biological monitor is required to be present during construction to ensure that there is no unlawful take of the protected species. For ground disturbance, work areas would be surveyed for burrows and their potential to support wildlife.

E. Storage Facilities

E-1 Well Maintenance Workover

Wells need to be maintained throughout the year to ensure the integrity of the gas and oil reservoir zones. Well depths can vary from several hundred to thousands of feet.

Workover rigs are set up to perform various activities related to well maintenance and inspection. These rigs are installed onto existing well sites at the well tree, and can vary in size according to job performed. Various drilling equipment, generators, and trucks will be necessary depending upon the size of the job. Crew size also varies according to well depth and the amount and type of maintenance necessary.

E-2 Well Drilling

New wells can be drilled to access oil and gas reservoirs at existing storage fields. Wells may be drilled to various depths ranging from several hundred to thousands of feet. When drilling a new well, work will continue nonstop until the correct depth is achieved and the job is completed. This may involve several months of round-the-clock work. A drilling rig is larger than a workover rig and has on-site generators, one or more vacuum trucks, storage tanks for drilling fluids, and storage for pipe casing. Due to the size and length of the operation, crew accommodations (e.g., trailers, portable restrooms, generators, and water totes) are typically necessary, although crew sizes are relatively small (five to seven personnel).

E-3 Storm Drains, Culverts and Catch Basin Cleaning

Regular maintenance of storm drains, culverts, and catch basins are necessary for compliance with Spill Prevention, Control and Countermeasure Plans, Storm Water Pollution Prevention Plans and Storm Water Management Plans. Clearing these drains, basins, and culverts of debris ensures erosion and runoff is restricted to existing designated drainage areas. Cleanouts of catch basins help to maintain capacities of the basins and prevent overflow in the event of a spill or high-volume storm event. Hydraulic clam buckets, backhoes, handheld tools, and light equipment vehicles may be used, and crew size typically depends upon the amount of debris and area to be cleaned. This activity can occur at any time during the year, but it generally occurs once or twice annually, prior to the beginning and after the end of the rainy season.

E-4 Well Cellar Cleaning

Storage field well cellars need to be kept free of debris and rainwater accumulation to allow access to well tree valves and keep personnel safe. Routine well cellar inspections are performed throughout the year, and debris and rainwater are removed if they are found. A small, one- to two-person crew and a portable cellar pump or vacuum truck are typically all that is necessary when a well cellar is cleaned.

E-5 Tank and Vessel Cleaning

Process vessels and storage tanks are periodically cleaned during the year to remove any sand or silt accumulation to protect components located downstream. The tank bottom waste is sent to disposal facilities. Vessels and tanks can be cleaned by a small, four- to five-person crew using a vacuum truck, portable blowers, a high-pressure washer, fire hoses, and an air compressor.

E-6 Electric Pole Installation

New electric poles are installed to help provide power to various locations throughout storage field boundaries. Older, preexisting electric poles also need to be replaced as necessary. Poles may be

replaced or installed at any time during the year. A boom truck, an operator, and a small two- to three-person crew are necessary to install and/or replace an electric pole.

E-7 Roadway Repair, Guard Rails and Pipe Supports

Nonpublic roadways and piping to remote well sites must be maintained for personnel safety, and for the protection of company property and the surrounding environment. Dirt roads may be paved where required for safety or to avoid or minimize erosion. Roadways and piping to well sites on hilly terrain can require bluff repairs due to rains or slippage. Pipe supports and guard rails may be added as necessary to increase pipeline stability and road safety. The equipment and number of crew necessary for each job are dependent upon the extent of the repairs and/or installation of safety features. While regular maintenance can be conducted throughout the year, emergency work is performed when threats to a pipeline or facility are identified. Equipment typically used for this activity includes multiple rubber-tired pickup trucks, one excavator, one motor grader, one bulldozer, one rubber-tired backhoe, one or more dump trucks, boring and drilling equipment, with a crew of six to 12 personnel, However, both the equipment and crew size vary based on the size and complexity of the job.

E-8 Seismic Testing

Seismic data is collected to define the subsurface geologic structure of the storage fields. A specialized vibration truck is used to generate ground vibration so that the seismic data can be acquired. Seismic testing can be conducted at any time, and the SoCalGas Underground Storage Department determines if and when it is necessary. The length of each job varies according to the amount of area covered. Crews typically consist of seven to 10 personnel.

E-9 Water, Oil, Air and Gas Line Repairs and Replacement

Storage fields have various utility lines to support oil and gas operations. These utility lines can include water, air, gas, and electric. Lines are periodically inspected and may need to be repaired or replaced depending on their condition. Line inspections are typically conducted during facility inspections, upgrades, or modifications. The equipment necessary to inspect and/or repair lines can vary depending upon the utility type. Buried utility line work would be expected to be consistent with the Covered Activities for below-ground construction, as described above.

E-10 Sump Investigation and Remediation

Historically, prior to natural gas storage, storage fields were used for oil production and sumps were used for the containment of spent drilling mud and/or other oilfield-related wastes as a result of the drilling process. These holding areas or depressions in the ground eventually become covered with soil and, consequently, vegetated. Field evidence suggests that sumps were covered with soil derived from earthwork cuts. Investigation is required to determine the locale of the historic sumps. These sumps are now subject to environmental testing for potential soil contamination (e.g., metals, petroleum hydrocarbons, solvents, and volatile organic compounds), per requirements set forth by the RWQCB. This testing is performed periodically. If contaminated soils are found, remediation is performed by removal of the contaminated soil and replacement with clean fill soil. Equipment typically used for this activity includes two rubber-tired pickup trucks, one backhoe, and inspection equipment, with a crew of four personnel.

2.3 Estimating Impacts

For the Covered Activities, SoCalGas has reviewed its historical records. Projects from 2003 to 2009 and 2013 to 2015 were analyzed, and impacts (to identify the activities that had the potential to result in temporary and permanent impacts) to the habitat of the Covered Species were determined. Most of the impacts were incurred during vegetation management to provide access for inspections; repair and replacement of pipelines, valves, odorant systems, and spans; and below-ground construction of buried pipelines and appurtenance facilities. To a lesser extent, O&M activities for storage facilities occasionally contributed to permanent and temporary impacts. Temporary and permanent impacts associated with emergency activities may result from the natural or anthropogenic causes of the emergency and the efforts required to resolve the emergency. Chapter 5, *Potential Biological Impacts and Take Assessment*, provides an analysis of the projected temporary and permanent impacts based on the trends evidenced in the historic data.

Chapter 3.0
COVERED SPECIES

This MSHCP covers 41 species, including 3 invertebrates, 1 fish, 4 amphibians, 2 reptiles, 6 birds, 3 mammals, and 22 plants. Of the 41 species, 26 species are federally listed as endangered and 9 species are federally listed as threatened. One species (burrowing owl) has no protection under the ESA but is a BCC that is frequently encountered in the CRCP Plan Area. Twenty of the 35 species with federal status are also afforded protection under the CESA. Three species with no federal status are listed as rare, threatened, or endangered under the CESA. The ITP will cover the 19 wildlife species. The ITP will not authorize incidental take of threatened and endangered plant species. However, 22 plant species are covered under the MSHCP in recognition of conservation benefits, to assist the Service in reviewing the effects to listed plants, and to provide "No Surprises" assurances under the ITP. These assurances are provided by the government through Section 10(a)(1)(B). In the event of "unforeseen circumstances," private landowners will not be required to commit additional land, water, financial compensation, or any other restrictions on the use of land, water, and natural resources beyond the level agreed to in the MSHCP. The 41 wildlife and plant species included in the MSHCP are referred to collectively as "Covered Species" (Table 3-1, *Covered Species*).

TABLE 3-1
COVERED SPECIES

Common Name	Scientific Name	Federal Status*	State Status**	Critical Habitat***
Invertebrates (3)				
Delhi sands flower-loving fly	*Rhaphiomidas terminatus abdominalis*	E	-	N/A
El Segundo blue butterfly	*Euphilotes battoides allyni*	E	-	Proposed
Morro shoulderband (banded dune) snail	*Helminthoglypta walkeriana*	E	-	Designated
Fish (1)				
Santa Ana sucker	*Catostomus santaanae*	T	-	Designated
Amphibians (4)				
Arroyo toad	*Anaxyrus californicus*	E	SSC	Designated
California red-legged frog	*Rana draytonii*	T	SSC	Designated
California tiger salamander	*Ambystoma californiense*	E	T	Designated
Mountain yellow-legged frog	*Rana muscosa*	E	E	Designated
Reptiles (2)				
Southern rubber boa	*Charina bottae umbratica*	-	T	N/A
Southwestern pond turtle	*Actinemys pallida marmorata*	-	SSC	N/A
Birds (6)				
Belding's savannah sparrow	*Passerculus sandwishensis beldingi*	-	E	N/A
Burrowing owl	*Athene cunicularia*	BCC	SSC	N/A
Coastal California gnatcatcher	*Polioptila californica californica*	T	SSC	Designated
Least Bell's vireo	*Vireo bellii pusillus*	E	E	Designated
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	E	Designated
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	T/BCC	E	N/A
Mammals (3)				
San Bernardino kangaroo rat	*Dipodomys merriami parvus*	E	SSC	Designated
San Joaquin kit fox	*Vulpes macrotis mutica*	E	T	N/A
Stephens' kangaroo rat	*Dipodomys stephensi*	E	T	N/A
Plants (22)				
Braunton's milk-vetch	*Astragalus brauntonii*	E	-	Designated
California seablite	*Suaeda californica*	E	-	NCH
Chorro Creek bog thistle	*Cirsium fontinale* var. *obispoense*	E	E	NCH
Conejo dudleya	*Dudleya abramsii* spp. *parva*	T	-	NCH

TABLE 3-1
COVERED SPECIES

Common Name	Scientific Name	Federal Status*	State Status**	Critical Habitat***
Gambel's water cress	*Nasturtium gambelii*	E	T	NCH
Gaviota tarplant	*Deinandra increscens* ssp. *villosa*	E	E	Designated
Indian Knob mountainbalm	*Eriodictyon altissimum*	E	E	NCH
Lompoc yerba santa	*Eriodictyon capitatum*	E	R	Designated
Lyon's pentachaeta	*Pentachaeta lyonii*	E	E	Designated
Marcescent dudleya	*Dudleya cymosa* ssp. *marcescens*	T	R	NCH
Morro manzanita	*Arctostaphylos morroensis*	T	-	NCH
Nevin's barberry	*Berberis nevinii*	E	E	Designated
Nipomo Mesa lupine	*Lupinus nipomensis*	E	E	NCH
Pismo clarkia	*Clarkia speciosa* ssp. *immaculata*	E	R	NCH
San Fernando Valley spineflower	*Chorizanthe parryi* var. *fernandina*	-	E	NCH
Santa Ana River woollystar	*Eriastrum densifolium* ssp. *Sanctorum*	E	E	NCH
Santa Monica Mountains dudleya	*Dudleya cymosa ssp. ovatifolia*	T	-	NCH
Seaside bird's beak	*Cordylanthus rigidus* ssp. *littoralis*	-	E	NCH
Slender-horned spineflower	*Dodecahema leptoceras*	E	E	NCH
Vandenberg monkey flower	*Diplacus vandenbergensis*	E	-	Designated
Ventura Marsh milk-vetch	*Astragalus pycnostachyus* var. *lanosissimus*	E	E	Designated
Verity's dudleya	*Dudleya verityi*	T	-	NCH

* Federal Status: Endangered (E); Threatened (T); Bird of Conservation Concern (BCC).
** State Status: Species of Special Concern (SSC); Threatened (T); Endangered (E); Rare (R).
*** Critical Habitat: Not applicable (N/A); No Critical Habitat Designated or Proposed (NCH).

The primary objective of this MSHCP is to ensure SoCalGas' compliance with the state and federal ESAs during implementation of its O&M activities and limited new construction, while protecting and contributing to the conservation of the Covered Species and their habitat through the implementation of an effective and comprehensive conservation strategy. This strategy is composed of a broad range of measures designed to avoid, minimize, and mitigate for impacts on Covered Species.

In determining which species to cover under this MSHCP, SoCalGas first developed an expansive list of plant and wildlife species to consider for coverage. This list was compiled using information from available data for the historic range of species that have the potential to be present in the CRCP Plan Area and for which take may be required by the covered projects:

- Informal and formal consultations with the USFWS and CDFW
- Historical observations and survey results associated with SoCalGas activities within the CRCP Plan Area
- USFWS Environmental Conservation Online System (ECOS) data for all threatened and endangered animals, plants, and critical habitat
- USFWS Carlsbad geographic information systems (GIS) species occurrence database (San Bernardino and Los Angeles counties)
- CDFW California Wildlife Habitat Relationships (CWHR) Life History Account and Range Maps, Biogeographic Information and Observation System (BIOD), and California Natural Diversity Database (CNDDB)

- CNPS's (online edition v8-03 0.39) Inventory of Rare and Endangered Vascular Plants of California

- USFS, Pacific Southwest Division Classification and Assessment with Landsat of Visible Ecological Groupings (CalVeg) Vegetation Classification and Mapping System

- Coordination with USDA Angeles National Forest, Los Padres National Forest, and San Bernardino National Forest

- Prior experience in the CRCP Plan Area of the approximately 20 biologists who participated in preparation of the MSHCP

- Coordination with CDFW, NMFS, and USACE for issues concerning the Southern California Steelhead Trout

Consideration of these data led to compilation of a species list comprising over 100 species of plants and animals with potential to occur in the CRCP Plan Area. Additional information was then gathered on status, population trends, distribution, threats, and conservation and management efforts (Appendix B, *Species Accounts*). The USFWS has announced that it will be commencing a 5-year review of selected species under the Endangered Species Act, with the initial phase between 2020 and 2022.[68] SoCalGas proceeded to further refine the species list through evaluation of several criteria, such as:

- Listing Status
- Availability of Legal Mechanism for Authorization for Take
- Historic and Extant Range
- Occurrence Data
- Potential Impact based on Proximity to Existing SoCalGas Facilities
- Lack of Existing Programmatic Coverage (Appendix C, *Process for Determining Target Species*)

[68] U.S. Fish and Wildlife Service. January27, 2020. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 66 Species in California and Nevada. Federal Register 85 (17): 4692–94. https://www.fws.gov/policy/library/2020/2020-01323.html

3.1 Covered Wildlife Species

Invertebrates

- Delhi sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*)
- El Segundo blue butterfly (*Euphilotes battoides allyni*)
- Morro shoulderband (*banded dune*) snail (*Helminthoglypta walkeriana*)

Fish

- Santa Ana sucker (*Catostomus santaanae*)

Amphibians

- Arroyo toad (*Anaxyrus californicus*)
- California red-legged frog (*Rana draytonii*)
- California tiger salamander (*Ambystoma californiense*)
- Mountain yellow-legged frog (*Rana muscosa*)

Reptiles

- Southern rubber boa (*Charina bottae umbratica*)
- Southwestern pond turtle (*Actinemys pallida*)

Birds

- Belding's savannah sparrow (*Passerculus sandwishensis beldingi*)
- Burrowing owl (*Athene cunicularia*)
- Coastal California gnatcatcher (*Polioptila californica californica*)
- Least Bell's vireo (*Vireo bellii pusillus*)
- Southwestern willow flycatcher (*Empidonax traillii extimus*)
- Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)

Mammals

- San Bernardino kangaroo rat (*Dipodomys merriami parvus*)
- San Joaquin kit fox (*Vulpes macrotis mutica*)
- Stephens' kangaroo rat (*Dipodomys stephensi*)

3.1.1 Delhi Sands Flower-Loving Fly (*Rhaphiomidas terminatus abdominalis*)

3.1.1.1 Status and Distribution

Delhi sands flower-loving fly (DSFF) is listed as endangered under the ESA. It has no listing under the CESA. No critical habitat rules have been published for DSFF. It is only known from Riverside

and San Bernardino Counties, where the Colton Dune system occurs. As of 2019, USFWS[69] estimates that approximately 1,028 acres of potential DSFF habitat remain, with approximately 900 acres known to be occupied across 12 sites within three recovery units:[70] Jurupa Recovery Unit, Colton Recovery Unit, and Ontario Recovery Unit. The Ontario Recovery Unit is not expected to sustain the species over the long term.[71] Suitable DSFF habitat that overlaps the CRCP Plan Area occurs in San Bernardino County within the Jurupa, Colton, and Ontario Recovery Units. In particular, an active main line pipe overlaps portions of the Colton Dunes Conservation Bank (northern and eastern extents) where high-quality habitat for DSFF occurs. SoCalGas O&M activities have the potential to encounter this species where facilities[72] overlap occupied habitat.

3.1.1.2 Habitat Characteristics and Use

DSFF occurs in areas that contain suitable soil conditions for the subterranean larval stages; adult nectar sources; and adult feeding, breeding, and perching areas. Occupied habitat tends to have sparse cover of perennial shrubs and other vegetation, usually in the range of 10 to 20 percent but sometimes approaching 50 percent. Three native plant species are primarily associated with occupied sites: buckwheat (*Eriogonum fasciculatum*), telegraph weed (*Heterotheca grandiflora*), and croton (*Croton californicus*).[73] However, DSFF can be tolerant of disturbances due to previous land uses, such as abandoned vineyards or grazing lands.[74]

Suitable habitat for DSFF contains soils mapped by the USDA as the "Delhi" series, which are characterized by loose, open, sandy soils that are subject to Aeolian influence. Oviposition occurs in the late summer months, and may be more common in close proximity to telegraph weed and/or native ant nests.[75] Little is known about the larval phase of the fly because development occurs completely underground. However, based on observations of similar species, they may be more commonly found within relatively moist soils located several feet below the surface where they are opportunistic subterranean predators.[76] In addition, it is believed that the underground larval/pupal stage may persist for several years, depending upon various environmental factors such as annual

[69] U.S. Fish and Wildlife Service. 2019. Delhi Sands Flower Loving Fly (Rhaphiomidas terminatus abdominalis) (Delhi Sands Flower Loving Fly Recovery Plan (1997).

[70] U.S. Fish and Wildlife Service. 1997. Delhi Sands Flower-Loving Fly (Rhaphiomidas terminatus abdominalis) Recovery Plan.

[71] U.S. Fish and Wildlife Service. 2008. Delhi Sands Flower Loving Fly (Rhaphiomidas terminatus abdominalis) 5-Year Review - Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc1898.pdf. Accessed 27 July 2017.

[72] "Facilities" is an all-inclusive term that includes both belowground and aboveground pipelines and appurtenance.

[73] U.S. Fish and Wildlife Service. 1997. Delhi Sands Flower-Loving Fly (Rhaphiomidas terminatus abdominalis) Recovery Plan.

[74] U.S. Fish and Wildlife Service. 2008. Delhi Sands Flower Loving Fly (Rhaphiomidas terminatus abdominalis) 5-Year Review - Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc1898.pdf. Accessed 27 July 2017.

[75] U.S. Fish and Wildlife Service. 2008. Delhi Sands Flower Loving Fly (Rhaphiomidas terminatus abdominalis) 5-Year Review - Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc1898.pdf. Accessed 27 July 2017.

[76] U.S. Fish and Wildlife Service. 2008. Delhi Sands Flower Loving Fly (Rhaphiomidas terminatus abdominalis) 5-Year Review - Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc1898.pdf. Accessed 27 July 2017.

rainfall, food availability, and weather conditions during the flight season.[77] DSFF emerge as adults from July through September during their flight season when they extract nectar from flowering shrubs and forbs.

3.1.2 El Segundo Blue Butterfly (*Euphilotes battoides allyni*)

3.1.2.1 Status and Distribution

The El Segundo blue butterfly (ESBB) is listed as an endangered species pursuant to the ESA. It has no listing under the CESA. Critical habitat for ESBB was proposed in 1977; however, the status of the proposed rule is unknown. It has historically resided in the El Segundo sand dunes in Los Angeles County. At the time when ESBB was federally listed, it was known from two locales: from Ocean Park to the north to beach bluffs between Malaga Cove in Palos Verdes and Redondo Beach to the south. The current range of ESBB now extends from Santa Barbara County to southern Los Angeles County. ESBB populations have increased due to successful efforts of the El Segundo Dunes Habitat Restoration Area as well as discovery of new populations. Current distribution for ESBB has grown to eight sites within these three distinct locations: two sites at the Los Angeles International Airport dunes location, two sites at the Chevron Preserve, and four sites near or north of Malaga Cove.[78] These areas consist of approximately 220 acres of occupied habitat. ESBB subspecies are restricted to three locations in what is left of the dunes and includes the Los Angeles International Airport dunes, the Chevron refinery dunes, and Malaga Cove.[79]

ESBB has recently been reported to occur at Vandenberg Air Force Base in Santa Barbara County. Based on surveys conducted in 2007 at Vandenberg Air Force Base, approximately 17,470 acres of potentially occupied ESBB habitat were recorded.[80] The entire ESBB distribution range is within the CRCP Plan Area. SoCalGas O&M activities have the potential to encounter this species where facilities overlap occupied habitat.

3.1.2.2 Habitat Characteristics and Use

ESBB is known to occur within the El Segundo sand dune ecosystem, which constitutes the largest coastal sand dune system between the mouth of the Santa Maria River in Santa Barbara County and Ensenada in Mexico. The vegetation has been defined as the sand verbena (*Abronia latifolia*)–beach bur (*Ambrosia chamissonis*) alliance (or dune mat).[81] Other native plants on the El Segundo sand dunes include coast buckwheat (*Eriogonum latifolium*), dunes golden bush (*Isocoma menziesii* var.

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[77] RBF. 2014. Habitat Conservation Plan for the Issuance of an Incidental Take Permit Under Section 10(A)(1)(B) of the Endangered Species Act for the Federally Endangered Delhi Sands Flower-Loving Fly Projects within Colton, California of San Bernardino County.

[78] U.S. Fish and Wildlife Service. 2008. Delhi Sands Flower Loving Fly (Rhaphiomidas terminatus abdominalis) 5-Year Review - Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc1898.pdf. Accessed 27 July 2017.

[79] Arnold, R.A. 1983. Ecological Studies of Six Endangered Butterflies (Lepidoptera: Lycaenidae); Island Biogeography, Patch Dynamics, and the Design of Habitat Preserves. Univ. California Pub. Ent. 99:1–161.

[80] U.S. Department of Defense. 2007. Relocatable In-Flight Interceptor Communications System Data Terminal #2 at Vandenberg Air Force Base.

[81] Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. A Manual of California Vegetation. 2nd ed. California Native Plant Society.

vernonioides), dunes wall flower (*Erysimum insulare*), dunes sun-cup (*Camissoniopsis cheiranthifolia*), and California croton (*Croton californicus*).[82]

ESBB has an exclusive host relationship with coast buckwheat (*Eriogonum parvifolium*), the flowers of which provide a food source for the larvae and nectar for the adults. Habitat requirements for *E. parvifolium* include shifting, wind-blown sand dunes. Plants supporting the highest concentration of larvae and adult butterflies are found in swales and on wind protected dune crests, which indicates that the slope and nature of the dunes are key environmental factors for the butterfly.[83]

3.1.3 Morro Shoulderband Snail (*Helminthoglypta walkeriana*)

3.1.3.1 Status and Distribution

The Morro shoulderband snail (MSS) is listed as endangered pursuant to the ESA. It has no listing under the CESA. Critical habitat for the MSS was designated in 2001 and consists of 2,566 acres located in San Luis Obispo County, California. A recovery plan for this species was established in 1998. MSS is found only in western San Luis Obispo County. Around the time the snail was listed as endangered, it was known to be distributed near Morro Bay. Its current known range includes areas south of Morro Bay, west of Los Osos Creek, and north of Hazard Canyon. Historically, the species has also been reported near the city of San Luis Obispo (type locality for "*morroensis*") and south of Cayucos.[84] The distribution range of MSS is entirely within the CRCP Plan Area; therefore, SoCalGas O&M activities have the potential to encounter this species where facilities overlap habitat.

3.1.3.2 Habitat Characteristics and Use

MSS is restricted to sandy soils of coastal dune and scrub communities, maritime chaparral, and grasslands and swales with shrubs that provide canopy and leaf litter.[85,86] However, this species has been occasionally observed in dense veldt grass (*Ehrharta* sp.) or on ice plants (*Drosanthemum floribundum*). MSS can be found under rocks, debris piles, and woody debris.

3.1.4 Santa Ana Sucker *(Catostomus santaanae)*

3.1.4.1 Status and Distribution

Santa Ana sucker (SAS) is listed as threatened pursuant to the ESA. It has no listing under the CESA. Critical habitat for this species was originally established in 2004 and revised to final designation in 2010. Critical habitat is divided into three units encompassing a total 9,331 acres over four counties (Los Angeles, San Bernardino, Riverside, and Orange). A recovery plan for this species was finalized in February 2017. Information about the historical distribution of SAS within its historical range is

[82] U.S. Fish and Wildlife Service. 1998. Recovery Plan for the El Segundo Blue Butterfly (Euphilotes battoides allyni).

[83] U.S. Fish and Wildlife Service. 1998. Recovery Plan for the El Segundo Blue Butterfly (Euphilotes battoides allyni).

[84] Roth, B. 1985. Status Survey of the Banded Dune Snail, Helminthoglypta walkeriana. Prepared for the U.S. Fish and Wildlife Service, Sacramento Endangered Species Office.

[85] U.S. Fish and Wildlife Service. 1991. Endangered and Threatened Wildlife Plants; Proposed Rule for Five Plants and Morro Shoulderband Snail from Western San Luis Obispo County. Proposed Rule. Federal Register 246:66400–408.

[86] U.S. Fish and Wildlife Service. 2003. Protocol Survey Guidelines for the Morro Shoulderband Snail (Helminthoglypta walkeriana).

incomplete; however, it is likely that the species' distribution within each of the watersheds it once occupied varied over time, depending on habitat suitability and access (for example, physical barriers or water availability). The species' range of the listed entity includes the Los Angeles River, San Gabriel River, and Santa Ana River basins.[87] Recent genetic work suggests the species is also native to the Santa Clara River.[88] Currently, dispersal barriers in the Santa Ana River restrict the range of SAS to approximately 34 miles: from the South La Cadena Drive Bridge in Colton to the approximate location of the California State Route 90–Santa Ana River bridge crossing in Yorba Linda. Within the San Gabriel River, the range of this species is restricted to approximately 26 miles in the upper portions of the watershed above San Gabriel Dam in the West Fork (east of Cogswell Dam), Bear Creek, North Fork, East Fork, and Cattle Canyon Creek. In the Los Angeles River watershed, its range is currently restricted to approximately 13 miles of Big Tujunga Creek (a tributary to the Los Angeles River) between Hansen and Big Tujunga Dams, and approximately 2.2 miles of Haines Creek (a tributary to Big Tujunga Creek).[89] There are other tributaries (for example, the lower portion of Little Tujunga Creek) that may be periodically occupied, but this depends on availability of water in the creek and habitat conditions. Due to the SAS CRCP Plan Area distributions within the CRCP Plan Area, SoCalGas O&M activities have the potential to encounter this species where facilities overlap occupied habitat.

3.1.4.2 Habitat Characteristics and Use

In general, SAS prefers cool, (<86 degrees Fahrenheit [° F]), well-oxygenated streams with good water quality, moderate gradient, velocity of approximately one foot per second, shallow depths (<3.2 feet), and streamside riparian vegetation that can provide refuge during seasonal floods and repopulation after flooding. Occupied streams may have flows from natural origins, or from wastewater discharge. SAS is also known to occur in channelized streams if the bottom is unlined.[90] Specific water quality tolerances for SAS have not been determined, although populations have been observed to thrive in clear water with a temperature less than 72°F.[91,92] Prime substrates consist of a mosaic of sand, gravel, cobble, and boulders in a series of riffles, runs, and pools, with shallow sandy stream margins.[93,94,95]

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[87] U.S. Fish and Wildlife Service. 2017. Recovery Plan for the Santa Ana Sucker.

[88] Richmond, J.Q., A.R. Backlin, C.Galst-Cavalcante, J.W. O'Brien, and R.N. Fisher. 2016. "Boom and Bust" Demography Distorts Genetic Signals of Population History in the Endemic Santa Ana Sucker (Catostomus santaanae) of Southern California. Unpublished manuscript.

[89] Richmond, J.Q., A.R. Backlin, C.Galst-Cavalcante, J.W. O'Brien, and R.N. Fisher. 2016. "Boom and Bust" Demography Distorts Genetic Signals of Population History in the Endemic Santa Ana Sucker (Catostomus santaanae) of Southern California. Unpublished manuscript.

[90] Brown, L.R., C.A. Burton, and K. Belitz. 2005. Aquatic Assemblages of the Highly Urbanized Santa Ana River Basin, California. American Fisheries Society Symposium 47: 267–87.

[91] U.S. Fish and Wildlife Service. 2017. Recovery Plan for the Santa Ana Sucker.

[92] Santa Ana Watershed Association (SAWA). 2014. Habitat Variability and Distribution of the Santa Ana Sucker, Catostomus santaanae, in the Santa Ana River from the Confluence of the Rialto Channel to the Prado Basin. Prepared for Santa Ana Watershed Project Authority, Riverside, CA.

[93] Saiki, M.K., B.A. Martin, G.W. Knowles, and P.W. Tennant. 2007. Life History and Ecological Characteristics of the Santa Ana Sucker, Castostomus santaanae. California Fish and Game 93 (2): 87–101.

[94] Feeney, F., and C.C. Swift. 2008. Description and Ecology of Larvae and Juveniles of Three Native Cypriniforms of Coastal Southern California. Ichthyological Research 55 (1): 65–77.

[95] Santa Ana Watershed Association (SAWA). 2014. Habitat Variability and Distribution of the Santa Ana Sucker, Catostomus santaanae, in the Santa Ana River from the Confluence of the Rialto Channel to the Prado Basin. Prepared for Santa Ana Watershed Project Authority, Riverside, CA.

3.1.5 Arroyo Toad (*Anaxyrus californicus*)

3.1.5.1 Status and Distribution

The arroyo toad is listed as an endangered species pursuant to the ESA. It has no listing under the CESA; however it is classified as an SSC by CDFW. Critical habitat was originally designated in 2005 and was revised to final designation in 2011.[96] Critical habitat for the arroyo toad includes 98,366 acres ranging from northern Santa Barbara County to San Diego County. A recovery plan for the arroyo toad was published in 1999. The arroyo toad is endemic to the coastal plains, mountains, and desert slopes of central and Southern California and northwestern Baja California, where the species occurs between sea level and 8,000 feet in elevation. Historically, this species ranged west of the deserts from the San Antonio River in southern Monterey County southward into northwestern Baja California Norte, Mexico.[97] Presently, it has been extirpated from approximately 65 to 75 percent of its former range and is now restricted to about 75 to 100 miles of streams and adjacent upland habitats in central and Southern California.[98]

Based on a recent report on the species,[99] extant arroyo toad populations occur at several locations within the CRCP Plan Area. These areas include the upper reaches of the Sisquoc River and Santa Ynez River watersheds in Santa Barbara County; the Sespe Creek and Piru Creek watersheds in Ventura County; and the upper reaches of the Santa Clara River, Los Angeles River, and Santa Ana River watersheds in Los Angeles County. However, these populations are generally in headwater areas that are remote from development, and SoCalGas facilities are not situated near most of these areas. Arroyo toad populations in the Santa Clara River and Mojave River watersheds (Los Angeles and San Bernardino Counties, respectively) are in the closest proximity to SoCalGas facilities; therefore, SoCalGas O&M activities have the potential to encounter this species where facilities overlap occupied habitat.

[96] U.S. Fish and Wildlife Service. 2011. Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Arroyo Toad; Final Rule. Federal Register 76: 7246–67.

[97] Stebbins, R. C. 1985. A Field Guide to Western Reptiles and Amphibians. McGraw-Hill.

[98] Sweet, S.S. 1993. Second Report on the Biology of the Arroyo Toad (Bufo microscaphus californicus) on the Los Padres National Forest of Southern California. Contract Report to U.S. Department of Agriculture, Forest Service, Los Padres National Forest, Goleta, CA.

[99] U.S. Fish and Wildlife Service. 2014. Arroyo Toad (Anaxyrus californicus) Species Report. Available at: https://www.fws.gov/ventura/docs/species/at/Arroyo%20Toad%20Final%20Species%20Report.pdf

3.1.5.2 Habitat Characteristics and Use

Arroyo toads inhabit both perennial and intermittent rivers and streams with shallow, sandy to gravelly pools adjacent to sand or fine gravel terraces. These toads require shallow slow-moving stream and riparian habitats that are naturally disturbed on a regular basis, primarily by flooding. Eggs and larvae require shallow pools with minimal current, little or no emergent vegetation, and sand or pea gravel substrate. Adults excavate shallow burrows for shelter during the day when the surface is damp or for longer intervals in the dry season.[100] Suitable upland habitat for aestivation includes riparian scrub, riparian woodland, floodplain scrub, and ruderal plant communities.[101]

3.1.6 California Red-Legged Frog (*Rana draytonii*)

3.1.6.1 Status and Distribution

The California red-legged frog (CRLF) is listed as a threatened species pursuant to the ESA. It has no listing under the CESA; however, it is classified as an SSC by CDFW. Critical habitat for this species was originally designated in 2006, and then revised to final designation in 2010. A recovery plan for the species was published in 2002.[102] Approximately 1,636,609 acres of critical habitat has been designated throughout California. Within the CRCP Plan Area, approximately 517,346 acres of critical habitat has been designated in Los Angeles, San Luis Obispo, Santa Barbara, and Ventura Counties. CRLF is a fairly widespread species in California's coastal streams as well as throughout the northern and southern Coast Ranges. The historical range of the CRLF extends from the vicinity of Point Reyes National Seashore in Marin County, California, on the coast and from the vicinity of Redding, California, inland, south to northwestern Baja California, Mexico.[103,104,105] CRLF has been documented in 46 counties in California but now remains in only 26 counties.[106] The greatest numbers occur in Monterey (32 occurrences), San Luis Obispo (36 occurrences), and Santa Barbara (36 occurrences) Counties. Within the CRCP Plan Area, most remaining populations occur in small streams along the coastline. Recovery efforts are underway, and CRLF have been reintroduced into several coastal streams within the CRCP Plan Area, particularly in the Santa Monica Mountains within western Los Angeles County. Therefore, SoCalGas O&M activities have the potential to encounter this species where facilities overlap occupied habitat.

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[100] U.S. Fish and Wildlife Service. 2000. Biological Opinion on the Effects of Ongoing National Forest Activities That May Affect Listed Riparian Species on the Cleveland National Forest, the Los Padres National Forest, the San Bernardino National Forest and Angeles National Forest in Southern California (1-6-99-F-21).

[101] Cadre Environmental. 2002. Arroyo Toad (Bufo californicus) Radio Telemetry and Pitfall Trapping Studies, Little Horsethief Canyon, Summit Valley Ranch, San Bernardino County, California. Prepared for California Department of Transportation, San Bernardino, CA.

[102] U.S. Fish and Wildlife Service. 2002. Recovery Plan for the California Red-legged Frog (Rana aurora draytonii).

[103] Hayes, M.P., and D.M. Krempels. 1986. Vocal Sac Variation among Frogs of the Genus Rana from Western North America. Copeia 1986 (4): 927–36.

[104] Jennings, M.R., and M.P. Hayes. 1985. Pre-1900 Overharvest of California Red-Legged Frogs (Rana aurora draytonii): The Inducement for Bullfrog (Rana catesbeiana) Introduction. Herpetologica 41 (1): 94–103.

[105] Storer, T.I. 1925. A Synopsis of the Amphibia of California. University of California Publications in Zoology 27: 1–342.

[106] U.S. Fish and Wildlife Service. 2000. Draft Recovery Plan for the California Red-Legged Frog (Rana aurora draytonii).

3.1.6.2 Habitat Characteristics and Use

CRLF larvae, juveniles, and adults have been collected from streams, creeks, ponds, marshes, sag ponds, stock ponds, deep pools and backwaters within streams and creeks, dune ponds, lagoons, and estuaries. Breeding adults are often associated with habitat characterized by shrubby riparian vegetation and with deep (>27 inches) still or slow-moving water.[107] Stands of Arroyo willow (*Salix lasiolepis*) are thought to provide the most suitable habitat structure, although cattails (*Typha sp.*) and bulrushes (*Scirpus sp.*) also provide suitable habitat.[108] While CRLF can occur in ephemeral or permanent streams or ponds, populations probably cannot be maintained in settings where surface water is not persistent. Juvenile CRLF seem to favor open, shallow aquatic habitats with dense submergent vegetation.

Dispersal sites typically provide forage and cover opportunities and include boulders or rocks; organic debris such as downed trees or logs; industrial debris; and agricultural features such as drains, watering troughs, spring boxes, and abandoned sheds.[109] CRLF also use small mammal burrows and moist leaf litter.[110] Incised stream channels with portions narrower and deeper than 18 inches may also provide habitat.[111] During periods of wet weather, starting with the first rains of fall, some individuals may make overland excursions through upland habitats. Researchers discovered in 1998 that frog movements are possible over the course of a wet season via upland habitat for about one mile.[112]

3.1.7 California Tiger Salamander (*Ambystoma californiense*)

3.1.7.1 Status and Distribution

The USFWS recognizes three distinct population segments (DPSs) of the California tiger salamander (CTS; Sonoma County, Central California, and Santa Barbara County). Only the Santa Barbara population has the potential to occur within the CRCP Plan Area, where CTS is listed as endangered pursuant to the ESA and threatened under the CESA. Critical habitat was designated for the species in 2004, and a recovery plan was published in 2016. Critical habitat for this DPS consists of 11,180 acres in northern Santa Barbara County. The Santa Barbara County DPS of the CTS is restricted to northern Santa Barbara County, generally between the cities of Santa Maria, Buellton, and Lompoc. All known occurrences of the Santa Barbara County DPS of the CTS are within the Santa Maria Basin

[107] Hayes, M.P., and M.R. Jennings. 1988. Habitat Correlates of Distribution of the California Red-Legged Frog (Rana aurora draytonii) and the Foothill Yellow-Legged Frog (Rana boylii): Implications for Management. In Management of Amphibians, Reptiles and Small Mammals in North America, eds. R.C. Szaro, K.E. Severson, and D.R. Patton, 144–158. U.S. Department of Agriculture Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-166.

[108] Jennings, M.R. 1988. Natural History and Decline of Native Ranids in California. In Proceedings of the Conference on California Herpetology, eds. H. F. DeLisle, P. R. Brown, B. Kaufman, and B. M. McGurty, 61–72. Southwestern Herpetologists Society, Special Publication (4).

[109] U.S. Fish and Wildlife Service. 2000. Biological Opinion on the Effects of Ongoing Forest Activities That May Affect Listed Riparian Species on the Cleveland National Forest, the Los Padres National Forest, the San Bernardino National Forest, and Angeles National Forest in Southern California (1-6-99-F-21).

[110] Jennings, M.R., and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California, under Contract 8023. California Department of Fish and Game.

[111] Federal Register 61: 25813.

[112] Federal Register 65: 54894.

Geomorphic Province, generally between the interface of the Santa Ynez Mountains and the Coast Ranges (the San Luis Range and San Rafael Mountains). The entirety of the Santa Barbara County DPS of CTS occurs within the CRCP Plan Area; therefore, SoCalGas O&M activities have the potential to encounter this species where facilities overlap occupied habitat.

3.1.7.2 Habitat Characteristics and Use

CTS is a lowland species restricted to grasslands and foothill regions where its breeding habitat (persistent rain-filled pools) occurs.[113] An important habitat requirement for this species is the presence of dry-season refuge sites within a reasonable distance of breeding sites (up to one mile).[114] During and after winter and spring rains, adult CTSs move from subterranean burrow sites to breeding pools during November through February.[115] During the winter months, CTS take refuge in damp places near the surface of the ground during the day and emerge at night to forage.[116] During dry weather, they take refuge in ground squirrel burrows, other burrows, or in crevices in the soil.[117]

3.1.8 Southern Mountain Yellow-Legged Frog (*Rana muscosa*)

3.1.8.1 Status and Distribution

The USFWS recognizes two DPSs of the mountain yellow-legged frog (MYLF), which are the Northern DPS and Southern DPS. The Southern California DPS extends in to the CRCP Plan Area. The Southern MYLF was listed as endangered in 2002 in accordance with the ESA.[118] No change in the listing status was recommended as a result of the most recent five-year review in 2012.[119] On September 15, 2010, the California Fish and Game Commission accepted a petition from the Center for Biological Diversity to list all populations of the mountain yellow-legged frog (*Rana muscosa* and *Rana sierrae*) as "endangered" under the CESA. On February 2, 2012, the California Fish and Game Commission acted to add both species (now classified as two DPSs of the same species) of the MYLF to the list of animals protected under the CESA, as "endangered."[120] Critical habitat was designated for this species in 2006, including approximately 8,283 acres for the Southern DPS.[121] There is no approved recovery plan for the Southern California DPS.

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[113] U.S. Department of Agriculture Forest Service. 2006. Species Accounts: California Tiger Salamander. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm. Accessed 27 July 2017.

[114] Austin, C.C., and H. B. Shaffer 1992. Short, Medium, and Long-Term Repeatability of Locomotor Performance in the Tiger Salamander, Ambystoma californiense. Functional Ecology 6 (2): 145–153.

[115] Jennings, M.R., and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California, under Contract 8023. California Department of Fish and Game.

[116] Storer, T.I. 1925. A Synopsis of the Amphibia of California. University of California Publications in Zoology 27: 1-342.

[117] Loredo, I., D. Van Vuren, and M.L. Morrison. 1996. Habitat Use and Migration Behavior of the California Tiger Salamander. Journal of Herpetology 30 (2): 282–85.

[118] U.S. Fish and Wildlife Service. 13 July 2012. Mountain Yellow-Legged Frog (*Rana muscosa*) Southern California Distinct Population Segment, 5-Year Review: Summary and Evaluation.

[119] U.S. Fish and Wildlife Service. 13 July 2012. Mountain Yellow-Legged Frog (*Rana muscosa*) Southern California Distinct Population Segment, 5-Year Review: Summary and Evaluation.

[120] Erdman, Jim, Dawne Emery, and Jack Crayon. 2016–2017. Mountain Yellow-Legged Frog Threats and Status. California Department of Fish and Wildlife.

[121] U.S. Fish and Wildlife Service. 2006. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Southern California Distinct Population Segment of the Mountain Yellow-Legged Frog (Rana muscosa); Final Rule. Federal Register 71: 54344–86.

The Southern DPS of MYLF occurs in the San Bernardino, San Gabriel, and San Jacinto Mountains of Southern California at elevations of 1,200 to 7,500 feet.[122] Currently, extant populations are known from only 10 locations, all of which are at least partially on National Forest System lands.[123,124,125] These locations are in Los Angeles, Riverside, and San Bernardino Counties. They include Devil's Canyon, Little Rock Creek, the South Fork of Big Rock Creek, Vincent Gulch, and Bear Gulch in the San Gabriel Mountains (Angeles National Forest); the East Fork of City Creek in the San Bernardino Mountains (San Bernardino National Forest); and Fuller Mill Creek, Dark Canyon, Tahquitz-Willow Creek, and Indian Creek (Hall Canyon) in the San Jacinto Mountains (San Bernardino National Forest). Because the species occurs in remote locations at high elevations, most known occurrences of the Southern DPS of MYLF are not in close proximity to SoCalGas facilities. However, this species has the potential to be encountered during O&M activities in the vicinity of Big Bear City in the San Bernardino Mountains[126] where facilities overlap occupied habitat.

3.1.8.2 Habitat Characteristics and Use

In Southern California, MYLF inhabits perennial mountain streams (i.e., streams that contain plunge pools or backwaters year-round, although not necessarily flowing year-round) with steep gradients—often in the chaparral belt—but may range into small meadow streams at higher elevations.[127,128] These streams are typically characterized by rocky substrates and overhead cover with cool waters originating from springs and snowmelt. Eggs are typically deposited in shallow water and may be attached to undercut banks or vegetation but may also be found attached to stones on the stream bottom.[129] The species occurs along a variety of shorelines but appears to prefer open stream and lake margins that gently slope to a depth of two to three inches.[130] Where characteristics of mountain

[122] Stebbins, R.C. 1985. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin.

[123] U.S. Fish and Wildlife Service. 2001. Biological and Conference Opinions on the Continued Implementation of Land and Resource Management Plans for the Four Southern California National Forests, as Modified by New Interim Management Direction and Conservation Measures (1-6-00-F-773.2).

[124] U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Southern California Distinct Vertebrate Population Segment of the Mountain Yellow-Legged Frog (Rana muscosa). Final Rule. Federal Register 67: 44382–92.

[125] U.S. Fish and Wildlife Service. 13 July 2012. Mountain Yellow-Legged Frog (*Rana muscosa*) Southern California Distinct Population Segment, 5-Year Review: Summary and Evaluation.

[126] U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Southern California Distinct Vertebrate Population Segment of the Mountain Yellow-Legged Frog (Rana muscosa). Final Rule. Federal Register 67: 44382–92.

[127] U.S. Fish and Wildlife Service. 2001. Biological and Conference Opinions on the Continued Implementation of Land and Resource Management Plans for the Four Southern California National Forests, as Modified by New Interim Management Direction and Conservation Measures (1-6-00-F-773.2).

[128] U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Southern California Distinct Vertebrate Population Segment of the Mountain Yellow-Legged Frog (Rana muscosa). Final Rule. Federal Register 67: 44382–92.

[129] Zweifel, R.G. 1955. Ecology, Distribution, and Systematics of Frogs of the Rana boylei Group. University of California Publications in Zoology 54 (4): 207–92.

[130] Jennings, M.R., and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California, under Contract 8023. California Department of Fish and Game.

streams extend to lower elevations (e.g., Eaton Canyon, San Gabriel River), MYLF have been recorded at elevations below 1,500 feet.[131]

3.1.9 Southern Rubber Boa (*Charina bottae umbratica*)

3.1.9.1 Status and Distribution

The southern rubber boa (SRB) has no listing under the ESA. SRB was listed as threatened under the CESA in June 1971. No critical habitat or recovery plan has been designated for this species. Populations of SRB are known to occur in the Tehachapi Mountains, Kern County; the Mt. Pinos area (including Mt. Abel and Alamo Mountain), straddling the Kern-Ventura County line; the San Bernardino Mountains in San Bernardino County; and the San Jacinto Mountains in Riverside County.[132] SRB is found in the San Bernardino and San Jacinto Mountains at elevations of 5,050 to 8,070 feet,[133] but it is absent from the San Gabriel Mountains. The Ventura County and San Bernardino County populations are potentially within the CRCP Plan Area on federal National Forest System lands; therefore, SoCalGas O&M activities have the potential to encounter this species where facilities overlap occupied habitat.

3.1.9.2 Habitat Characteristics and Use

SRB is associated with moist woodlands and coniferous forests, which include Jeffrey pine (*Pinus jeffreyi*), sugar pine (*Pinus lambertiana*), white fir (*Abies concolor*), and black oak (*Quercus kelloggii*). It tends to be associated with densely vegetated sites, usually with deep, well-developed soils. SRB is a burrower and commonly makes use of rock outcrops as hibernacula. Large downed logs and a well-developed litter/duff layer are considered important for cover and for maintaining high soil moisture. Soil moisture may be a limiting factor for rubber boas, as they are usually found during summer months in damp draws near springs, seeps, and streams. Young are born alive in loose, well-aerated soil, under surface objects, or within rotting logs.[134]

Individuals may migrate annually between the ridges and canyon bottoms as they move from winter hibernacula to summer habitat. SRB is highly secretive due to its burrowing habit and crepuscular or nocturnal activity. In the spring when they emerge from their winter hibernacula in rock outcrops, individuals are usually found under rocks, logs, and other surface objects.[135]

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[131] U.S. Fish and Wildlife Service. 2001. Biological and Conference Opinions on the Continued Implementation of Land and Resource Management Plans for the Four Southern California National Forests, as Modified by New Interim Management Direction and Conservation Measures (1-6-00-F-773.2).

[132] Hoyer, R.F., and G.R. Stewart. 2000. Biology of the Rubber Boa (*Charina bottae*), with Emphasis on C. b. umbratica. Part I: Capture, Size, Sexual Dimorphism, and Reproduction. Part II: Diet, Antagonists, and Predators. Journal of Herpetology 34 (3): 348–60.

[133] Stewart, G.R. 1988. The Rubber Boa (*Charina bottae*) in California, with Particular Reference to the Subspecies, C. b. umbratica. In Proceedings of the Conference on California Herpetology. Southwestern Herpetologists' Society Special Publication No. 4.

[134] U.S. Department of Agriculture Forest Service 2006. Species Accounts: Animals. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm. Accessed 27 July 2017.

[135] U.S. Department of Agriculture Forest Service 2006. Species Accounts: Animals. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm. Accessed 27 July 2017.

3.1.10 Southwestern Pond Turtle (*Actinemys pallida*)

3.1.10.1 Status and Distribution

The southwestern pond turtle (SWPT) has no listing under the ESA, although it is currently under review for such listing. It is not listed under the CESA; however, it is a CDFW SSC. No critical habitat designations or recovery plan are in place for this species. SWPT is found from south of San Francisco Bay to northern Baja California at elevations of around sea level to 6,500 feet.[136] This subspecies intergrades with northern pond turtles (*Actinemys marmorata*) over a large area in central California.[137,138] Historically, pond turtles occurred throughout most of the west coast of North America, primarily west of the Cascade-Sierra crest, from western British Colombia to northern Baja California.[139] Currently, there are records of isolated populations occurring in Afton Canyon and the upper Mohave River in the Mojave Desert and in the Amargosa River in Los Angeles County.[140] SWPT occurrences have been recorded in 53 sites located in Ventura, Los Angeles, San Diego, Orange, San Bernardino, and Riverside Counties.[141,142,143]

Within the CRCP Plan Area, SWPT has been documented in Los Angeles, San Luis Obispo, Santa Barbara, and Ventura Counties. The species occurs throughout the Los Padres National Forest, with populations concentrated in Piru Creek, Sespe Creek, the Indian Creek/Mono Creek area, the Sisquoc River/Manzana Creek area, Alamo Creek, the Nacimiento River, and Arroyo Seco Creek. The species also occurs in most of the small coastal drainages of Santa Barbara and San Luis Obispo Counties. Although the number of occurrences has been reduced from historic levels, SWPT likely persists in most of the rivers and streams within the CRCP Plan Area that are in a relatively natural condition; therefore, SoCalGas O&M activities have the potential to encounter this species where facilities overlap habitat.

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[136] U.S. Department of Agriculture Forest Service 2006. Species Accounts: Animals. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm. Accessed 27 July 2017.

[137] Bury, R.B. 1970. Clemmys marmorata. Catalogue of American Amphibians and Reptiles 100: 1–3.

[138] Stebbins, R.C. 1985. A Field Guide to Western Reptiles and Amphibians. 2nd ed. Houghton Mifflin.

[139] Ernst, C.H., J.E. Lovich, and R.W. Barbour. 1994. Turtles of the United States and Canada. Smithsonian Institution Press.

[140] Lovitch, J.E. 1999. Western Pond Turtle Clemmys marmorata. Department of Biology, University of California, Riverside.

[141] Brattstrom, B.H. 1988. Habitat Destruction on California with Special Reference to Clemmys marmorata: A Perspective. In Proceedings of the Conference on California Herpetology, ed. H.F. DeLisle, P.R. Brown, B. Kaufman, and B.M. McGurty. Southwestern Herpetological Society.

[142] Brattstrom, B.H., and D.F. Messer. 1988. Current Status of the Southwestern Pond Turtle, Clemmys marmorata pallida, in Southern California. Final Report for California Department of Fish and Game, Contract C-2044.

[143] Lovitch, J.E. 1999. Western Pond Turtle Clemmys marmorata. Department of Biology, University of California, Riverside.

3.1.10.2 Habitat Characteristics and Use

SWPT inhabits a wide variety of aquatic habitats including rivers, streams, lakes, ponds, wetlands, reservoirs, and brackish estuarine waters.[144] It is also found in abandoned gravel pits, stock ponds, and sewage treatment plants; however, individuals occurring in such habitats are likely displaced individuals and do not represent viable breeding populations.[145,146] SWPT requires emergent basking sites for thermoregulation, which can include rocks, logs, or emergent vegetation.[147] It may be found in waters with temperatures as low as 34° F, and rarely in water with temperatures exceeding 104° F.[148] Aquatic refugia consist of rocks, logs, mud, submerged vegetation, and undercut banks. Terrestrial overwintering habitat consists of burrows in leaf litter or soil. Upland nesting sites must be dry and often have high clay or silt content. Typically, SWPT digs nests on unshaded slopes that are not steeper than 25 degrees and that may be at least in part south-facing.[149] Nesting has been reported to occur up to approximately 660 feet from water.[150]

3.1.11 Belding's Savannah Sparrow (*Passerculus sandwishensis beldingi*)

3.1.11.1 Status and Distribution

Belding's savannah sparrow (BSS) is not listed under the ESA. It was listed as endangered under the CESA in 1974. No critical habitat or recovery plan has been established for this subspecies. BSS is a coastal salt marsh-endemic species that ranged historically from Goleta in Santa Barbara County south to el Rosario, Baja California, Mexico. Currently, 27 of the coastal salt marsh systems from Goleta Slough in Santa Barbara County in the north to Tijuana Slough National Wildlife Refuge on the Mexican border support breeding populations of BSS.[151] The CRCP Plan Area overlaps the current known distribution of BSS at eight salt marsh sites in Santa Barbara, Ventura, and Los Angeles Counties, including Devereux Slough, Goleta Slough, Carpinteria Marsh, McGrath Beach State Park, Ormond Beach Wetlands, Mugu Lagoon, Ballona Wetlands, and Los Cerritos Marsh.[152] SoCalGas

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[144] U.S. Department of Agriculture Forest Service 2006. Species Accounts: Animals. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm. Accessed 27 July 2017.

[145] Holland, D.C. 1994. The Western Pond Turtle: Habitat and History. U.S. Department of Energy, Bonneville Power Administration.

[146] Jennings, M.R., and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California, under Contract 8023. California Department of Fish and Game.

[147] U.S. Department of Agriculture Forest Service 2006. Species Accounts: Animals. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm. Accessed 27 July 2017.

[148] Holland, D.C. 1994. The Western Pond Turtle: Habitat and History. U.S. Department of Energy, Bonneville Power Administration.

[149] U.S. Department of Agriculture Forest Service 2006. Species Accounts: Animals. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm. Accessed 27 July 2017.

[150] Jennings, M.R., and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California, under Contract 8023. California Department of Fish and Game.

[151] Zembal, R., S.M. Hoffman, and R.T. Patton. 2015. A Survey of the Belding's Savannah Sparrow (Passerculus sandwichensis beldingi) in California, 2015. Nongame Wildlife Program Report, 2015-02. California Department of Fish and Wildlife, Wildlife Branch.

[152] Zembal, R., S.M. Hoffman, and R.T. Patton. 2015. A Survey of the Belding's Savannah Sparrow (Passerculus sandwichensis beldingi) in California, 2015. Nongame Wildlife Program Report, 2015-02. California Department of Fish and Wildlife, Wildlife Branch.

O&M activities have the potential to encounter this subspecies where facilities overlap occupied habitat.

3.1.11.2 Habitat Characteristics and Use

BSS is closely associated with dense pickleweed, particularly *Salicornia virginica*, within which most nests are found.[153] They occur in greatest numbers and densities in marshes with regular tidal flushing,[154] and avoid areas that are flooded too frequently. The subspecies is not present in freshwater-influenced brackish marsh habitat. BSS may also be excluded from narrow bands (less than 32 feet wide) of salt marsh present along upland and freshwater marsh-interfaces due to competition with other species. Nesting is semicolonial or locally concentrated within dense pickleweed habitat from late March through June.

3.1.12 Burrowing Owl (*Athene cunicularia*)

3.1.12.1 Status and Distribution

Burrowing owl is not listed under the ESA, although it is considered a BCC by USFWS. A BCC is any migratory non-game bird without additional conservation actions that is likely to become a candidate for listing under the ESA.[155] It is not listed under the CESA; however, it is listed as an SSC by CDFW. No critical habitat or approved recovery plan has been established in California. Historically, the burrowing owl was widely distributed throughout California. The largest numbers remaining in the central and southern coast regions are in Riverside and San Bernardino Counties.[156] Burrowing owls also occur sporadically in southern desert regions, such as across most of the Mojave and Colorado Deserts of Inyo, eastern Kern, northern Los Angeles, San Bernardino, eastern Riverside, eastern San Diego, and Imperial Counties.[157] Within the CRCP Plan Area, the current burrowing owl breeding range is restricted to San Bernardino County and the easternmost portion of Los Angeles County.[158] SoCalGas O&M activities have the potential to encounter this species where facilities overlap occupied habitat.

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[153] Zembal, R., S.M. Hoffman, and R.T. Patton. 2015. A Survey of the Belding's Savannah Sparrow (Passerculus sandwichensis beldingi) in California, 2015. Nongame Wildlife Program Report, 2015-02. California Department of Fish and Wildlife, Wildlife Branch.

[154] Zembal, R., K.J. Kramer, and M.J. Elpers. 1987. A Survey of Belding's Savannah Sparrows in California, 1986. A Report to the U.S. Navy, Natural Resources Management Branch.

[155] U.S. Fish and Wildlife Service. 2015. Birds of Conservation Concern. Available at: https://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php

[156] Comrack, L., and Mayer, D. 2003. An Evaluation of the Petition to List the California Population of the Western Burrowing Owl (Athene cunicularia hypugaea) as an Endangered or Threatened Species. Available at: http://www.defenders.org/sites/default/files/publications/petition_evaluation_for_western_burrowing_owl.pdf. Accessed 27 July 2017.

[157] Center for Biological Diversity. 2003. Petition to the State of California Fish and Game Commission and Supporting Information for Listing the California Population of the Western Burrowing Owl (Athene cunicularia hypugaea) as an Endangered or Threatened Species under the California Endangered Species Act. Available at: http://www.biologicaldiversity.org/species/birds/western_burrowing_owl/pdfs/petition.pdf. Accessed 17 July 2017.

[158] Gervais, Jennifer A., Daniel K. Rosenberg, and Lyann A. Comrack. 2008. Burrowing Owl. In California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California, ed. W. D. Shuford and T. Gardali. Studies of Western Birds 1. Western Field Ornithologists and California Department of Fish and Game.

3.1.12.2 Habitat Characteristics and Use

Burrowing owls usually inhabit desert and grassland habitat and, in many cases, urban and agricultural landscapes. Occupied habitats are characterized by flat, open areas with sparse vegetation that is typical of heavily grazed grasslands, low-stature grasslands, sparse sage scrub, or desert vegetation that also includes available burrows.[159] As burrowing owls require underground burrows or artificial structures for shelter and nesting, they are associated with other burrowing animals such as ground squirrels, badgers, and kit fox. They may also use artificial structures such as drain pipes and culverts. Burrows are used year-round and are an essential component to the life history of burrowing owls.

3.1.13 Coastal California Gnatcatcher (*Polioptila californica californica*)

3.1.13.1 Status and Distribution

The coastal California gnatcatcher (CAGN) is listed as threatened under the ESA. It is not listed under the CESA; however, it is considered a CDFW SSC. Critical habitat for CAGN was designated in 2007 and consists of approximately 197,303 acres distributed within six counties (Los Angeles, Orange, San Bernardino, San Diego, Riverside, and Ventura).[160] No recovery plan has been published for this species. It is distributed around the coastal slopes of Southern California and into Baja California, Mexico. This distribution includes portions of the following counties: Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura. Within its overall range, historic and current distribution is patchy, which can be common in some areas of suitable habitat and scarce or absent in others.[161] In the CRCP Plan Area, CAGN is distributed within portions of San Bernardino, Los Angeles, and Ventura Counties. SoCalGas O&M activities have the potential to encounter this subspecies where facilities overlap occupied habitat. There are 36 total HCPs for CAGN according to the USFWS ECOS database.[162] Due to the subspecies' spotty distribution, there are some gaps of coverage within the CRCP Plan Area, which is why CAGN is included in this MSHCP.

[159] Johnsgard, P. A. 1988. North American Owls Biology and Natural History. Smithsonian Institution.

[160] U.S. Fish and Wildlife Service. 2007. Endangered and Threatened Wildlife and Plants; Reopening of Public Comment Periods for the Proposed Designations of Critical Habitat for the Coastal California Gnatcatcher and the San Diego Fairy Shrimp. Proposed Rules: Reopening of Public Comment Periods. Federal Register 72: 15857–59.

[161] U.S. Fish and Wildlife Service. 2010. Coastal California gnatcatcher 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3571.pdf. Accessed 27 July 2017.

[162] U.S. Fish and Wildlife Service. 2016. Species Profile for Coastal California gnatcatcher (*Polioptila californica californica*). Available at: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B08X#recovery. Accessed 27 July 2017.

3.1.13.2 Habitat Characteristics and Use

CAGN occurs almost exclusively within sage scrub vegetation, but can occasionally be found in chaparral, grassland, or riparian communities adjacent to sage scrub habitat.[163] Characteristic sage scrub plant species include California sagebrush (*Artemisia californica*), various species of sage (*Salvia* spp.), California buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), California encelia (*Encelia californica*), coyote brush (*Baccharis pilularis*), cholla cactus (*Cylindropuntia* spp.), and golden bush (*Isocoma menziesii*).[164] Suitable sage scrub habitat typically includes shrub cover of between 20 and 60 percent,[165] with a minimum height of approximately 3.2 feet.[166] It also prefers nesting in areas with less than 40 percent slope gradient,[167] but it has been has been recorded on slopes with greater than 50 percent slope gradient.[168] Approximately 99 percent of CAGN occurrences are below 2,000 feet in elevation. Nests are typically constructed within California sagebrush approximately three feet above the ground. The breeding season is between late February and July, but nest initiation occurs most often between mid-March and mid-May.

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

3.1.14.1 Status and Distribution

The least Bell's vireo (LBV) is listed as endangered under the ESA and the CESA. Critical habitat for this subspecies was established in 1994. Approximately 38,000 acres were designated critical habitat in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego Counties.[169] During the breeding season (starting in late March), this subspecies is distributed throughout Southern California, where suitable riparian habitat occurs from Santa Barbara County southward, including Ventura, Los Angeles, Orange, San Diego, Riverside, and San Bernardino Counties. Records also exist from Inyo, Kern, Monterey, San Benito, and Stanislaus Counties.[170] LBV may occur in the CRCP Plan Area where suitable habitat is present at the minimum area requirements for a breeding territory (one-half acre).[171] Within San Bernardino County, the majority of territories occur

[163] U.S. Fish and Wildlife Service. 2010. Coastal California Gnatcatcher 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3571.pdf. Accessed 27 July 2017.

[164] Oberbauer, Thomas, Meghan Kelly, and Jeremy Buegge. March 2008. Draft Vegetation Communities of San Diego County. (Based on Preliminary Descriptions of the Terrestrial Natural Communities of California, Robert F. Holland, October 1986.)

[165] Mock, P. 2004. California Gnatcatcher (Polioptila californica). In The Coastal Scrub and Chaparral Bird Conservation Plan: A Strategy for Protecting and Managing Coastal Scrub and Chaparral Habitats and Associated Birds in California. California Partners in Flight. Available at: http://www.prbo.org/calpif/htmldocs/scrub.html

[166] Beyers, J.L., and W.O. Wirtz. 1997. Vegetative Characteristics of Coastal Sage Scrub Sites Used by California Gnatcatchers: Implications for Management in a Fire-Prone Ecosystem. In Proceedings: First Conference on Fire Effects on Rare and Endangered Species and Habitats, Coeur d'Alene, ID. International Association of Wildland Fire.

[167] Mock, P. 2004. California Gnatcatcher (Polioptila californica). In The Coastal Scrub and Chaparral Bird Conservation Plan: A Strategy for Protecting and Managing Coastal Scrub and Chaparral Habitats and Associated Birds in California. California Partners in Flight. Available at: http://www.prbo.org/calpif/htmldocs/scrub.html

[168] Grishaver, M.A., P.J. Mock, and K.L. Preston. 1998. Breeding Behavior of the California Gnatcatcher in Southwestern San Diego County, California. Western Birds 29: 299–322.

[169] Federal Register 59: 4845–67.

[170] U.S. Fish and Wildlife Service. 2006. Least Bell's Vireo 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc781.pdf. Accessed 27 July 2017.

[171] Kus, B. E. 1991. Habitat Use and Breeding Status of the Least Bell's Vireo at the Tijuana River, California. International Boundary and Water Commission.

along the Santa Ana River and its tributaries (including flood control facilities), and the Prado Reservoir in San Bernardino County. In Los Angeles and Ventura Counties, the largest population is along the Santa Clara River and its tributaries (including flood control facilities). The largest population in Santa Barbara County occurs along the Santa Ynez River and its tributaries. SoCalGas O&M activities have the potential to encounter this subspecies where facilities overlap occupied habitat.

3.1.14.2 Habitat Characteristics and Use

LBV is typically associated with early successional (5–10 years old) riparian scrub and woodlands that have a developed canopy layer and dense shrubs at three to six feet.[172,173,174] Occupied riparian habitat is typically dominated by species such as mulefat (*Baccharis salicifolia*), willows (*Salix* sp.), cottonwood (*Poplus* sp.), and Mexican elderberry (*Sambucus nigra* ssp. *caerulea*). The most critical structural component of nesting habitat in California is a dense shrub layer at two to 10 feet aboveground. If this understory element is present, LBV can be found using any-age riparian habitat.[175,176] LBV requires a structurally diverse canopy for foraging, with a preference for the 10- to 20-foot zone.[177]

3.1.15 Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

3.1.15.1 Status and Distribution

The southwestern willow flycatcher (SWF) is listed as endangered under the ESA and the CESA. Critical habitat for this subspecies was finalized in 2013.[178] Previous designations of critical habitat occurred in 1997 and 2005. Currently, 378 stream miles encompassing an area of approximately 39,205 acres are designated within Inyo, Kern, Los Angeles, Riverside, Santa Barbara, San Bernardino, San Diego, and Ventura Counties.[179] Additionally, a recovery plan for this subspecies was published in 2002. The SWF breeding range includes the southern portion of California, southern Nevada, southern Utah, southwestern Colorado, Arizona, New Mexico, western Texas, and extreme northwestern Mexico.[180] Surveys within Southern California have revealed breeding

[172] Kus, B. 1998. Use of Restored Riparian Habitat by the Endangered Least Bell's Vireo (Vireo belli pusillus). Restoration Ecology 6 (1): 75–82.

[173] Franzreb, K. E. 1989. Ecology and conservation of the endangered least Bell's vireo. U.S. Fish Wildlife Service. Biol. Rep. 89 (1).

[174] U.S. Fish and Wildlife Service. 2006. Least Bell's Vireo 5 year Review. Carlsbad office. 27 p. Accessed on July 28, 2017: https://ecos.fws.gov/docs/five_year_review/doc781.pdf. Accessed 27 July 2017.

[175] Franzreb, K. E. 1989. Ecology and conservation of the endangered least Bell's vireo. U.S. Fish Wildlife Service. Biol. Rep. 89 (1).

[176] Kus, B. 1998. Use of Restored Riparian Habitat by the Endangered Least Bell's Vireo (Vireo belli pusillus). Restoration Ecology 6 (1): 75–82.

[177] Kus, B. 2002. Least Bell's Vireo (Vireo bellii pusillus). In The Riparian Bird Conservation Plan: A Strategy for Reversing the Decline of Riparian-Associated Birds in California. California Partners in Flight. Available at: http://www.prbo.org/calpif/htmldocs/species/riparian/least_bell_vireo.htm. Accessed 27 July 2017.

[178] U.S. Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Southwestern Willow Flycatcher. Final Rule. Federal Register 78: 50542–629.

[179] U.S. Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Southwestern Willow Flycatcher. Final Rule. Federal Register 78: 50542–629.

[180] U.S. Fish and Wildlife Service. 2014. Southwestern Willow Flycatcher 5-Year Review. Arizona Ecological Services. Available at: https://ecos.fws.gov/docs/five_year_review/doc4437.pdf. Accessed 27 July 2017.

populations on the San Luis Rey River; Santa Margarita River; San Dieguito River; the Santa Ynez River within Santa Barbara County; and Pilgrim, De Luz, French, and Las Flores Creeks.[181,182]

SWF winters in locations such as southern Mexico, Central America, and South America, with the Pacific lowlands of Costa Rica as a documented important location.[183] Current occurrences of SWF within the CRCP Plan Area are rare due to continued population declines. Even large expanses of suitable habitat at Prado Dam (Santa Ana River in San Bernardino County) have seen steep declines to one or two territories in recent years. Some creeks in the San Bernardino and San Gabriel Mountains may still support this species, as well as the Santa Ynez River in Santa Barbara County and the Santa Clara River in Ventura County.[184] SoCalGas O&M activities have the potential to encounter this subspecies where facilities overlap occupied habitat.

3.1.15.2 Habitat Characteristics and Use

SWF breeds in relatively dense and expansive growths of riparian habitat, generally near or adjacent to surface water or underlain by saturated soil.[185] Habitat characteristics vary widely among breeding sites but nesting typically occurs in areas with willows and/or tamarisk (*Tamarix* sp.). Other less common species include boxelder (*Acer negundo*) and Russian olive (*Elaeagnus angustifolia*).[186] Along the upper San Luis Rey River, 71 percent of nests studied between 1995 and 2001 were placed in oak trees, and another 8 percent in multi-substrate association with coast live oak, most commonly incorporating California blackberry. Along the lower Santa Margarita River, nests have been documented in poison hemlock and giant reed.[187] Nests can be placed in trees where the plant growth is most dense, where trees and shrubs have vegetation near ground level, and where there is a low-density canopy.[188] Egg laying by SWF occurs from the end of May through the end of June.

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[181] Holmgren, M.A., and P.W. Collins, eds. 1995. Interim Report on the Distribution, Breeding Status, and Habitat Associations of Seven Federal Special-Status Bird Species and Brown-headed Cowbirds at Vandenburg Air Force Base, Santa Barbara County, California. Department of Ecology, Evolution and Marine Biology, University of California at Santa Barbara. Museum of Systematics and Ecology Environmental Report 3: 49–66.

[182] U.S. Fish and Wildlife Service. 1997. Final Determination of Critical Habitat for the Southwestern Willow Flycatcher. Federal Register 62: 39129–47.

[183] U.S. Fish and Wildlife Service. 2014. Southwestern Willow Flycatcher 5-Year Review. Arizona Ecological Services. Available at: https://ecos.fws.gov/docs/five_year_review/doc4437.pdf. Accessed 27 July 2017.

[184] U.S. Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Southwestern Willow Flycatcher. Final Rule. Federal Register 78: 50542–629.

[185] Sogge, M.K., D. Ahlers, and S.J. Sferra. 2010. A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher. U.S. Geological Survey Techniques and Methods 2A-10.

[186] U.S. Fish and Wildlife Service. 2014. Southwestern Willow Flycatcher 5-Year Review. Arizona Ecological Services. Available at: https://ecos.fws.gov/docs/five_year_review/doc4437.pdf. Accessed 27 July 2017.

[187] Haas, W., and P Unitt. 2004. Willow Flycatcher Species Account. San Diego County Bird Atlas. Available at: http://sdplantatlas.org/birdatlas/pdf/Willow%20Flycatcher.pdf. Accessed 27 July 2017.

[188] U.S. Fish and Wildlife Service. 2014. Southwestern Willow Flycatcher 5-Year Review. Arizona Ecological Services. Available at: https://ecos.fws.gov/docs/five_year_review/doc4437.pdf. Accessed 27 July 2017.

3.1.16 Western Yellow-Billed Cuckoo (*Coccyzus americanus occidentalis*)

3.1.16.1 Status and Distribution

The western yellow-billed cuckoo (WYBC) is listed as threatened under the ESA and is considered a BCC by USFWS. It is listed as endangered under the CESA. Critical habitat for this species was proposed in 2014 and included approximately 395 acres that fall within the CRCP Plan Area.[189] A proposed revision in the area of WYBC critical habitat that was published in the Federal Register on February 27, 2020, would eliminate all 395 acres within the CRCP Plan area.[190] The geographical breeding range of the yellow-billed cuckoo in western North America includes low- to moderate-elevation areas west of the crest of the Rocky Mountains in Canada and the United States, as well as river systems in Mexico. Currently, WYBC is only known to breed in California, Arizona, New Mexico, Colorado, Idaho, and Nevada.[191] In California, breeding is restricted to the Sacramento, Kern, and Colorado Rivers.[192,193,194] The Palo Verde Ecological Reserve north of Blythe in Riverside County supported 50 confirmed breeding territories in 2016.[195] Fall migration routes follow the western coasts of Central America (including Mexico, Nicaragua, and Costa Rica), and wintering has been documented in the Gran Chaco region of northern Argentina and southern Bolivia.[196]

No known breeding populations are currently known to occur within the CRCP Plan Area. Breeding pairs of WYBC historically occurred at Prado Dam, which is within proposed critical habitat. The current WYBC range within the CRCP Plan Area falls north of Prado Dam in San Bernardino County approximately two miles from SoCalGas facilities.

3.1.16.2 Habitat Characteristics and Use

Preferred habitat for WYBC consists of riparian woodlands with mixed stands of willow-cottonwood vegetation, mesquite-thorn forest vegetation, or a combination of these in contiguous or nearly contiguous patches. Suitable habitat patches are typically greater than 325 feet in width and 200

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[189] Cuckoo; Proposed Rule. 2016. Federal Register 79: 48547–652.

[190] U.S. Fish and Wildlife Service. February 27, 2020. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-Billed Cuckoo. Available at: https://www.federalregister.gov/documents/2020/02/27/2020-02642/endangered-and-threatened-wildlife-and-plants-revised-designation-of-critical-habitat-for-the. Accessed May 1, 2020.

[191] Halterman, M.D., M.J. Johnson, J.A. Holmes, and S.A. Laymon. 2015. A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-Billed Cuckoo: U.S. Fish and Wildlife Techniques and Methods. U.S. Fish and Wildlife Service.

[192] U.S. Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Proposed Threatened.

[193] U.S. Fish and Wildlife Service. 2014. Southwestern Willow Flycatcher 5-Year Review. Arizona Ecological Services. Available at: https://ecos.fws.gov/docs/five_year_review/doc4437.pdf. Accessed 27 July 2017.

[194] Halterman, M.D., M.J. Johnson, J.A. Holmes, and S.A. Laymon. 2015. A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-Billed Cuckoo: U.S. Fish and Wildlife Techniques and Methods. U.S. Fish and Wildlife Service.

[195] Parametrix, Inc., and Southern Sierra Research Station. 2016. Yellow-billed Cuckoo Surveys on the Lower Colorado River, 2016 Annual Report. Submitted to the Bureau of Reclamation, Boulder City, Nevada, by D. Tracy and S.E. McNeil, Southern Sierra Research Station, and J. Lisignoli, Parametrix, Inc.

[196] Parametrix, Inc., and Southern Sierra Research Station. 2016. Yellow-billed Cuckoo Surveys on the Lower Colorado River, 2016 Annual Report. Submitted to the Bureau of Reclamation, Boulder City, Nevada, by D. Tracy and S.E. McNeil, Southern Sierra Research Station, and J. Lisignoli, Parametrix, Inc.

acres or more in total extent.[197] Nest sites within these habitat patches are generally within willow-dominated areas with dense canopy closure (greater than 70 percent), and a cooler, more humid environment than the surrounding riparian and upland habitats. At Palo Verde Ecological Reserve near the Colorado River, nesting has been documented in Fremont cottonwood (*Populus fremontii*), honey mesquite (*Prosopis glandulosa*), and Gooding's willow (*Salix gooddingii*).[198]

3.1.17 San Bernardino Kangaroo Rat (*Dipodomys merriami parvus)*

3.1.17.1 Status and Distribution

San Bernardino kangaroo rat (SBKR) is listed as endangered under the ESA. It has no listing under the CESA; however, it is a CDFW SSC. Critical habitat for this subspecies was finalized in 2002. Additional critical habitat was designated in 2008 but was subsequently overruled by a federal district court.[199] Critical habitat for this subspecies consists of 10,696 acres within San Bernardino and Riverside Counties, of which 9,446 acres are within the CRCP Plan Area. The historical range of the SBKR extended from the San Bernardino Valley in San Bernardino County to the Menifee Valley in Riverside County.[200] Extant populations are restricted to areas along the Santa Ana River, Mill Creek, Plunge Creek, City Creek, Lytle Creek, Cajon Wash, Cable Creek, San Jacinto River, and Bautista Creek.[201] Agriculture and urban development have reduced the occupied range of this subspecies by approximately 95 percent. SBKR have the potential to occur along the easternmost boundaries of the CRCP Plan Area in San Bernardino County. Within the CRCP Plan Area, SBKR habitat overlaps SoCalGas facilities near the Lytle Creek area; therefore, SoCalGas O&M activities have the potential to encounter this species.

3.1.17.2 Habitat Characteristics and Use

Soil texture is a primary limiting factor in the habitat and distribution of SBKR. Sandy loam substrates within alluvial fan and floodplain landforms are preferred. Within these areas, this species is known to dig simple, shallow burrows.[202] Vegetation associated with the SBKR includes scattered, low shrub canopy cover of alluvial sage-scrub and chaparral.[203] SBKR are also known to occur in areas of low density non-native grass, on gentle slopes along washes, and on adjacent upland areas with soils containing sand, loam and gravel deposited by rivers and streams.[204]

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[197] Cuckoo; Proposed Rule. 2014. Federal Register 79: 48547–652.

[198] Parametrix, Inc., and Southern Sierra Research Station. 2016. Yellow-billed Cuckoo Surveys on the Lower Colorado River, 2016 Annual Report. Submitted to the Bureau of Reclamation, Boulder City, Nevada, by D. Tracy and S.E. McNeil, Southern Sierra Research Station, and J. Lisignoli, Parametrix, Inc.

[199] U.S. Fish and Wildlife Service. 2010. Species Profile for San Bernardino Maerriam's kangaroo rat (*Dipodomys merriami parvus*). Available at: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A0G8.

[200] U.S. Fish and Wildlife Service. 1998. Endangered and Threatened Wildlife and Plants; Final Rule to List San Bernardino Kangaroo Rat as Endangered. Federal Register 63 (185): 51005–17.

[201] U.S. Fish and Wildlife Service. 2002. Service Proposes Critical Habitat for Endangered San Bernardino Kangaroo Rat.

[202] U.S. Fish and Wildlife Service. 1998. Endangered and Threatened Wildlife and Plants; Final Rule to List San Bernardino Kangaroo Rat as Endangered. Federal Register 63 (185): 51005–17.

[203] U.S. Fish and Wildlife Service. 2002. Service Proposes Critical Habitat for Endangered San Bernardino Kangaroo Rat.

[204] Center for Biological Diversity. n.d. Natural History (San Bernardino Kangaroo Rat). Available at: http://www.biologicaldiversity.org/species/mammals/San_Bernardino_kangaroo_rat/natural_history.html. Accessed 27 July 2017.

3.1.18 San Joaquin Kit Fox (*Vulpes macrotis mutica*)

3.1.18.1 Status and Distribution

San Joaquin kit fox (SJKF) is listed as endangered under the ESA. It is listed as threatened under the CESA. No critical habitat rules have been designated for SJKF. A recovery plan for SJKF and 33 upland species of the San Joaquin Valley was published in 1998. Although no extensive survey has been conducted across its historical range, kit foxes are thought to inhabit suitable habitat on the San Joaquin Valley floor and in the surrounding foothills of the coastal ranges, Sierra Nevada, and Tehachapi Mountains. Kit foxes have been found on all the larger, scattered patches of natural lands on the valley floor in Kern, Tulare, Kings, Fresno, Madera, San Benito, Merced, Stanislaus, San Joaquin, Alameda, and Contra Costa Counties. They also occur in the interior basins and ranges in Monterey, San Benito, San Luis Obispo, and, possibly, Santa Clara Counties; and in the upper Cuyama River watershed in northern Ventura and Santa Barbara Counties and southeastern San Luis Obispo County.[205] The largest extant population of this species occurs in western Kern County on and around Elk Hills and Buena Vista Valley, and in the Carrizo Plain Natural Area, San Luis Obispo County.[206] Within the CRCP Plan Area, SJKF occurrences have been recorded within 20 miles of the City of Paso Robles, with a heavy concentration two miles west of San Miguel. SoCalGas currently operates and maintains facilities within the range of the SJKF in the CRCP Plan Area, including the vicinities of San Miguel, Paso Robles, and the upper Cuyama River Valley. SoCalGas O&M activities have the potential to encounter this subspecies where facilities overlap habitat.

3.1.18.2 Habitat Characteristics and Use

SJKF typically occurs in desert-like habitats such as shrublands and grasslands. Occupied areas are characterized by sparse or absent shrub cover, sparse ground cover, and short vegetative structures in hot, dry environments.[207] Vegetation communities associated with SJKF in the southwestern portion of its range include valley sink scrub, valley saltbush, and annual grasslands. This subspecies can also be found in agricultural areas including row crops, irrigated pastures, orchards, vineyards, oilfields, and grazed annual grassland.[208]

SJKF dens are usually located in loose-textured soils but can also be found in a variety of soil types. Den density decreases in areas with shallow soils, high water tables, or hardpan layers. This subspecies can also occupy human-made structures that resemble the physical structures of dens or burrows, such as abandoned pipelines and culverts. Presence of SJKF also requires prey sources such as kangaroo rats, mice, and squirrels.

[205] U.S. Fish and Wildlife Service. 1983. San Joaquin Kit Fox Recovery Plan.

[206] U.S. Fish and Wildlife Service. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California.

[207] Cypher, B., C. Van Horn Job, and S. Phillips. 2012. Conservation Strategies for San Joaquin Kit Foxes in Urban Environments. California State University, Stanislaus, Endangered Species Recovery Program.

[208] U.S. Fish and Wildlife Service. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California.

3.1.19 Stephens' Kangaroo Rat (*Dipodomys stephensi*)

3.1.19.1 Status and Distribution

Stephens' kangaroo rat (SKR) is listed as endangered under the ESA. It is listed as threatened under the CESA. No critical habitat rules have been designated for SKR. A recovery plan was drafted in 1997 but has not been finalized to date. SKR distribution includes the San Jacinto Valley and adjacent areas of western Riverside, southwestern San Bernardino, and northwestern San Diego Counties.[209] It also known to occur in the Badlands within Riverside and San Bernardino Counties. As flatter portions of the valleys within its historic range have been developed, SKR has become increasingly confined to the bases of hills, the tops of level ridges, and the margins of plowed fields. The USFWS has estimated that the entire geographic range of this species has been reduced to approximately 1,108 square miles. Within the CRCP Plan Area, SKR has the potential to occur near the vicinity of the San Bernardino–Riverside County boundary; SoCalGas operates and maintains a variety of facilities within this general area.

3.1.19.2 Habitat Characteristics and Use

SKR occurs in open habitats and is commonly associated with grasslands, coastal sagebrush, and California buckwheat scrub, although populations can occur in shrubless areas.[210,211] This species is usually found in areas with a vegetative cover of less than 30 percent. It is not uncommon to find SKR along dirt roads and other types of disturbed areas with high percentages of bare ground. This species generally requires herbaceous layers for foraging, usually dominated by *Erodium cicutarium*. Certain non-native annual grasses, such as *Bromus diandrus*, have been found to exclude SKR from otherwise suitable habitat.[212] SKR is found between 180 and 4,101 feet above sea level and typically occurs in relatively flat or gently sloping ground.[213] Similar to SBKR, soil texture is a limiting factor in the habitat and distribution of SKR. SKR prefers well-drained soil such as gravelly soil and typically avoids clay soils. In areas of hard soils, it has been known to occupy other small mammal burrows.[214]

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[209] U.S. Fish and Wildlife Service. 1997. Draft Recovery Plan for the Stephen's Kangaroo Rat.

[210] U.S. Fish and Wildlife Service. 1988. Endangered and Threatened Wildlife and Plants: Determination of Endangered Status for the Stephens' Kangaroo Rat. Final Rule. Federal Register 53: 38465–70.

[211] Riverside County Habitat Conservation Agency.1998. Habitat Conservation for the Stephen's Kangaroo Rat in Western Riverside County, California. Available at: http://www.skrplan.org/skr.html. Accessed 27 July 2017.

[212] U.S. Fish and Wildlife Service. 1997. Draft Recovery Plan for the Stephen's Kangaroo Rat.

[213] U.S. Fish and Wildlife Service. 1997. Draft Recovery Plan for the Stephen's Kangaroo Rat.

[214] U.S. Fish and Wildlife Service. 1997. Draft Recovery Plan for the Stephen's Kangaroo Rat.

3.2 Covered Plant Species

- Braunton's milk-vetch (*Astragalus brauntonii*)
- California seablite (*Suaeda californica*)
- Chorro Creek bog thistle (*Cirsium fontinale var. obispoense*)
- Conejo dudleya (*Dudleya abramsii* ssp. *parva*)
- Gambel's water cress (*Nasturtium gambelii*)
- Gaviota tarplant (*Deinandra increscens* ssp. *villosa*)
- Indian Knob mountainbalm (*Eriodictyon altissimum*)
- Lompoc yerba santa (*Eriodictyon capitatum*)
- Lyon's pentachaeta (*Pentachaeta lyonii*)
- Marcescent dudleya (*Dudleya cymosa* ssp. *marcescens*)
- Morro manzanita (*Arctostaphylos morroensis*)
- Nevin's barberry (*Berberis nevinii*)
- Nipomo Mesa lupine (*Lupinus nipomensis*)
- Pismo clarkia (*Clarkia speciosa* ssp. *immaculate*)
- San Fernando Valley spineflower (*Chorizanthe parryi var. fernandina*)
- Santa Ana River woollystar (*Eriastrum densifolium* ssp. *sanctorum*)
- Santa Monica Mountains dudleya (*Dudleya cymosa* ssp. *ovatifolia*)
- Seaside bird's beak (*Cordylanthus rigidus* ssp. *littoralis*)
- Slender-horned spineflower (*Dodecahema leptoceras*)
- Vandenberg monkeyflower (*Diplacus vandenbergensis*)
- Ventura Marsh milk-vetch (*Astragalus pycnostachyus var. lanosissimus*)
- Verity's dudleya (*Dudleya verity*)

3.2.1 Braunton's Milk-Vetch (*Astragalus brauntonii*)

3.2.1.1 Status and Distribution

Braunton's milk-vetch (BMV) is listed as endangered under the ESA. It has no listing under the CESA. BMV has a CRPR designation of 1B.1. Critical habitat for this species was designated in 2006 and consists of 3,300 acres distributed throughout Los Angeles, Orange, and Ventura Counties.[215] Approximately 2,465 acres of designated critical habitat fall within the CRCP Plan Area. BMV is endemic to coastal Southern California and occurs only in five distinct geographic areas in Ventura, Los Angeles, and Orange Counties. These include (1) Simi Hills in eastern Ventura and western Los Angeles Counties; (2) eastern Santa Monica Mountains in Los Angeles County; (3) western Santa Monica Mountains near Pacific Palisades, Los Angeles County; (4) San Gabriel Mountains in Monrovia, Los Angeles County; and (5) Santa Ana Mountains in Orange County.[216] All areas except for the Santa Ana Mountains in Orange County fall within the CRCP Plan Area; therefore, SoCalGas O&M activities have the potential to encounter this species where facilities over occupied habitat.

[215] U.S. Fish and Wildlife Service. 2006. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Astragalus brauntonii and Pentachaeta lyonii. Federal Register 71. 50 CFR part 17, RIN 1018-AU51.

[216] U.S. Fish and Wildlife Service. 2009. Braunton's Milk-Vetch 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc2381.pdf. Accessed 27 July 2017.

3.2.1.2 Habitat Characteristics and Use

BMV is found on limestone outcrops and knolls with shallow calcium-carbonate soils derived from marine substrates, or rarely downslope from such areas where survivorship may be reduced on non-carbonate soils. This species is associated with chaparral and coastal sage scrub communities at elevations ranging from 800 to 2,100 feet. Its blooming period is between January and August.[217] BMV does not tolerate shading and occurs where microsite conditions inhibit shrub growth, or where disturbances (such as fire, flooding, erosion) reduce competition and stimulate seed germination,[218] so that vegetative cover is typically less than 10 percent.[219] Threats to the species include habitat fragmentation or degradation due to residential and commercial development, loss of pollinators and associated species, disruption of natural fire cycles, prescribed fuel modification for fire prevention, and land management activities.[220,221]

3.2.2 California Seablite (*Suaeda californica*)

3.2.2.1 Status and Distribution

California seablite is listed as endangered pursuant to the ESA. California seablite is not listed under the CESA. It has a CRPR designation of 1B.1. No critical habitat rules have been published for this species. California seablite is a California-endemic plant species currently found along the coastal region of central San Luis Obispo County. Extant naturally occurring populations of California seablite are restricted to the upper tidal salt marshes of Morro Bay and estuarine creek mouths near Cayucos, California.[222] Historically, populations once occurred in the San Francisco Bay area, but salt marsh habitats there have declined, resulting in the local extirpation of this species. Potential habitat along the central California coast is extremely limited;[223] however, the entire known distribution of this species falls within the CRCP Plan Area and is in relatively close proximity to SoCalGas facilities. Therefore, SoCalGas O&M activities have the potential to encounter this species where facilities overlap occupied habitat.

3.2.2.2 Habitat Characteristics and Use

California seablite is found in estuarine habitats such as herbaceous wetlands and is usually restricted to the upper intertidal zone. This zone usually occurs along the perimeter of a coastal bay at zero to 50 feet of elevation. Its blooming period is between July and October. California seablite is usually found in seasonal wetlands but may occur in non-wetland habitats as well. Remaining populations

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[217] California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California. Available at: http://www.rareplants.cnps.org. Accessed 9 October 2017.

[218] U.S. Fish and Wildlife Service. 2009. Braunton's Milk-Vetch 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc2381.pdf. Accessed 27 July 2017.

[219] Federal Register 71: 66374–423.

[220] U.S. Fish and Wildlife Service. 2009. Braunton's Milk-Vetch 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc2381.pdf. Accessed 27 July 2017.

[221] U.S. Fish and Wildlife Service. 1999. Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin.

[222] Walgren, Michael, Park Ecologist, California Department of Parks and Recreation, Morro Bay, CA. 2006. Email sent by Michael Walgren to Valary Bloom.

[223] NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

are threatened by factors that alter the integrity of salt marsh habitat, such as sedimentation, dredging projects, invasion by non-native plants, bluff erosion, and recreational activities.[224,225]

3.2.3 Chorro Creek Bog Thistle (*Cirsium fontinale* var. *obispoense*)

3.2.3.1 Status and Distribution

Chorro Creek bog thistle (CCBT) is listed as endangered under both the ESA and the CESA. It has a CRPR designation of 1B.2. No critical habitat rules have been established for this subspecies. CCBT is endemic to San Luis Obispo County, where only 13 CNDDB occurrences have been documented. Due to its very specific habitat requirements, it is unlikely that this subspecies was ever widespread or abundant.[226] No SoCalGas facilities currently operate near known CCBT distributions. Although CCBT does not exist near any facilities, potential impacts may occur within CCBT habitat. Therefore, CCBT is included in this MSHCP.

3.2.3.2 Habitat Characteristics and Use

Habitat for CCBT is characterized by open boggy seep areas and drainages with serpentine soils in chaparral, coastal scrub, and valley grasslands at elevations between approximately 110 to 1,260 feet in elevation. CCBT typically blooms from February to July, but may extend to October.[227] Populations are threatened by impacts from cattle ranching such as trampling, hydrologic alterations, and competition with non-native plant species. Extreme weather conditions may also constitute a developing future threat.[228]

3.2.4 Conejo Dudleya (*Dudleya abramsii* ssp. *parva*)

3.2.4.1 Status and Distribution

Conejo dudleya is listed as threatened under the ESA. Conejo dudleya is not listed under the CESA. It has a CRPR designation of 1B.2. No critical habitat rules have been designated for this species. Conejo dudleya is endemic to California and is currently known from the western end of the Simi Hills to the Santa Monica Mountains in Ventura County. Within this range, there is a large meta-population that extends along the northern slope of Mountclef Ridge from the vicinity of the Reagan Library in the east to Camarillo Springs Road in the west.[229] Due to the scattered distribution of the subspecies, SoCalGas O&M activities have the potential to encounter it where facilities overlap occupied habitat.

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[224] California Department of Fish and Game. 2000. Natural Diversity Database (RareFind 2), Version 2.1.2.

[225] Baldwin, B.G., S. Boyd, B.J. Ertter, R.W. Patterson, T.J. Rosatti, and D.H. Wilken. n.d. Jepson Flora Project. Regents of the University of California. Online. Available at: http://ucjeps.berkeley.edu/jepson_flora_project.html. Accessed 2003.

[226] U.S. Fish and Wildlife Service. 2017. Environmental Conservation Online System: Species Profile for Chorro Creek bog thistle (Cirsium fontinale var. obispoense). Available at: http://ecos.fws.gov/ecp0/profile/speciesProfile?sId=5991#status. Accessed 12 June 2017.

[227] California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39. Available at: http://www.rareplants.cnps.org. Accessed 12 July 2017.

[228] California Department of Fish and Wildlife. 2017. California Natural Diversity Database. Rare Find 5 Results for Cirsium fontinale var. obisponense.

[229] U.S. Fish and Wildlife Service. 2015. Conejo Dudleya 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc4507.pdf. Accessed 27 July 2017.

3.2.4.2 Habitat Characteristics and Use

Conejo dudleya grows at the base of scattered volcanic or sandstone rock outcrops in grassland and coastal sage scrub habitats.[230] Conejo dudleya occurs between 200 and 1,480 feet of elevation. Its blooming period is between April and July.[231] Threats to this subspecies include recreational activities such as hiking and equestrian use, urban development, fire management and suppression activities, and illegal collection.[232]

3.2.5 Gambel's Water Cress (*Nasturtium gambelii*)

3.2.5.1 Status and Distribution

Gambel's water cress (GWC) is listed as endangered pursuant to the ESA. It is listed as threatened under CESA. No critical habitat rules have been designated for this species. GWC has a CRPR designation of 1B.1. Historically, it occurred in cismontane regions (on the coastward side of the mountains) of central and Southern California, in Orange, San Bernardino, Los Angeles, Santa Barbara, and San Luis Obispo Counties. Currently, GWC is known from four small populations: three in San Luis Obispo County and one in Santa Barbara County. The San Luis Obispo County populations occur at Little Oso Flaco Lake and Oso Flaco Lake and Black Lake Canyon; however, these populations have been observed co-occurring with non-native *N. officinale* species.[233] Only one remaining native wild population is extant at Vandenberg Air Force Base in Santa Barbara County. Another population is present on the Guadalupe-Nipomo Dunes National Wildlife Refuge in San Luis Obispo County; however, this population was introduced.[234] The nearest known GWC population to SoCalGas facilities occurs in San Luis Obispo County. However, given the restricted habitat requirements for this species (as described below) and the distribution of known populations, there is a low likelihood that it will be encountered during SoCalGas O&M activities.

3.2.5.2 Habitat Characteristics and Use

GWC is found in freshwater or brackish marsh habitats at the margins of lakes and along slow-flowing streams with sandy, acidic soils. It grows in or just above the water surface and requires a permanent source of hydrology. GWC occurs in elevations below 1,480 feet. Its blooming is between April and June.[235] Existing populations are primarily threatened by competition with exotic species and development where suitable habitat remains.

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[230] U.S. Fish and Wildlife Service. 1997. Threatened Species Status for Dudleya abramsii ssp. Parva (Conejo Dudleya). Federal Register 62 (19), 50 CFR part 17, RIN 1018-AB88.

[231] California Native Plant Society, Rare Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California. Available at: http://www.rareplants.cnps.org. Accessed 27 July 2017.

[232] Skinner, Mark W., and Bruce M. Pavlik, eds. 1994. Inventory of Rare and Endangered Vascular Plants of California. 5th ed. CNPS Special Publication No. 1. California Native Plant Society.

[233] California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plants and Animals of California Species Accounts.

[234] U.S. Fish and Wildlife Service. 2011. Gambel's Water Cress 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3949.pdf. Accessed 27 July 2017.

[235] NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

3.2.6 Gaviota Tarplant (*Deinandra increscens* ssp. *villosa*)

3.2.6.1 Status and Distribution

Gaviota tarplant is listed as endangered under the ESA and the CESA. It has a CRPR designation of 1B.1. Critical habitat was designated in 2002. Approximately 9,709 acres have been designated as critical habitat in Santa Barbara County, all of which are located within the CRCP Plan Area.[236] The Gaviota tarplant is endemic to California. It is found along the west coast of Santa Barbara County, ranging from 151 to 1,000 feet of elevation.[237] Historically, populations of Gaviota tarplant were only known from marine terraces in the vicinity of Gaviota. Extant populations have been discovered west of Gaviota along the coast and in the Santa Ynez Mountains to Point Arguello. Seven primary populations are recognized from a highly localized distribution within this area: Lion's Head (near Point Sal), Point Arguello, Tranquillion Mountain/Sudden Peak, Point Conception, Hollister Ranch, Santa Ynez Mountains, and Gaviota.[238] All known populations are known to occur within the CRCP Plan Area and are within relatively close proximity to SoCalGas facilities; therefore, Gaviota tarplant may potentially be encountered during SoCalGas O&M activities.

3.2.6.2 Habitat Characteristics and Use

Gaviota tarplant can be found in habitats where needlegrass grasslands intergrade with coastal sage scrub on sandy soils associated with marine terraces and uplifted marine sediments. This subspecies is typically found at elevations ranging from 150 to 1,000 feet of elevation. Its blooming period is between May and October.[239] Primary conservation threats include destruction of individual plants by trampling, habitat loss, and habitat degradation from the development and decommissioning of oil and gas facilities.[240]

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[236] U.S. Fish and Wildlife Service. 2002.Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Eridoictyon capitatum and Deinandra increscens ssp. villosa. Federal Register 67. 50 CFR part 17, RIN 1018-AG88.

[237] NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

[238] U.S. Fish and Wildlife Service. 2011. Gaviota Tarplant 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3884.pdf. Accessed 27 July 2017.

[239] NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

[240] U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Eriodictyon capitatum (Lompac yerba santa) and Deinandra increscens ssp. villosa (Gaviota tarplant). Final Rule. Federal Register 67 (216): 67968–68000.

3.2.7 Indian Knob Mountainbalm (*Eriodictyon altissimum*)

3.2.7.1 Status and Distribution

Indian Knob mountainbalm (IKM) is listed as endangered pursuant to the ESA and the CESA. It has a CRPR designation of 1B.1. No critical habitat rules have been designated for this species. IKM is restricted to a limited area in the coastal region of San Luis Obispo County, entirely within the CRCP Plan Area. This species is known from six occurrences in the Irish Hills and on Indian Knob in San Luis Obispo County.[241] Due to its restricted habitat requirement (described below) and the distribution of the known populations, which do not occur in close proximity to this species, there is a low likelihood that it will be encountered during O&M activities.

3.2.7.2 Habitat Characteristics and Use

IKM grows on shallow, sandy soils derived from siliceous sandstone ridges in coast live oak woodland and coast maritime chaparral, generally between 260 and 890 feet of elevation.[242] Its blooming period is March through July.[243] IKM is primarily threatened by urbanization, energy development, and off-highway vehicles, and possibly by alterations of fire regimes and invasion by non-native plants.[244]

3.2.8 Lompoc Yerba Santa (*Eriodictyon capitatum*)

3.2.8.1 Status and Distribution

Lompoc yerba santa (LYS) is listed as endangered under the ESA. It is listed as rare under the CESA. LYS has a CRPR designation of 1B.2. Critical habitat was designated for this species in 2002. Approximately 6,401 acres of critical habitat have been designated in Santa Barbara County.[245] LYS is endemic to California and is currently known from four locations in southwestern Santa Barbara County on Vandenberg Air Force Base, the west crest of the Santa Ynez Mountains on Hollister Ranch, and Graciosa Ridge in the Solomon Hills southeast of Orcutt. The entire LYS distribution range is within the CRCP Plan Area and within relatively close proximity to SoCalGas facilities; therefore, LYS may potentially be encountered during SoCalGas O&M activities.

3.2.8.2 Habitat Characteristics and Use

LYS is found in two distinct habitats with strongly acidic soils. It grows on sandstone soils in chaparral and coastal sage scrub communities and on diatomaceous Monterey shales with an overstory of Bishop Pine. It generally occurs between approximately 130 and 2,950 feet of elevation. Its blooming

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[241] U.S. Fish and Wildlife Service. 1994. Endangered or Threatened Status for Five Plants and the Morro Shoulderband Snail from Western San Luis Obispo County, California. Federal Register 59: 64613–23.

[242] California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plants and Animals of California Species Accounts.

[243] California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California. Available at: http://www.rareplants.cnps.org. Accessed 16 July 2017.

[244] California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California.

[245] U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Eridoictyon capitatum and Deinandra increscens ssp. villosa. Federal Register 67. 50 CFR part 17, RIN 1018-AG88.

period is between March and September.[246] Threats to the species include fire suppression, invasion by non-native plant species, low seed productivity, and naturally occurring catastrophic events such as wildfire.[247]

3.2.9 Lyon's Pentachaeta (*Pentachaeta lyonii*)

3.2.9.1 Status and Distribution

Lyon's pentachaeta is listed as endangered under the ESA and the CESA. It has a CRPR designation of 1B.1. Critical habitat was designated for this species in 2006 and consists of approximately 3,396 acres located in Los Angeles and Ventura Counties.[248] Lyon's pentachaeta is endemic to coastal Southern California.[249] Its current distribution only includes the Santa Monica Mountains in eastern Ventura and western Los Angeles Counties and the western Simi Hills in Ventura County. Occurrences from the Palos Verdes Peninsula and Santa Catalina Island were recorded historically, but populations from these areas are presumed to be extirpated. Populations found within the western Simi Hills in Ventura County overlap SoCalGas facilities. All known populations are known to occur within the CRCP Plan Area and are within relatively close proximity to SoCalGas facilities; therefore, Lyon's pentachaeta may potentially be encountered during SoCalGas O&M activities.

3.2.9.2 Habitat Characteristics and Use

Lyon's pentachaeta is found on saddles, tops of hills and knolls, and flat areas at the base of slopes within an elevation range of 280 to 2,060 feet.[250] Suitable soils include rocky clays of volcanic origin. It has a blooming period between April and June. This species is most common where openings or bare ground occur, including margins of roads and trails, within grassland, chaparral, and coastal sage scrub habitat. It does not compete well with dense annual grasses or shrubs.[251] Threats to Lyon's pentachaeta include habitat loss, fragmentation or degradation due to residential and commercial development, loss of pollinators and associate species, disruption of natural fire cycles, encroachment and competition with non-native invasive species, and recreational activities.[252]

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[246] California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California.

[247] California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plants and Animals of California Species Accounts.

[248] Federal Register 71: 66374–423.

[249] U.S. Fish and Wildlife Service. 2008. Lyon's Pentachaeta (Pentachaeta lyonii) 5-Year Review. Available at: http://ecos.fws.gov/docs/five_year_review/doc1994.pdf. Accessed 27 July 2017.

[250] U.S. Fish and Wildlife Service. 2008. Lyon's Pentachaeta (Pentachaeta lyonii) 5-Year Review. Available at: http://ecos.fws.gov/docs/five_year_review/doc1994.pdf. Accessed 27 July 2017.

[251] U.S. Fish and Wildlife Service. 2008. Lyon's Pentachaeta (Pentachaeta lyonii) 5-Year Review. Available at: http://ecos.fws.gov/docs/five_year_review/doc1994.pdf. Accessed 27 July 2017.

[252] U.S. Fish and Wildlife Service. 2008. Lyon's Pentachaeta (Pentachaeta lyonii) 5-Year Review. Available at: http://ecos.fws.gov/docs/five_year_review/doc1994.pdf. Accessed 27 July 2017.

3.2.10 Marcescent Dudleya (*Dudleya cymosa* ssp. *marcescens*)

3.2.10.1 Status and Distribution

Marcescent dudleya is listed as threatened pursuant to the ESA. It is listed as rare under the CESA. It has a CRPR designation of 1B.2. No critical habitat rules have been designated for this subspecies. Marcescent dudleya is a California-endemic plant species. There have been 10 reported occurrences of marcescent dudleya from an area of about 14 square miles in the Santa Monica Mountains within Ventura County.[253] These occurrences are grouped along two watersheds, Little Sycamore Canyon and Malibu Creek, with all other occurrences scattered between these two locations. These areas all occur within the CRCP Plan Area; however, given the restricted habitat requirements for this species (as described below) and the distribution of known populations, there is a low likelihood that it will be encountered during SoCalGas O&M activities.

3.2.10.2 Habitat Characteristics and Use

Marcescent dudleya typically occurs on lower reaches of volcanic rock outcrops adjacent to streams, chaparral, and coast live oak woodland between approximately 490 to 1,740 feet of elevation.[254] The blooming period is between April and July. This subspecies may be the only flowering plant occurring in a microhabitat that is otherwise dominated by mosses, lichens, and ferns, which may play roles in trapping marcescent dudleya seeds and allowing them to germinate and establish on the volcanic outcrops.[255] Threats to this species include residential development and recreational activities such as rock climbing.[256]

3.2.11 Morro Manzanita (*Arctostaphylos morroensis*)

3.2.11.1 Status and Distribution

Morro manzanita is listed as threatened under the ESA. Morro manzanita is not listed under the CESA. It has a CRPR designation of 1B.1. No critical habitat rules have been designated for this species. Morro manzanita is a San Luis Obispo County–endemic plant species. It is known from fewer than 10 occurrences in the Morro Bay area, from the northeast side of Morro Bay to the southern end of Montaña de Oro State Park. Approximately 75 percent of its historical habitat has been converted for residential use, resulting in highly fragmented populations.[257] The entire distribution range is located within the CRCP Plan Area, and SoCalGas facilities occur within relatively close proximity to known occurrences; therefore, Morro manzanita may potentially be encountered during SoCalGas O&M activities.

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[253] NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

[254] NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

[255] U.S. Fish and Wildlife Service. 2009. Dudleya cymosa ssp. marcescens (Marcescent Dudleya) 5-Year Review: Summary and Evaluation.

[256] U.S. Fish and Wildlife Service. 2009. Dudleya cymosa ssp. marcescens (Marcescent Dudleya) 5-Year Review: Summary and Evaluation.

[257] U.S. Fish and Wildfire Service. 2013. Acrotostaphylos morroensis (Morro Manzanita) 5-Year Review:

3.2.11.2 Habitat Characteristics and Use

Morro manzanita is found in association with coastal dune scrub, maritime chaparral, and coast live oak woodland on sites with low to moderate slopes, and in nearly pure stands on steep slopes, primarily on north exposures between 15 and 670 feet of elevation.[258,259] The blooming period is between is December and March. Distribution of Morro manzanita is correlated with that of soils derived from ancient sand dunes that are classified as Baywood fine sands. Due to its narrow habitat preferences, Morro manzanita is particularly vulnerable to habitat loss and fragmentation. Additional threats to this species include alterations of fire regimes and competition from non-native plants.

3.2.12 Nevin's Barberry (*Berberis nevinii*)

3.2.12.1 Status and Distribution

Nevin's barberry is listed as endangered under with the ESA and the CESA. It has a CRPR designation of 1B.1. Critical habitat for this species was established in 2008; however, no critical habitat is designated within the CRCP Plan Area. According to the USFWS, it is naturally limited (14 native occurrences) and occurs in small patches (less than 20 individuals, and often only one or two) in scattered locations in Los Angeles, San Bernardino, and Riverside Counties. Additionally, individuals have recently been observed in Ventura County at California State University at Channel Islands (CSUCI).[260] It is most abundantly distributed south of Vail Lake in Riverside County.[261,262] There are four occurrence areas that overlap the CRCP Plan Area: (1) Lopez Canyon in western Los Angeles County on the Angeles National Forest, (2) Cobal Canyon in eastern Los Angeles County near Claremont, (3) Scott and San Timoteo Canyons in southern San Bernardino County near Redlands/Loma Linda and (4) those found at CSUCI. Several locations are known to occur near SoCalGas facilities, although these facilities occur within urban developments. Therefore, there is a low likelihood that this species will be encountered during SoCalGas O&M activities.

3.2.12.2 Habitat Characteristics and Use

Characterizing habitat for Nevin's barberry is difficult due to the varied soils, bedrock substrates, and topography with which this species is associated. The variety of habitats known to support this species include nearly flat sandy washes, terraces, and canyon floors to gravelly wash margins, steep-sloped drainage banks, and steep rocky ridges, slopes, and mountain summits.[263] This species is known to occur in chaparral, coastal sage scrub, oak woodland, riparian scrub/woodland, and alluvial scrub vegetation types.[264] It is strongly associated with alluvial soils or soils derived from

[258] NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

[259] California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California.

[260] California State University at Channel Islands. n.d. Nevin's barberry. Available at: https://nativeplants.csuci.edu/berberis-nevinii.htm. Accessed 5 July 2018.

[261] Federal Register 73: 8412–40.

[262] U.S. Fish and Wildlife Service. 2009. Berberis nevinii (Nevin's Barberry) 5-Year Review: Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc2557.pdf. Accessed 27 July 2017.

[263] U.S. Fish and Wildlife Service. 2009. Berberis nevinii (Nevin's Barberry) 5-Year Review: Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc2557.pdf. Accessed 27 July 2017.

[264] U.S. Fish and Wildlife Service. 2009. Berberis nevinii (Nevin's Barberry) 5-Year Review: Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc2557.pdf. Accessed 27 July 2017.

non-marine sedimentary-based substrates, especially sandstone derived from granitic material. Its blooming period is between March and April. Most native occurrences are found within an elevation range of 1,400 to 1,700 feet, although one native occurrence on the Oak Mountain summit north of Vail Lake is at approximately 2,700 feet. Major threats to this species include urbanization, road widening, recreational activities, fire management practices, and altered fire regimes, as well as extreme climatic events given the species' small population size and low reproductive output.[265]

3.2.13 Nipomo Mesa Lupine (*Lupinus nipomensis*)

3.2.13.1 Status and Distribution

Nipomo Mesa lupine (NML) is listed as endangered under the ESA and the CESA. It has a CRPR designation of 1B.1. No critical habitat rules have been designated for this species. NML is endemic to San Luis Obispo County. NML grows in the stabilized back dune habitat of the Guadalupe Dunes in the southwestern corner of San Luis Obispo County. The species occurs as one extended population made up of seven occurrences with fewer than 700 plants. The small patches are spread over 1.5 miles west of Highway 1 and between Black Lake Canyon to the north and Oso Flaco Lake to the south. Historical occurrences from three formerly occupied locations have not been observed in recent surveys.[266] No known populations are known to overlap SoCalGas facilities; however, existing pipelines are known to be within one mile of suitable habitat for this species. Therefore, NML may potentially be encountered during O&M activities.

3.2.13.2 Habitat Characteristics and Use

NML is restricted to stabilized back dunes supporting a relatively open, central coast dune scrub community. This species generally occurs approximately 430 feet above sea level. Its blooming period is between December through May.[267] Dominant species within dune scrub communities supporting NML typically include mock heather and silver lupine (*Lupinus chamissonis*). The majority of the historical habitat is considered to be degraded by either physical disturbance or invasion by nonnative weedy species. Threats to extant populations include continued coastal development, off-highway vehicle activity, and expansion of introduced weedy plants, particularly veldt grass and ice plant.[268]

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[265] U.S. Fish and Wildlife Service. 2009. Berberis nevinii (Nevin's Barberry) 5-Year Review: Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc2557.pdf. Accessed 27 July 2017.

[266] U.S. Fish and Wildlife Service. 2000. Endangered and Threatened Wildlife and Plants; Final Rule for Endangered Status for Four Plants from South Central Coast California. Federal Register 65: 14888–97.

[267] California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California. Available at: http://www.rareplants.cnps.org. Accessed 20 June 2017.

[268] California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plants and Animals of California Species Accounts.

3.2.14 Pismo Clarkia (*Clarkia speciosa* ssp. *immaculate*)

3.2.14.1 Status and Distribution

Pismo clarkia is listed as endangered under the ESA. It is listed as rare under the CESA. It has a CRPR designation of 1B.1. No critical habitat rules have been designated for this subspecies. Pismo clarkia is endemic to San Luis Obispo County. Historically known distributions ranged from San Luis Obispo south to the Nipomo Mesa area. Currently, this subspecies is known from 14 occurrences in the Pismo Beach area with a narrow range that is approximately 14 miles long by six miles wide. All known populations are known to occur within the CRCP Plan Area and are within relatively close proximity to SoCalGas facilities; therefore, Pismo clarkia may potentially be encountered during SoCalGas O&M activities.

3.2.14.2 Habitat Characteristics and Use

Pismo clarkia is found on pockets of dry sandy soils, possibly ancient sand dunes, in grassy openings (including roadsides) within chaparral and oak woodland communities.[269] It generally occurs at elevations between approximately 80 to 610 feet. Its blooming period is between May and July.[270] Threats to Pismo clarkia include habitat loss resulting from residential development, invasion by non-native plants, wildfires, and recreational uses.[271]

3.2.15 San Fernando Valley Spineflower (*Chorizanthe parryi* var. *fernandina*)

3.2.15.1 Status and Distribution

San Fernando Valley spineflower (SFVS) was proposed as threatened under the ESA, but USFWS withdrew the proposed rule in March 2018. It is listed as endangered under the CESA. It has a CRPR designation of 1B.1. No critical habitat has been designated for this species. SFVS is endemic to California and is currently narrowly distributed across Los Angeles and Ventura Counties. Known populations exist in Laskey Mesa (Ventura County) and near Santa Clarita (Los Angeles County). Historically, it was known from other locations in Los Angeles and Orange Counties. SoCalGas facilities currently overlap the known distribution of this species within the CRCP Plan Area in Ventura and Los Angeles Counties; therefore, SFVS may potentially be encountered during SoCalGas O&M activities.

3.2.15.2 Habitat Characteristics and Use

Habitat for SFVS consists of open areas in coastal scrub as well as valleys and foothill grasslands. It grows in poorly developed soils composed of loam, silty clay loam, and/or sand, generally within an

[269] NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

[270] California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plants and Animals of California Species Accounts.

[271] U.S. Fish and Wildlife Service. 2009. Clarkia speciose subsp. Immaculate (Pismo Clarkia) 5-Year Review: Summary and Evaluation.

elevation range of 490 to 4,000 feet.[272] Its blooming period is between April and July.[273] Threats to this species include urban development and introduction of non-native species.

3.2.16 Santa Ana River Woolly-Star (*Eriastrum densifolium* ssp. *sanctorum*)

3.2.16.1 Status and Distribution

Santa Ana River woolly-star (SARW) is listed as endangered under the ESA and the CESA. It has a CRPR designation of 1B.1. No critical habitat rules have been designated for this species. It is endemic to the Santa Ana River drainage of Southern California and occurs within the floodplains of Mill Creek, City Creek, Plunge Creek, the Santa Ana River, Cajon Wash, and Lytle Creek within San Bernardino County. It is also known to occur within more downstream portions of the Santa Ana River within Riverside County, although it was once believed to be extirpated from this area.[274] Historically, it also occurred along the Santa Ana River in Orange County. All known occurrences overlap the CRCP Plan Area and have the potential to overlap SoCalGas facilities in the vicinity of the census-designated place of Muscoy in San Bernardino County; therefore, SARW may potentially be encountered during SoCalGas O&M activities.

3.2.16.2 Habitat Characteristics and Use

Preferred habitat for SARW includes open, sandy areas within the alluvial fan sage scrub plant community where perennial and annual vegetative cover is relatively low. SARW generally occurs in elevations below 1,640 feet. Its blooming period is between May and September.[275] These open wash areas tend to be created by fluvial action during major flood events but typically exist as terraces above the high water mark of the river and associated tributaries. These open sandy areas can persist for extended periods after a flood event (60-plus years), but without periodic flooding, scouring, and/or sediment deposition, the vegetation tends to become more dense and less favorable to SARW. Threats to this subspecies include habitat alteration or destruction through urban floodplain development, alteration of hydrology, aggregate mining, off-highway vehicle use, hybridization, and extreme weather conditions.[276]

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[272] U.S. Fish and Wildlife Service. 2016. Threatened Species Status for Chorizanthe parryi var Fernandina (San Fernando Spineflower). Proposed Rule. Federal Register 81 (179): 63453–66.

[273] California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California. Available at: http://www.rareplants.cnps.org. Accessed 20 June 2017.

[274] U.S. Fish and Wildlife Service. 2010. Eriastrum densifolium subsp. sanctorum (Santa Ana River woolly-star) 5-Year Review: Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc3780.pdf. Accessed 27 July 2017.

[275] De Groot, S., D. Gowen, and R. Patterson. 2016. Eriastrum densifolium subsp. sanctorum. Jepson eFlora. Available at: http://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=50332. Accessed 30 August 2017.

[276] U.S. Fish and Wildlife Service. 2010. Eriastrum densifolium subsp. sanctorum (Santa Ana River Woolly-Star) 5-Year Review: Summary and Evaluation.

3.2.17 Santa Monica Mountains Dudleya (*Dudleya cymosa* ssp. *ovatifolia*)

3.2.17.1 Status and Distribution

Santa Monica Mountains dudleya (SMMD) is listed as threatened under the ESA. SMMD is not listed under the CESA. It has a CRPR designation of 1B.1. No critical habitat rules have been designated for this subspecies. Currently, there are three populations of SMMD: one occurs in the Santa Ana Mountains (Modjeska Canyon in Orange County), and the other two occur in the Santa Monica Mountains (Topanga and Malibu Canyons, Los Angeles County).[277] The listing of SMMD was inclusive of plants now identified as *Dudleya cymosa* ssp. *agourensis* (Agoura Hills liveforever), which occurs in one contiguous population, but with six occurrences in the Santa Monica Mountains (Agoura Hills, Los Angeles, and Ventura Counties). There are three occurrence areas that overlap the general CRCP Plan Area: (1) Lopez Canyon in western Los Angeles County on the Angeles National Forest, (2) Cobal Canyon in eastern Los Angeles County near Claremont, (3) Scott and San Timoteo Canyons in southern San Bernardino County near Redlands/Loma Linda. Populations are known to occur within the CRCP Plan Area and are within relatively close proximity to SoCalGas facilities; therefore, SMMD may potentially be encountered during SoCalGas O&M activities.

3.2.17.2 Habitat Characteristics and Use

SMMD is found on shaded slopes and canyon bottoms on sedimentary or conglomerate rock along the south-facing slope of the Santa Monica Mountains.[278] In the Santa Ana Mountains, it occurs on shaded sandstone cliffs.[279] Adjacent plant communities include chaparral or coastal scrub. It occurs in elevation ranges between 490 and 1,640 feet and blooms from May to June.[280] In most locations, the topographic relief has prevented deep soil formation, and the microhabitat may be dominated by club mosses, mosses, and lichens.

3.2.18 Seaside Birds' Beak (*Cordylanthus rigidus* spp. *littoralis*)

3.2.18.1 Status and Distribution

Seaside bird's beak (SBB) is not listed pursuant to the ESA. SBB is listed as endangered pursuant to the CESA. It has a CRPR designation of 1B.1. SBB is endemic to California. The current known distribution and populations are restricted to the coastal regions of Monterey and Santa Barbara Counties.[281] The populations that are in the vicinity of Lompoc and Vandenberg Air Force Base, Santa

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[277] U.S. Fish and Wildlife Service. 2009. Dudleya cymosa ssp. ovatifolia (Santa Monica Mountains Dudleya) 5-Year Review. Available at: http://ecos.fws.gov/docs/five_year_review/doc3224.pdf. Accessed 27 July 2017.

[278] U.S. Fish and Wildlife Service. 2009. Dudleya cymosa ssp. ovatifolia (Santa Monica Mountains Dudleya) 5-Year Review. Available at: http://ecos.fws.gov/docs/five_year_review/doc3224.pdf. Accessed 27 July 2017.

[279] Roberts, Fred. 2009. 19 September 2009. Email correspondence to Connie Rutherfored, Listing and Recovery Coordinator, Ventura Fish and Wildlife Office, regarding Dudleya cymosa sub sp. Ovatifolia, and the Santiago Fire of 2007.

[280] Wade McCabe, Stephen. 2017. Dudleya cymosa subsp. ovatifolia, Jepson eFlora, Available at: http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=50238. Accessed 30 August 2017.

[281] Smith, J.P., and K. Berg. 1988. California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California. 4th ed. California Native Plant Society.

Barbara County, occur within the CRCP Plan Area; therefore, SBB may potentially be encountered during SoCalGas O&M activities.

3.2.18.2 Habitat Characteristics and Use

Habitat for SBB is associated with closed-cone coniferous forest, chaparral (maritime), cismontane woodland, coastal dunes, and coastal scrub with sandy, often disturbed soil between approximately 0 and 1,690 feet in elevation. Its blooming period is between April and October. The primary threats to SSB are development, energy projects, road widening, vehicles, and military operations.[282]

3.2.19 Slender-Horned Spineflower (*Dodecahema leptoceras*)

3.2.19.1 Status and Distribution

Slender-horned spineflower (SHS) is listed as endangered pursuant to the ESA and the CESA. It has a CRPR designation of 1B.1. No critical habitat rules have been designated for this species. SHS is a California-endemic plant species. Its current known distribution extends from the San Gabriel Mountains in Los Angeles County, east to the San Bernardino Mountains, and south to the northern edge of the Peninsular Ranges.[283] There are currently 20 extant SHS occurrences distributed among Los Angeles County (Big Tujunga Wash and Bee Canyon), San Bernardino County (upper Santa Ana River, Cajon Creek, and Lytle Creek), and Riverside County (Temescal Wash, Bautista Creek, and near Vail Lake-Kolb and Arroyo Seco Creeks).[284] Within the CRCP Plan Area, locations around Lytle Creek (San Bernardino County) and La Cañada Flintridge (Los Angeles County) overlap current SoCalGas facilities; therefore, SHS may potentially be encountered during SoCalGas O&M activities.

3.2.19.2 Habitat Characteristics and Use

The SHS grows in sandy soils in alluvial fans, floodplains, terrace washes, and benches in chaparral, cismontane woodland, and coastal scrub vegetation communities, generally between 660 and 2,490 feet in elevation.[285] Its blooming period is between April and June.[286] Threats to this species include urban development and introduction of non-native species.

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[282] California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California.

[283] U.S. Fish and Wildlife Service. 1987. Endangered Status for Eriastrum divesifolium ssp. sanctorum (Santa Ana River Woolly Star) and Centrostegia leptoceras (Slender-Horned Spineflower). Final Rule. Federal Register 52 (187): 36265–70.

[284] U.S. Fish and Wildlife Service. 2010. Slender-Horned Spineflower 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3622.pdf. Accessed 27 July 2017.

[285] NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

[286] California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California. Available at: http://www.rareplants.cnps.org. Accessed 20 June 2017.

3.2.20 Vandenberg Monkeyflower (*Diplacus vandenbergensis/Mimulus fremontii* var. *vandenbergensis*)

3.2.20.1 Status and Distribution

Vandenberg monkeyflower is listed as endangered pursuant to the ESA. Vandenberg monkeyflower is not listed pursuant to the CESA. It has a CRPR designation of 1B.1. Critical habitat for Vandenberg monkeyflower was established by the USFWS in 2015. Approximately 5,800 acres of critical habitat were designated in Santa Barbara County. Vandenberg monkeyflower is endemic to California. The current and historic distribution is limited to fragmented areas in Santa Barbara County within the Burton Mesa.[287] Current known distribution ranges in Santa Barbara County are known to occur within the CRCP Plan Area; therefore, Vandenberg monkeyflower may potentially be encountered during SoCalGas O&M activities.

3.2.20.2 Habitat Characteristics and Use

Vandenberg monkeyflower occurs in sandy, often disturbed areas within chaparral, cismontane woodland, and costal dunes at an elevation approximately between 197 to 394 feet. The blooming period is between April and June. Threats to this species include development, vehicles, and competition from non-native plants.[288]

3.2.21 Ventura Marsh Milk-Vetch (*Astragalus pycnostachyus* var. *lanosissimus*)

3.2.21.1 Status and Distribution

Ventura marsh milk-vetch (VMMV) is listed as endangered pursuant to the ESA and the CESA. It has a CRPR designation of 1B.1. Critical habitat for VMMV was established by the USFWS in 2004. Approximately 420 acres of critical habitat were designated in Santa Barbara and Ventura Counties. VMMV is endemic to California. The current known distribution is limited to one native population in Oxnard, Ventura County, known as North Shore on the Mandalay Property. In addition, there are outplanting sites that may support individuals: Mandalay State Beach, McGrath State Beach, and Ormond Beach in Ventura County; and Coal Oil Point Reserve (Goleta) and Carpinteria Salt Marsh in Santa Barbara County.[289] Historically, the VMMV is known from coastal sites in Ventura, Los Angeles, and Orange Counties.[290] Current known distribution ranges in Santa Barbara and Ventura Counties overlap several SoCalGas facilities; therefore, VMMV may potentially be encountered during SoCalGas O&M activities.

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[287] U.S. Fish and Wildlife Service. 2014. Endangered and Threatened Wildlife and Plants; Endangered Status for Vandenberg Monkeyflower. 16 U.S.C. 1361-1407; 1531-1544; 4201-4245, unless otherwise noted. Available at: https://www.federalregister.gov/documents/2014/08/26/2014-20054/endangered-and-threatened-wildlife-and-plants-endangered-status-for-vandenberg-monkeyflower

[288] California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California. Available at: http://www.rareplants.cnps.org

[289] U.S. Fish and Wildlife Service. 2010. Ventura Marsh Milk-Vetch 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3554.pdf. Accessed 27 July 2017.

[290] U.S. Fish and Wildlife Service. 2001. Endangered and Threatened Wildlife And Plants; Final Rule for Endangered Status for Astragulus pycnostachyus var. lanosissimus (Ventura Marsh Milkvetch). Federal Register 66: 27901–8.

3.2.21.2 Habitat Characteristics and Use

VMMV occurs in open sites near the coast on soils with a high water table, such as on bluffs or flats near seeps or bodies of brackish or fresh water, or in or near coastal marshes.[291] Currently, habitat is described as low-elevation coastal dune-swale areas where freshwater levels are high enough to reach the roots of the plants. The blooming period is between June and October.[292] Threats to this species include urban development, herbivory, disease, competition from non-native invasive weeds, and hydrological alterations.[293]

3.2.22 Verity's Dudleya (*Dudleya verity*)

3.2.22.1 Status and Distribution

Verity's dudleya is listed as threatened pursuant to the ESA. Verity's dudleya is not listed pursuant to the CESA. It has a CRPR designation of 1B.1. No critical habitat has been designated for this species. Verity's dudleya is endemic to California. Its current distribution is within eastern Ventura County, along north-facing volcanic rock outcrops on the lower slopes of the west end of the Santa Monica Mountains. The entire distribution of the species is scattered over a four-mile stretch of land along the northern slope of Conejo Mountain and on north-facing volcanic outcrops in the vicinity of the California State University, Channel Islands campus.[294] Due to its restricted habitat requirements and the distribution of known populations, there is a low likelihood that this species will be encountered during SoCalGas O&M activities. Recent catastrophic events such as extreme fire, "exceptional" drought, and loss of Verity's dudleya obligate lichen species have put this species in a critically endangered status. The USFWS estimates that approximately 99 to 99.9 percent of all Verity's Dudleya individuals were lost in these catastrophic events.

3.2.22.2 Habitat Characteristics and Use

Verity's dudleya is found in chaparral, cismontane woodland, and coastal sage scrub vegetation communities, generally between 200 and 1,150 feet of elevation. The blooming period is between May and June. It inhabits sparsely vegetated ocean bluffs, sheer cliffs, and rock outcrops on thin, nutrient-poor soils derived from the Miocene Conejo volcanic activity. Verity's dudleya prefers slopes ranging from 20 to 90 degrees, most commonly with north-facing exposures. Dominant species in the sage scrub communities where it occurs includes California sagebrush, California buckwheat, purple sage (*Salvia leucophylla*), and occasionally giant coreopsis (*Coreopsis gigantea*). In addition, a diverse lichen flora is associated with this species and is thought to provide a nursery

[291] Wilken D., and T. Wardlaw. 2001. Ecological and Life History Characteristics of Ventura Marsh Milkvetch (Astragalus pycnostachyus var. lanosissimus) and Their Implications for 24 Recovery. Prepared for California Department of Fish and Game, South Coast Region. U.S. Fish and Wildlife Service Section 6 Program.

[292] Wilken D., and T. Wardlaw. 2001. Ecological and Life History Characteristics of Ventura Marsh Milkvetch (Astragalus pycnostachyus var. lanosissimus) and Their Implications for 24 Recovery. Prepared for California Department of Fish and Game, South Coast Region. U.S. Fish and Wildlife Service Section 6 Program.

[293] NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

[294] U.S. Fish and Wildlife Service. 2009. Verity's Dudleya 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc2554.pdf. Accessed 27 July 2017.

habitat for seed capture and germination. Currents threats to remaining populations of Verity's dudleya are from mining, flood control activities, development, and non-native plant competition.[295]

3.3 Fully Protected Species

In addition to the 41 covered wildlife and plant species discussed above, SoCalGas has identified seven wildlife species afforded "fully protected" status by the State of California that have the potential to be present within the CRCP Plan Area:

- Unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*)
- American peregrine falcon (*Falco peregrinus anatum*)
- California condor (*Gymnogyps californianus*)
- California least tern (*Sterna antillarum browni*)
- Golden eagle (*Aquila chrysaetos*)
- White-tailed kite (*Elanus leucurus*), and
- Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*).

These seven fully protected species are not proposed for coverage under this MSHCP. SoCalGas SOPs and AMMs have avoided impacts to these species in the past, and SoCalGas will continue to implement avoidance measures for the duration of the 30-year permit term (discussed in Chapter 6).

3.3.1 Unarmored Threespine Stickleback (*Gasterosteus aculeatus williamsoni*)

3.3.1.1 Status and Distribution

Unarmored threespine stickleback (UTS) is listed as endangered pursuant to the ESA and the CESA. It is also listed as a fully protected species by CDFW. Critical habitat for UTS was proposed in 1980; however, the USFWS determined in 2002 that no critical habitat designation should be made. A recovery plan for the species was published in 1977 and revised in 1985. UTS distribution is restricted to the upper Santa Clara River and its tributaries in Los Angeles County, San Antonio Creek on Vandenberg Air Force Base in Santa Barbara County, and the Shay Creek vicinity in San Bernardino County.[296] Historic populations occurred within the San Gabriel and Santa Ana Rivers, but these have since been deemed extirpated.

3.3.1.2 Habitat Characteristics and Use

Previous studies suggest that UTS thrives in headwater streams with slow, continuous flows that are isolated—except during rainy periods—from the ocean by stretches of dry streambed.[297] Adults (1.25 inches standard length or longer) are found in all areas of the stream and tend to gather in areas of slower-moving or standing water. In rapid-moving water, adults are usually found behind obstructions, or at the edge of the stream, especially under the edge of algal (*Cladophora* spp.) mats.

[295] U.S. Fish and Wildlife Service. 2009. Dudleya verityi (Verity's Dudleya) 5-Year Review: Summary and Evaluation.

[296] U.S. Fish and Wildlife Service. 2009. Unarmored Threespine Stickleback (Gasterosteus aculeatus williamsoni) 5-Year Review: Summary and Evaluation.

[297] U.S. Fish and Wildlife Service. 1980. Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for the Endangered Unarmored Threespine Stickleback. Proposed Rule. Federal Register 223: 76012–15.

Population size estimates indicate that the best habitat is a small clean pond in the stream with a constant flow of water through it.[298,299] A pond such as this, located at Thousand Trails in Soledad Canyon, supported between 2.0 and 3.4 fish per square meter. The high water quality in Soledad Canyon is indicated by the 2.49 diatom diversity index found there.[300]

3.3.2 American Peregrine Falcon (*Falco peregrinus anatum*)

3.3.2.1 Status and Distribution

The American peregrine falcon (APF) was delisted under the ESA in 1999.[301] It was delisted under the CESA in 2009.[302] APF remains listed as a fully protected subspecies by CDFW. In California, APF is an uncommon breeder (mostly along coastal areas in the CRCP Plan Area) and an uncommon winter migrant in coastal and more inland areas.[303] However, since the 1970s, the breeding population has dramatically increased, and active nest sites are known from 40 counties, spanning the length of California.[304]

3.3.2.2 Habitat Characteristics and Use

APF generally utilize open habitats for foraging. Nonbreeding APF may also occur in open areas without cliffs. Many artificial habitats like towers, bridges, and buildings are also utilized for perching and nesting.[305] APF build their nests in substrates on ledges of cliffs ranging from 26 to 1,312 feet in height. APF arrive at nest sites around April or May, and egg-laying may begin from two weeks to two months later depending on the latitude.

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[298] Baskin, J.N. 1975. Biology and the Habitat of the Unarmored Threespine Stickleback, Gasterosteus aculeatus williamsoni, in the Upper Santa Clara River, California. Unpublished Report, Contract No. Ab-27. California. Department of Fish and Game.

[299] Baskin, J.N., and M.A. Bell. 1976. Unarmored Threespine Stickleback Survey and Report. Unpublished Report, Contract No. 39-5495. U.S. Department of Agriculture Forest Service.

[300] Baskin, J.N. 1974. Survey of the Unarmored Threespine Stickleback, Gasterosteus aculeatus williamsoni, in the Upper Santa Clara River Drainage. Unpublished Report, Contract No. 14-16-001-5387SE. U.S. Bureau of Sport Fish and Wildlife.

[301] U.S. Fish and Wildlife Service. 2006. Post-Delisting Monitoring Results for the American Peregrin Falcon (Falco peregrinus anatum), 2003. Federal Register 71 (198): 60561–63.

[302] Comrack, L.A., and R.J. Logsdon. 2008. Status Review of the American Peregrine Falcon (Falco Peregrinus Anatum) in California. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2008-06.

[303] Zeiner, D.C., W.F. Laudenslayer Jr., K.E. Mayer, and M. White, eds. 1990. California's Wildlife, vol. II, Birds. California Department of Fish and Game.

[304] Comrack, L.A., and R.J. Logsdon. 2008. Status Review of the American Peregrine Falcon (Falco Peregrinus Anatum) in California. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2008-06.

[305] White, Clayton M., Nancy J. Clum, Tom J. Cade, and W. Grainger Hunt. 2002. Peregrine Falcon (Falco peregrinus). In The Birds of North America Online, ed. A. Poole. Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu/bna/species/660. Accessed 27 July 2017.

3.3.3 California Condor (*Gymnogyps californianus)*

3.3.3.1 Status and Distribution

The California condor is listed as endangered pursuant to the ESA and the CESA. It is also listed as a fully protected species by CDFW. Federally designated critical habitat for this species was established in 1977.[306] Although once more widely distributed in western North America, by the 1950s California condors were confined in California to a horseshoe-shaped area encompassing six counties north of Los Angeles.[307] During 1986 and early 1987, the remaining adult and juvenile wild birds were captured for a captive breeding program; and California condors were absent from the wild until 1992, when the first eight captive reared birds were released in Southern California.[308] In 2016, the wild California condor population was estimated to consist of 276 individuals distributed in Southern California (80), central California (86), Arizona and Utah (76), and Baja Mexico (34).[309] The current range of California condor overlaps portions of the CRCP Plan Area within Santa Barbara, Ventura, and Los Angeles Counties. One of the main gas distribution lines in the CRCP Plan Area occurs within approximately 12 miles of the California condor Bitter Creek release site, so California condors may be found in this region as they may fly 35 miles or more between roosting and feeding sites.[310]

3.3.3.2 Habitat Characteristics and Use

California condors require large areas of remote lands for foraging, roosting, and nesting.[311] Nests are typically located in shallow caves and rock crevices on steep cliffs where there is minimal disturbance. California condors have also been documented using holes at the top of giant sequoia trees as nests. They roost on large trees or snags, or on isolated rocky outcrops and cliffs. Foraging habitat includes open grasslands and oak savanna foothills that support populations of large mammals such as deer and cattle. These animals provide a source of carrion that serves as the Condor's primary food source.

3.3.4 California Least Tern (*Sterna antillarum browni*)

3.3.4.1 Status and Distribution

The California least tern (CLT) is listed as endangered pursuant to the ESA and the CESA. It is also listed as a fully protected subspecies by CDFW. Historically, this subspecies' breeding range occurred along the Pacific Coast from Moss Landing, Monterey County, to San Jose del Cabo, southern Baja California, Mexico.[312] Within Southern California, historic records of nesting colonies

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[306] Federal Register 42: 47840–45.

[307] Koford, C.B. 1953. The California Condor. National Audubon Society.

[308] U.S. Fish and Wildlife Service. 2013. California Condor 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc4163.pdf. Accessed 27 July 2017.

[309] U.S. Fish and Wildlife Service. 2016. California Condor Recovery Program, 2016 Annual Population Status. Available at: https://www.fws.gov/cno/es/CalCondor/PDF_files/2016-CA-condor-population-status.pdf. Accessed 27 July 2017.

[310] Koford, C.B. 1953. The California Condor. National Audubon Society.

[311] U.S. Fish and Wildlife Service. 2017. California Condor Recovery Program. Available at: https://www.fws.gov/cno/es/CalCondor/Condor.cfm. Accessed 27 July 2017.

[312] U.S. Fish and Wildlife Service. 1980. Revised California Least Tern Recovery Plan.

exist for Santa Barbara, Ventura, Los Angeles, Orange, and San Diego Counties.[313] Nesting ranges along the Pacific Coast have been discontinuous, with large colonies spread out along beaches at estuaries. This subspecies has the potential to occur near SoCalGas facilities.

3.3.4.2 Habitat Characteristics and Use

CLT usually inhabit seacoasts, beaches, bays, estuaries, lagoons, lakes, and rivers, where they are known to rest on sandy beaches, mudflats, and salt-pond dikes.[314,315] They may roost at night on sandy beaches away from nesting areas for several weeks before nesting. Nesting sites are usually found on open, flat beaches along lagoon or estuary margins, sometimes on mud or sand flats a distance from the ocean, or on artificial islands created from dredge spoils.[316] CLT usually nests in the same area in successive years and is known to return to natal sites to nest.[317]

3.3.5 Golden Eagle (*Aquila chrysaetos*)

3.3.5.1 Status and Distribution

The golden eagle is not listed pursuant to the ESA. However, golden eagles are afforded protection pursuant to the federal Bald and Golden Eagle Protection Act. "Take" of golden eagles is subject to a permit under this act. The golden eagle is also listed as a fully protected species by CDFW. Golden eagles inhabit a wide range of latitudes throughout the northern hemisphere and use a variety of habitats ranging within the arctic to desert biomes.[318] In California, the golden eagle is widespread but rare along the immediate coast; in open deserts; in flat portions of the Central Valley away from the foothills; along the lower Colorado River; and around the Salton Sea.[319] Most golden eagles in California are year-round residents, but some migrate from other locations into California for winter. Given its wide distribution range, the golden eagle has the potential to occur throughout the CRCP Plan Area and may be encountered near SoCalGas facilities.

3.3.5.2 Habitat Characteristics and Use

Golden eagles generally inhabit open and semiopen country such as prairies, sagebrush, arctic and alpine tundra, savannah or sparse woodland, and barren areas, especially in hilly or mountainous regions, in areas with sufficient mammalian prey base and near suitable nesting sites.[320] Nest building may begin one to three months prior to mating and is considered part of the breeding process.

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[313] U.S. Fish and Wildlife Service. 2006. California Least Tern (Sternula antillarum browni) 5-Year Review Summary and Evaluation.

[314] American Ornithologists' Union (AOU). 1957. The A.O.U. Check-list of North American Birds. 5th ed. Port City Press, Inc.

[315] Stiles, F.G., and A.F. Skutch. 1989. A Guide to the Birds of Costa Rica. Cornell University Press.

[316] Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1992. Birds in Jeopardy: The Imperiled and Extinct Birds of the United States and Canada, Including Hawaii and Puerto Rico. Stanford University Press.

[317] Atwood, J.L., and B.W. Massey. 1988. Site Fidelity of Least Terns in California. Condor 90: 389–94.

[318] Kochert, M.N., K. Steenhof, C.L MacIntyre, and E.H Craig. 2002. Golden Eagle Aquila chrysaetos. The Cornell Lab of Ornithology: Birds of North America. Available at: https://birdsna.org/Species-Account/bna/species/goleag. Accessed 27 July 2017.

[319] Small, Arnold.1994.California Birds: Their Status and Distribution. IBIS Publishing Company.

[320] Great Basin Bird Observatory (GBBO). 2010. Nevada Comprehensive Bird Conservation Plan, ver. 1.0.

Breeding season varies regionally but generally begins in November and December in southern areas.

3.3.6 White-Tailed Kite (*Elanus leucurus*)

3.3.6.1 Status and Distribution

The white-tailed kite (WTK) is not listed pursuant to the ESA. WTK is listed as a fully protected species by CDFW. The WTK occurs sporadically year round all over the state, but is most commonly observed in the winter months. This species generally avoids areas with extensive winter freezes, but rainfall and humidity vary greatly throughout the bird's range. Most WTK populations occur and breed in lowlands and foothills west of the Sierra Nevada and the southeastern deserts, from the northern Sacramento Valley and Coastal Del Norte County south intermittently to San Diego County.[321] Due to its wide distribution range, there is the possibility for WTK to be encountered near SoCalGas facilities.

3.3.6.2 Habitat Characteristics and Use

WTK is commonly found in open cultivated and marshy bottomlands with scattered tall trees, savannah, grassy foothill slopes interspersed with oaks, agricultural areas with trees for windbreaks, orchards, and roadside verges under 2,000 feet of elevation.[322] WTK hunts over lightly grazed or ungrazed fields, where there may be larger prey populations than in more heavily grazed areas.

3.3.7 Morro Bay Kangaroo Rat (*Dipodomys heermanni morroensis*)

3.3.7.1 Status and Distribution

The Morro Bay kangaroo rat (MBKR) is listed as endangered pursuant to the ESA and the CESA. It is also listed as fully protected species by CDFW. Critical habitat for this species was established in 1977.[323] This species of kangaroo rat historically occurred in central California from El Dorado County south to Santa Barbara County but is currently restricted to the vicinity of Los Osos, San Luis Obispo County.[324] MBKR have been known to occur in eight locations in Los Osos; however, no captures have occurred since 1986, although suitable habitat remains present within the known locations. Current population estimates are unavailable, but in 1999 it was estimated that fewer than 50 individuals existed in the wild.[325] Given that SoCalGas pipelines are restricted to urbanized areas of Los Osos, the remaining habitat for MBKR is unlikely to be disturbed by O&M activities.

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[321] Small, Arnold. 1994. California Birds: Their Status and Distribution. IBIS Publishing Company.

[322] Small, Arnold.1994.California Birds: Their Status and Distribution. IBIS Publishing Company.

[323] Federal Register 42: 47840–45.

[324] U.S. Fish and Wildlife Service. 2011. Morro Bay Kangaroo Rat (Dipodomys heermanni morroensis) 5-Year Review: Summary and Evaluation.

[325] U.S. Fish and Wildlife. 1999. Morro Bay Kangaroo Rat (Dipodomys heermanni morroensis) Draft Revised Recovery Plant.

3.3.7.2 Habitat Characteristics and Use

The MBKR inhabits a variety of vegetation types characterized by early seral stages of the chaparral community; low and sparse vegetation; widely scattered shrubs; southern coastal scrub, coastal sage scrub, or coastal sand plains; and stabilized dunes. Plant species in this habitat include bush lupine (*Lupinus albifrons*), dune lupine (*Lupinus chamissonis*), mock heather (*Ericameria ericoides*), coyote bush (*Baccharis pilularis*), California sagebrush, croton, buckwheat, phlox (*Galium* sp.), and deerweed (*Acmispon* sp.). Plant roots provide support for burrows, which are typically constructed in medium-textured sandy loam soils.[326]

3.4 Occurrences in the CRCP Plan Area

The wildlife and plant species proposed for coverage under this MSHCP are all known to occur in the CRCP Plan Area. CNDDB provides spatial data that helps to analyze baseline conditions; therefore, a CNDDB query for occurrence data—known as "element occurrences"—within the CRCP Plan Area was conducted. An element occurrence is defined by CDFW as a recorded siting of a rare, California-native species or natural community. Occurrence data includes both historical and recent observations of the Covered Species, and is meant to indicate the relative extent of presence of each species within the CRCP Plan Area, based on existing data. Table 3.4-1, *Occurrences in the CRCP Plan Area*, summarizes recorded observations of covered species and fully protected wildlife.

The CRCP uses a habitat suitability modeling approach to evaluate the potential for a Covered Species to be encountered at a SoCalGas facility subject to an O&M activity. The model is based on suitable habitat and other factors specific to each species such as elevation, temperature range, precipitation, and proximity to streams and other hydrologic features. SoCalGas developed a Geographic Environmental Analysis & Reporting System (GEARS) in 2007 as an ArcGIS geospatial database to screen and provide specific data for utility jobs that may impact the environment. GEARS is a centralized, comprehensive system used to screen, manage, and document projects to demonstrate compliance. Prior to conducting O&M activities, SoCalGas screens jobs through querying of geospatial data that includes but is not limited to coastal zone jurisdiction; plant communities; land use and zoning; land ownership; cultural resources; hazardous materials; ecological subregions; topography; precipitation; riparian areas; streams, lakes, and reservoirs; documented species occurrences; critical habitat; and other protected or sensitive areas such as conservation easements. SoCalGas uses GEARS to identify the local jurisdiction's compliance requirements, then works with the land use authority (permitting agency, such as USFS or California State Parks) to avoid or minimize environmental impacts from O&M activities.

Species distribution ranges for Covered Species are incorporated into GEARS and consist of habitat suitability within the CRCP Plan Area. The CRCP modeling approach relies on habitat suitability modeling to determine where listed species are likely to occur and where avoidance, minimization, and mitigation measures are warranted unless protocol-level surveys by qualified biologists determine a site is unoccupied. The GEARs database is used in conjunction with SoCalGas' other SOPs, such as conducting site visits for all undeveloped areas within or near historic properties, and anticipated range of Covered Species to assess physical absence or presence.

[326] Matthews, J.R., and C.J. Moseley, eds. 1990. The Official World Wildlife Fund Guide to Endangered Species of North America. Beacham Publications.

TABLE 3.4-1
OCCURRENCES IN THE CRCP PLAN AREA

Species	CNDDB Occurrences (# of individuals)
Wildlife	
Invertebrates	
DSFF	666
ESBB	10
MSS	74
Fish	
SAS	315
Amphibians	
Arroyo toad	2,473
CRLF	173,194
CTS	12,653
MYLF	3,666
Reptiles	
SWPT	323,248
SRB	2,455
Birds	
BSS	156
Burrowing owl	136,887
CAGN	65,552
LBV	40,182
SWF	855
WYBC	1,846
Mammals	
SBKR	881
SJKF	36,264
SKR	333
Covered Plant Species	
BMV	1,007
California seablite	84
CCBT	231
Conejo dudleya	156
GWC	101
Gaviota tarplant	1,491
IKM	18
LYS	38
Lyon's pentachaeta	1,054
Marcescent dudleya	116
Morro manzanita	53
Nevin's barberry	431
NML	14
Pismo clarkia	410
SFVS	263
SARW	668
SMMD[327]	20
SBB	664
SHS	544

[327] The USFWS refers to this species as Santa Monica Mountains dudleya, while CDFW and CNDDB refer to it as Santa Monica dudleya.

TABLE 3.4-1
OCCURRENCES IN THE CRCP PLAN AREA

Species	CNDDB Occurrences (# of individuals)
Vandenberg monkeyflower	91
VMMV	30
Verity's dudleya	36
Fully Protected Species	
Fish	
UTS	115
Birds	
APF	326
California condor	42
CLT	816
Golden eagle	2,807
WTK	2,175
Mammals	
MBKR	78

Chapter 4.0
ENVIRONMENTAL SETTING AND BIOLOGICAL RESOURCES

4.1 Environmental Setting

4.1.1 Climate

The climate in Southern California is characterized as "Mediterranean." The Mediterranean climate is hot and dry during the summer, going anywhere from four to six months without significant precipitation due to the presence of subtropical high-pressure cells,[328] collectively called the "Pacific high," which deflects most storm tracks to the north (Figure 4.1.1-1, *Precipitation*).[329] The Pacific high decreases in intensity in winter and moves further south, permitting storms to move into and across the State, producing widespread rain at low elevations and snow at high elevations.[330]

There are a variety of climates across the State of California, primarily due to the wide ranges of altitude and the continuous interaction of maritime air masses with those of continental origin. Together, these influences result in pronounced climatic changes within short distances.[331]

Two primary mountain chains are located within the CRCP Plan Area: the Coast Ranges and the Transverse Ranges. Within the CRCP Plan Area boundaries, the Coast Ranges parallel the coastline from San Luis Obispo County in the north to just above the Los Angeles Basin, at which point the Transverse Ranges extend eastward, bordered by the Mojave Desert to the north. The Tehachapi Mountains are considered a segment of the Coast Ranges and connect the southern end of the Sierra Nevada with the mountains along the coast, including the western portion of the Transverse Ranges.[332] From the point where the Tehachapi and the Coast Ranges join, a series of ranges extend southeastward to the southern border of the State, known as the Peninsular Ranges.[333]

[328] George, Melvin R. n.d. Mediterranean Climate. UC Rangelands Research & Education Archive. Available at: http://rangelandarchive.ucdavis.edu/Annual_Rangeland_Handbook/Mediterranean_Climate/. Accessed 19 July 2017.

[329] Prism Climate Group. n.d. *30-Year Normals*. Available at: http://prism.oregonstate.edu/normals/ .

[330] State Climatologists. n.d. Climate of California. National Climatic Data Center. Available at: http://www.wrcc.dri.edu/narratives/CALIFORNIA.htm. Accessed 19 July 2017.

[331] State Climatologists. n.d. Climate of California. National Climatic Data Center. Available at: http://www.wrcc.dri.edu/narratives/CALIFORNIA.htm. Accessed 19 July 2017.

[332] The Editors of Encyclopedia Britannica. n.d. Tehachapi Mountains. Encyclopedia Britannica. Available at: https://www.britannica.com/place/Tehachapi-Mountains. Accessed 19 July 2017.

[333] The Editors of Encyclopedia Britannica. n.d. Tehachapi Mountains. Encyclopedia Britannica. Available at: https://www.britannica.com/place/Tehachapi-Mountains. Accessed 19 July 2017.

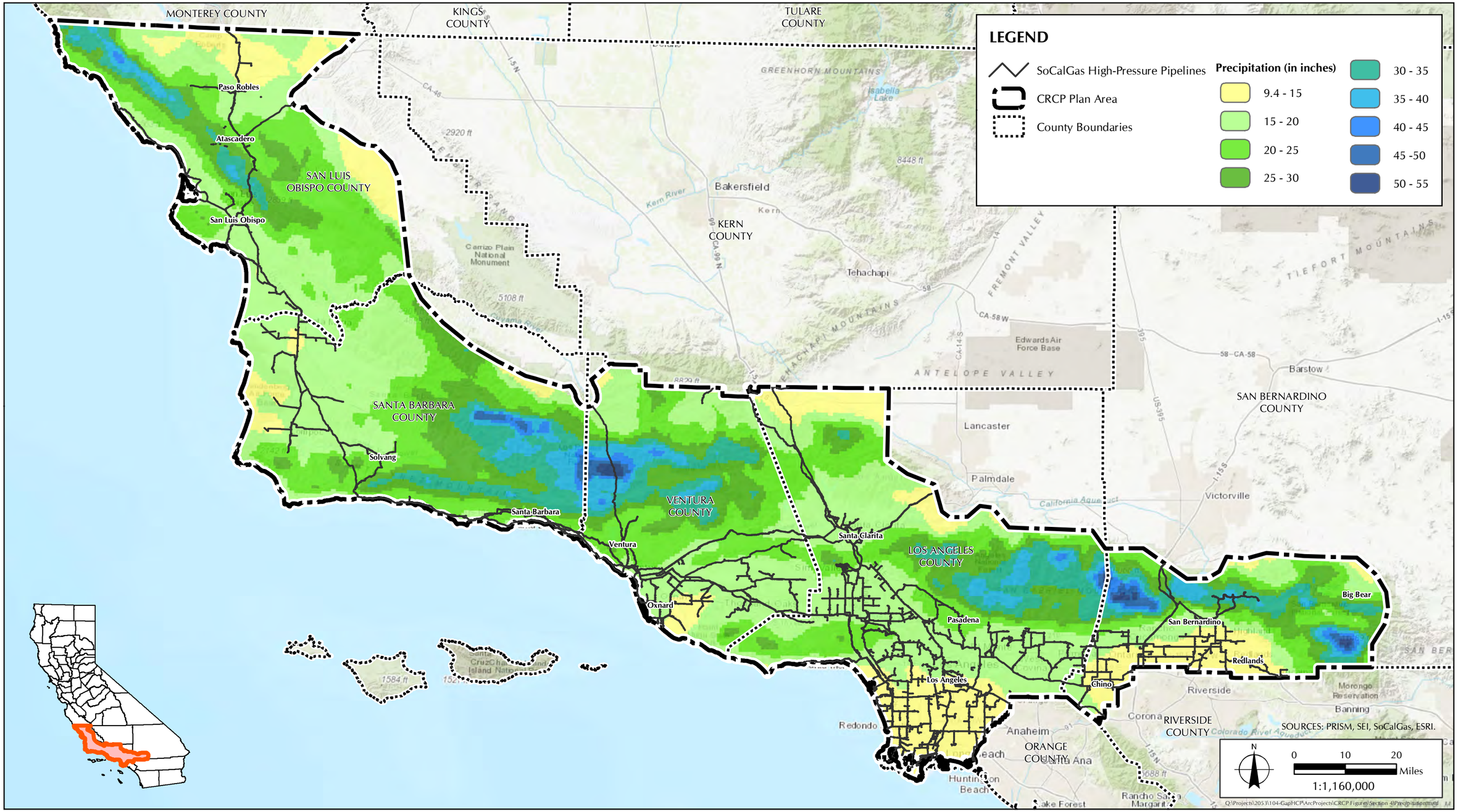

FIGURE 4.1.1-1
Precipitation

Because the Coast Ranges run primarily north-south, isotherms, which are lines of constant or equal temperature,[334] also run mostly north-south, instead of east-west as is common in most parts of the temperate zone of the United States. The climate along the western side of the Coast Ranges, which includes portions of San Luis Obispo and Santa Barbara Counties, is heavily influenced by the Pacific Ocean. This area experiences relatively warm winters and cool summers, in addition to high relative humidity and incremental daily and seasonal temperature ranges. This maritime influence decreases as distance from the coast increases. Inland areas are not influenced by the Pacific Ocean and therefore experience warmer summers, colder winters, greater daily and seasonal temperature ranges, and generally lower relative humidity. Due to the strong flow of air off the Pacific Ocean, precipitation is heavier on the coastal or western side of the Coast Ranges and lighter on the eastern slopes.[335]

The CRCP Plan Area includes a small area in the southeastern portion of the Mojave Desert. Because it is located to the east of the Coast Ranges, its climate is not affected by the moderating influence of the Pacific Ocean. Therefore, it is an area of climatological extremes, including wide ranges in daily temperatures, and very low average annual rainfall.

In the basins and valleys adjoining the coast, including the inland Los Angeles County portion of the CRCP Plan Area, climate varies widely within short distances due to the influence of topography on the circulation of marine air. For example, within the Los Angeles Basin, average July temperatures on the coast peak at around 75 degrees Fahrenheit, while temperatures average about 20 degrees higher just 15 miles to the north, in the San Fernando Valley (Figure 4.1.1-2, *Temperature*).[336]

4.1.1.1 Air Quality

California is divided geographically into air basins so that State air resources can be managed on a regional basis. An air basin generally has similar meteorological and geographic conditions throughout.[337] The CRCP Plan Area encompasses portions of three air basins: the South Central Coast, the South Coast, and the Mojave Desert.

The CARB has established State ambient air quality standards (State standards) to identify outdoor pollutant levels considered safe for the public. The State standards cover 10 pollutants: ozone, suspended particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide, nitrogen dioxide, sulfur dioxide, sulfates, lead, hydrogen sulfide, and visibility reducing particles. For each State standard, CARB designates each area as attainment, nonattainment, or unclassified. In addition to State standards, the Federal Clean Air Act requires the EPA to set National Ambient Air Quality Standards (NAAQS).[338]

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[334] Isotherms are often used on weather maps by meteorologists to give a large scale view of temperatures across the U.S. See http://climate.ncsu.edu/edu/k12/.IsobarIsotherm. Accessed 23 June 2017.

[335] State Climatologists. n.d. Climate of California. National Climatic Data Center. Available at: http://www.wrcc.dri.edu/narratives/CALIFORNIA.htm. Accessed 19 July 2017.

[336] State Climatologists. n.d. Climate of California. National Climatic Data Center. Available at: http://www.wrcc.dri.edu/narratives/CALIFORNIA.htm. Accessed 19 July 2017.

[337] California Air Resources Board. 14 March 2014. California Air Basin Map. Available at: https://www.arb.ca.gov/ei/maps/statemap/abmap.htm. Accessed 19 July 2017.

[338] California Air Resources Board. 5 May 2016. Air Quality Standards and Area Designations. Available at: https://www.arb.ca.gov/desig/desig.htm. Accessed 19 July 2017.

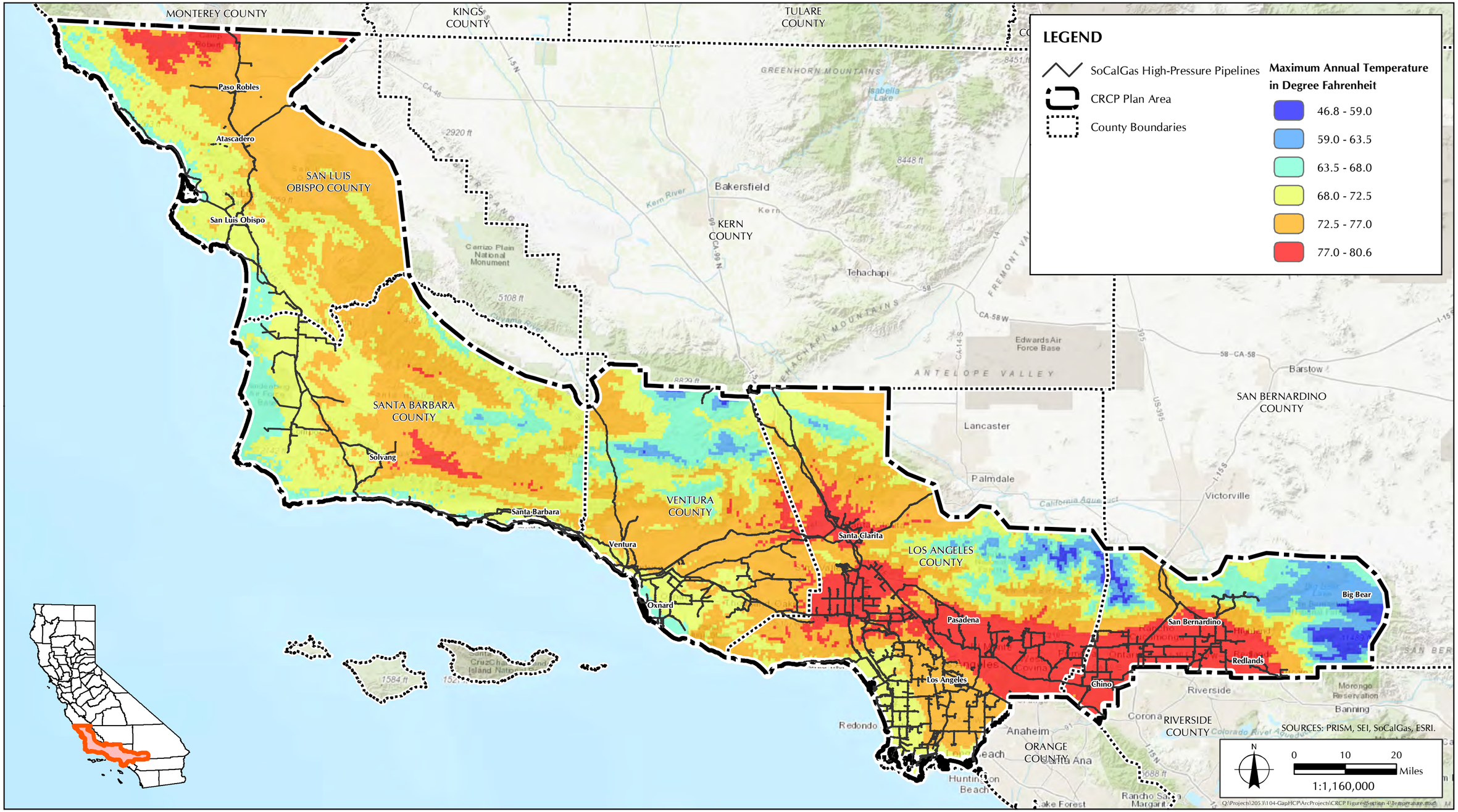

FIGURE 4.1.1-2

Temperature

The majority of the South Central Coast Air Basin is within the CRCP Plan Area. The South Central Coast Air Basin includes the counties of San Luis Obispo, Santa Barbara, and Ventura. It is in attainment for carbon monoxide, SOx, NOx, sulfates, and lead. For $PM_{2.5}$, it is in attainment (Santa Barbara County is unclassified). For ozone and PM_{10}, it is designated as nonattainment. It is unclassified for hydrogen sulfide and visibility reducing particles.[339] The CRCP Plan Area within the South Central Coast Air Basin is regulated by three air districts: Ventura County Air Pollution Control District (APCD), Santa Barbara County APCD, and San Luis Obispo County APCD. The 2016 Ventura County Air Quality Management Plan presents Ventura County's strategy to attain the 2008 federal 8-hour ozone standard by 2020.[340] The Santa Barbara County APCD 2013 Clean Air Plan is the latest plan update to implement "an all feasible measures" strategy to ensure continued progress towards attainment of the state ozone standards.[341] The San Luis Obispo County APCD 2015 Annual Air Quality Report discusses the attainment level and challenges, as well as plans to reach compliance.[342]

Approximately half of the South Coast Air Basin is within the CRCP Plan Area. The South Coast Air Basin encompasses Orange County, as well as portions of Los Angeles County, San Bernardino County, and Riverside County. It is designated as in attainment for carbon monoxide, NOx, SOx, sulfates, and lead. It is in nonattainment for ozone, $PM_{2.5}$, and PM_{10}. It is unclassified for hydrogen sulfide and visibility reducing particles.[343] The CRCP Plan Area within the South Coast Air Basin is governed by the South Coast Air Quality Management District (AQMD). In the 2016 Air Quality Management Plan, approved by the South Coast AQMD Board in March 2017, the South Coast AQMD articulated control strategies that rely on a combination of available and advanced technologies to reach attainment with the air quality standards.[344] Although criteria pollutants are regulated separately from greenhouse gases (GHGs), SCAQMD has recognized that certain air pollutants are both climate forcers and criteria pollutants. Therefore, they developed many of the control measures to achieve multiple co-benefits by combining planning efforts for climate change, transportation, and the energy sector.[345]

A small portion of the Mojave Desert Air Basin is included within the CRCP Plan Area. The Mojave Desert Air Basin includes portions of Kern County, Los Angeles County, San Bernardino County, and Riverside County. The CRCP Plan Area within the Mojave Desert Air Basin is regulated by the Antelope Valley AQMD and the Mojave Desert AQMD. The Antelope Valley AQMD is in nonattainment for federal level 8-hr ozone, and state-level ozone and PM_{10}.[346] In 2004, the Antelope Valley AQMD adopted an ozone attainment plan for state and federal, with a compliance date of 2007; however, attainment was not achieved.[347] The Antelope Valley AQMD subsequently adopted

[339] California Air Resources Board. n.d. Area Designations for State Ambient Air Quality Standards (for) Ozone. Available at: https://www.arb.ca.gov/desig/adm/2015/state_o3.pdf. Accessed 19 July 2017.

[340] Ventura County Air Pollution Control District, 2016 Ventura County Air Quality Management Plan.

[341] Santa Barbara County Air Pollution Control District. 2013. 2013 Clean Air Plan, p. 1-1.

[342] San Luis Obispo County Air Pollution Control District, 2015 Annual Air Quality Report.

[343] Santa Barbara County Air Pollution Control District. 2013. 2013 Clean Air Plan.

[344] South Coast Air Quality Management District. 2016. 2016 Air Quality Management Plan, Executive Summary. Available at: http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/final-2016-aqmp/executive-summary.pdf. Accessed 23 June 2017.

[345] South Coast Air Quality Management District. 2016. 2016 Air Quality Management Plan, Chapter 10 Climate and Energy, p. 10-2. Available at: http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/final-2016-aqmp/executive-summary.pdf. Accessed 23 June 2017.

[346] Antelope Valley AQMD. August 2016. *AV CEQA & Conformity Guidelines*.

[347] AVAQMD 2004 Ozone Attainment Plan (State and Federal), adopted April 20, 2004.

an 8-hour ozone attainment plan to come into compliance with the federal ozone level by 2021.[348] The Mojave Desert AQMD has adopted state and federal attainment plans for the region within its jurisdiction.[349] It is in attainment for carbon monoxide, NOx, SOx, sulfates, and lead. It is designated nonattainment for ozone, $PM_{2.5}$, PM_{10}, and—in the Searles Valley—hydrogen sulfide. It is unclassified for hydrogen sulfide outside of the Searles Valley and for visibility reducing particles.[350] A portion of the Mojave Desert AQMD is included in the Western Mojave Desert nonattainment area.

4.1.2 Topography and Geology

4.1.2.1 Geomorphic Provinces

Mojave Desert. The CRCP Plan Area includes a small portion of the southwestern-most extent of the Mojave Desert geomorphic province. The entirety of the Mojave Desert occupies approximately 25,000 square miles. There are two important fault trends that control topography, a prominent northwest-southeast trend and a secondary east-west trend. The Mojave province is wedged in a sharp angle between the Garlock Fault to the north, the Nevada state line to the east, the San Bernardino/Riverside County line to the south, and the San Andreas Fault to the west. Erosional features such as broad alluvial basins that receive nonmarine sediments from the adjacent uplands dominate the Mojave Desert region. Numerous playas, or ephemeral lakebeds within internal drainage basins, also characterize the region (Figure 4.1.2.1-1, *CRCP Plan Area Geology*).

Throughout this province, small hills—some the remnants of ancient mountainous topography—rise above the valleys that are surrounded by younger alluvial sediments. The highest elevation approaches 4,000 feet above mean sea level (MSL), and most valleys lie between 2,000 to 4,000 feet above MSL.[351]

The CRCP Plan Area is located within the western Mojave Desert, more specifically the Antelope Valley portion of the Mojave Desert geomorphic province. The Antelope Valley is a desert ecosystem spanning approximately 2,200 square miles and constitutes the western tip of the Mojave Desert. It is situated north of the San Gabriel Mountains (Angeles National Forest, San Andreas Fault) and south of the Garlock Fault and the Tehachapi Mountains, and opening up to the Victor Valley to the east.[352,353]

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[348] AVAQMD Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area), adopted May 20, 2008.

[349] Mojave Desert Air Quality Management District. n.d. Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area), p. 1.

[350] Mojave District Air Quality Management District. n.d. Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area).

[351] Mojave Disstrict Air Quality Management District. n.d. Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area).

[352] U.S. Geological Survey. n.d. Topography, surface features, and flooding of Rogers Lake playa, California. Available at: https://pubs.er.usgs.gov/publication/wri984093. Accessed 23 June 2017.

[353] U.S. Geological Survey. n.d. Land use and water use in the Antelope Valley, California. Available at: https://pubs.er.usgs.gov/publication/wri944208. Accessed 23 June 2017.

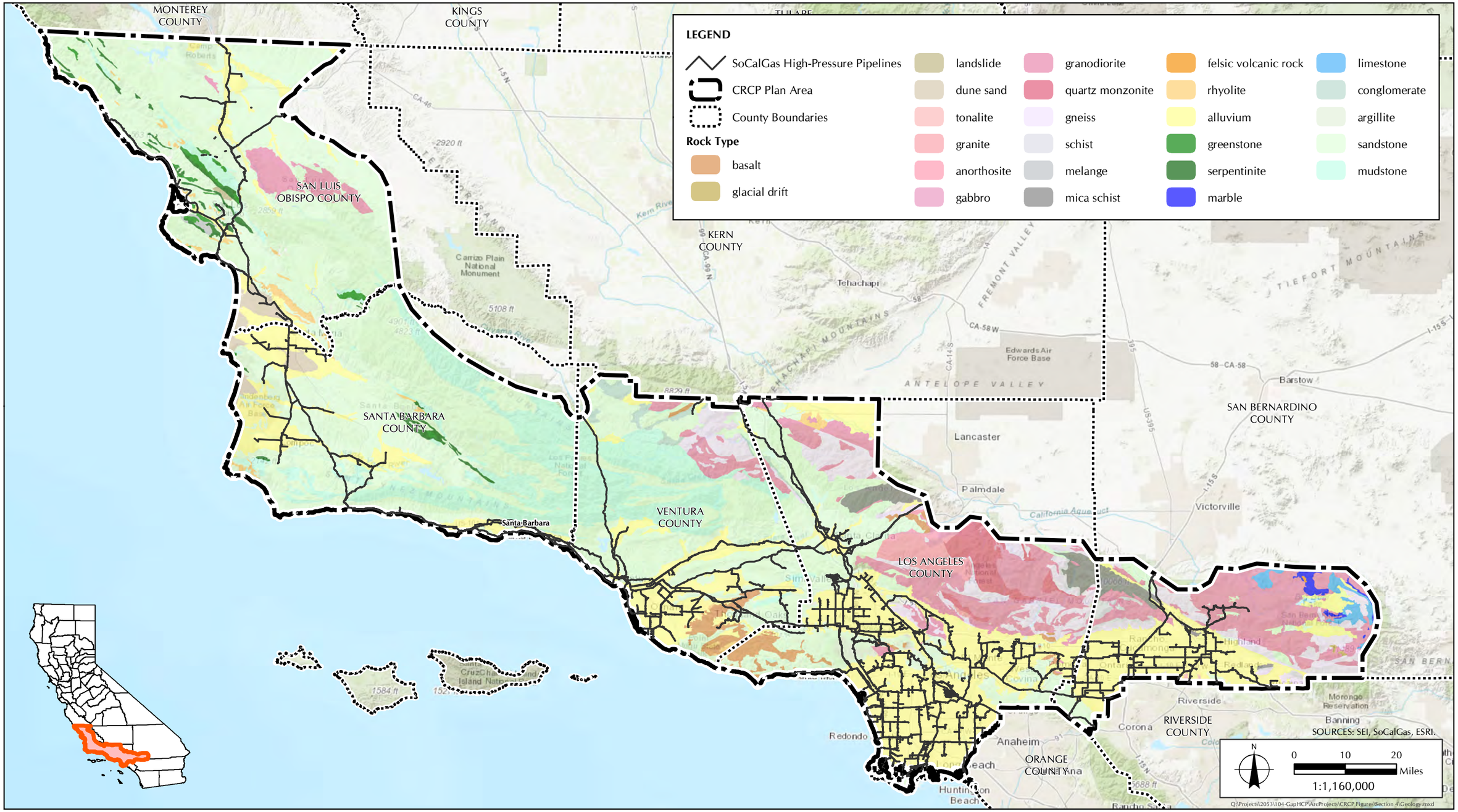

FIGURE 4.1.2.1-1

CRCP Plan Area Geology

Transverse Ranges. The Transverse Ranges are an east-west trending series of steep and narrow mountain ranges, broad alluvial valleys and fault blocks, alluviated lowlands, and dissected westward sloping granitic uplands that extend approximately 320 miles from Point Arguello in the west to the Little San Bernardino Mountains in the east. The east-west structure of the Transverse Ranges is oblique to the normal northwest trend of coastal California, and extends offshore to include San Miguel, Santa Rosa, and Santa Cruz Islands. Within the CRCP Plan Area, the Transverse Ranges occupy portions of Santa Barbara, Ventura, Los Angeles, and San Bernardino Counties. The highest elevations are found in the San Gabriel and San Bernardino Mountains, which lie in the eastern portion of Los Angeles County and the southwestern portion of San Bernardino County. The San Gabriel and San Bernardino Mountains cover approximately 620,800 and 652,000 acres, respectively. Some of the highest peaks in the Transverse Ranges include Mount San Antonio (10,064 feet above MSL) at the Los Angeles–San Bernardino County line, Mount Baden-Powell (9,399 feet above MSL), Mount Burnham (8,997 feet above MSL), and Mount San Gorgonio (11,503 feet above MSL) (Figure 4.1.2.1-2, *Elevation Range*).[354] Northern, western, and southwestern Los Angeles County also includes many smaller, lower peaks. The Santa Monica Mountains, also part of the Transverse Ranges, are a well-known range extending west from the city of Los Angeles. The Transverse Ranges experience intense north-south compression squeezing, resulting in prominent basins and ranges found in this province, including the Ventura Basin and the San Gabriel and San Bernardino Mountains. This is one of the most rapidly rising regions on earth. Several active faults, such as the San Andreas Fault Zone, are located in the Transverse Ranges. Other faults in the province include the Santa Clara River Valley Fault, the San Gabriel Fault Zone, the Santa Cruz Island Faults, the Santa Rosa Island Faults, and the Soledad Faults. This province is also one of the most geologically diverse in California, containing a wide variety of bedrock types and structures. California's highest peaks south of the central Sierra Nevada and the only Paleozoic rocks in the coastal mountains in the United States are found here.

Because of this great lithological diversity, the province is further subdivided into eight subprovinces, each displaying its own geologic signature characterized by broad alleviated valleys, narrow stream canyons, and prominent faults.[355]

Peninsular Ranges. The Peninsular Ranges province consists of a series of ranges separated by northwest trending valleys, subparallel to faults branching from the San Andreas Fault. This province is bounded on the northwest by the Transverse Ranges, on the east by the Colorado Desert, and extends south, encompassing the Los Angeles Basin and terminating 775 miles south of the United States–Mexico border. The Peninsular Ranges are characterized by narrow ranges, broad fault blocks, alluviated lowlands, and dissected westward sloping granitic uplands.

[354] San Gogonio Mountain, California. n.d. Peakbagger.com. Available at: http://www.peakbagger.com/peak.aspx?pid=1417.

[355] California Department of Conservation, California Geological Survey. 2002. California Geomorphic Provinces. Note 36. Sacramento, CA.

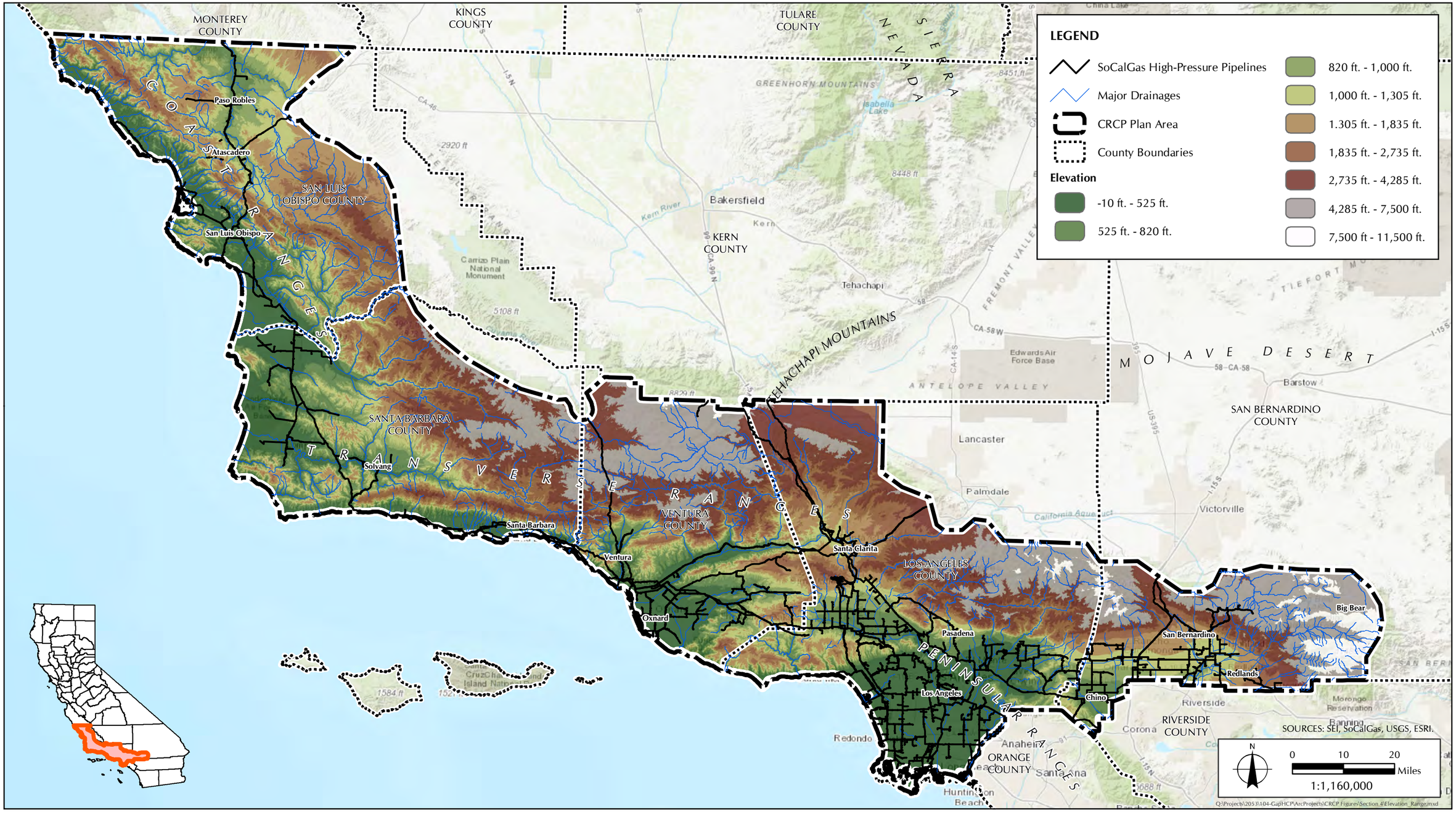

FIGURE 4.1.2.1-2

Elevation Range

Within the CRCP Plan Area, the Peninsular Ranges include the southern portion of Los Angeles County and the southwest corner of San Bernardino County. The Peninsular Ranges also extend throughout all of Orange County and include the San Jacinto Mountains and the Coachella Valley in the central portion of Riverside County. The ranges are composed of a series of northwest-southeast trending mountains that are separated by several active faults, including the San Jacinto and Elsinore Fault Zones. The Peninsular Ranges comprise one of the largest geologic units in western North America. The highest elevations are found in the San Jacinto-Santa Rosa Mountains, with San Jacinto Peak reaching 10,805 feet above MSL. The orientation and shape of the Peninsular Ranges is similar to the Sierra Nevada, in that the west slope is gradual and the eastern face is steep and abrupt. Drainage from the province is typically by the San Diego, San Dieguito, San Luis Rey, and Santa Margarita Rivers.[356]

Coast Ranges. The Coast Ranges geomorphic province ranges in elevation from sea level to more than 6,000 feet above MSL. The Coast Ranges include northwest-trending mountain ranges and valleys that are subparallel to the San Andreas Fault and parallel the Pacific Ocean to the west. The coastline is uplifted, terraced and wave-cut. The Coast Ranges are generally composed of thick Mesozoic and Cenozoic sedimentary strata; the eastern border is characterized by strike-ridges and valleys in Upper Mesozoic strata. The CRCP Plan Area includes the Central California Coast and Southern California Coast Ranges. The Central California Coast Ranges have parallel ranges, and folded, faulted, and metamorphosed strata; the rounded crests are of subequal height. The Central Coast Ranges include late Mesozoic shelf, slope, and eugeosynclinal sedimentary rocks, and Mesozoic ultramafic rocks; while the Southern Coast Ranges include alluvial deposits and Mesozoic granitic and ultramafic rocks. Geomorphology in the Southern California Coast Ranges comprises narrow ranges and broad fault blocks, as well as alluviated lowlands and coastal terraces. West of the San Andreas is the Salinian Block, a granitic core extending from the southern extremity of the Coast Ranges to the north of the Farallon Islands.[357]

Within the CRCP Plan Area, the Coast Ranges parallel the Pacific Coast in Ventura County and comprise a coastal plain and mountainous interior within Santa Barbara County, including the Santa Ynez Mountains, San Rafael Mountains, and Sierra Madre Mountains. The highest elevation in Santa Barbara County is 6,820 feet above MSL at Big Pine Mountain in the San Rafael Mountains.[358] North of the mountains is the Cuyama Valley, located within San Luis Obispo and Ventura Counties.

[356] California Department of Conservation, California Geological Survey. 2002. California Geomorphic Provinces. Note 36. Sacramento, CA.

[357] California Department of Conservation, California Geological Survey. 2002. California Geomorphic Provinces. Note 36. Sacramento, CA.

[358] Big Pine Mountain, California. n.d. Peakbagger.com. Available at: http://www.peakbagger.com/peak.aspx?pid=1252.

4.1.2.2 Earthquake Faults

The CRCP Plan Area is located in an area that has historically experienced high seismicity. In the past 100 years, several earthquakes of magnitude 5.0 or larger have been reported on the active San Andreas, and Newport-Inglewood fault systems. These two fault systems are concentrated in the western portion of the CRCP Plan Area, running in a northwest to southeast direction.[359] Within the CRCP Plan Area, the San Andreas Fault lies furthest to the east, extending just above the northern border of Ventura County and the San Gabriel Mountains. As a result, significant earthquake hazards exist in the region. Injury to people and damage to structures during earthquakes can be caused by actual surface rupture along an active fault, by ground shaking from a nearby or distant fault, liquefaction, or dam failure.

The California Geological Survey (CGS) defines active faults as those that have exhibited evidence of displacement during the Holocene period (10,000 years ago to present).[360] Numerous active and potentially active faults have been mapped in the CRCP Plan Area.[361] The CRCP Plan Area contains lateral strike slip faults similar to the San Andreas and various identified and hidden blind thrust faults. A fault trace is the surface expression of a particular fault.[362] Buried or blind thrust faults, which do not exhibit readily identifiable traces on the earth's surface and are typically at considerable depth within the underlying geologic formation, are mapped within the CRCP Plan Area.[363]

4.1.2.3 Geologic and Seismic Hazards

Geologic hazards are natural geologic events that can endanger human lives and threaten property. Potential geologic hazards include rupture of a known earthquake fault, seismic ground shaking, seismic ground failure including liquefaction, and landslides. Other hazards in relation to geology and soils include soil erosion or loss of topsoil, and development of structures and buildings in locations with geologic units or soils that are unstable or expansive soils.

Movements on the previously identified faults would likely cause future earthquakes in the CRCP Plan Area. Earthquakes can originate in areas where potential seismic energy has built up along a fault over time, but has not yet been released in the form of an earthquake. Studies supported by the National Earthquake Hazards Reduction Program enable scientists to evaluate the hazard level in different areas. In Southern California, scientists estimate that the probability of a magnitude 7.0 or greater earthquake by the year 2024 approaches 80 to 90 percent. The four major hazards generally associated with earthquakes are ground shaking, surface fault rupture (ground displacement), liquefaction ground failures, and settlement. A detailed discussion of these types of hazards is found below.

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[359] See http://maps.conservation.ca.gov/cgs/fam/. Accessed 23 June 2017.

[360] Petersen, M.D., W.A. Bryant, and C.H. Cramer. 1996. Probabilistic Seismic Hazard Assessment for the State of California Department of Conservation, Division of Mines, 1996. Geology Open-File Report issued jointly with U.S. Geological Survey, CDMG 96-08. U.S. Geological Survey.

[361] Department of Conservation. California Geological Survey. 2010. Fault Activity Map of California (2010). Available at: http://maps.conservation.ca.gov/cgs/fam/. Accessed 23 June 2017.

[362] Department of Conservation. California Geological Survey. 2010. Fault Activity Map of California (2010). Available at: http://maps.conservation.ca.gov/cgs/fam/. Accessed 23 June 2017.

[363] See http://maps.conservation.ca.gov/cgs/fam/. Accessed 23 June 2017.

Ground Shaking. Ground shaking may affect areas hundreds of miles distant from the earthquake's epicenter. Historic earthquakes have caused strong ground shaking and damage in many areas of the CRCP Plan Area. The composition of underlying soils in areas located relatively distant from faults can intensify ground shaking. Areas that are underlain by bedrock tend to experience less ground shaking than those underlain by unconsolidated sediments such as artificial fill.

Ground shaking is commonly described in terms of peak ground acceleration as a fraction of the acceleration of gravity (g), or by using the Modified Mercalli (MM) Intensity Scale, a common metric for characterizing intensity. MM intensities range from level I (shaking that is not felt) to level XII (total damage). MM intensities ranging from IV to X could cause moderate to significant structural damage.

Earthquakes on the various and potentially active fault systems are expected to produce a wide range of ground shaking intensities in the CRCP Plan Area. The estimated maximum moment magnitudes represent characteristic earthquakes on particular faults. Magnitude is a measure of the energy released in an earthquake while intensity is a measure of the ground shaking effects at a particular location and shaking intensity is dependent on the overall magnitude, distance to the fault, focus of earthquake energy, and characteristics of geologic media and decrease with distance from the fault.

Surface Fault Rupture. The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the risk to human habitation of seismically induced ground-surface ruptures. This state law was a direct result of the 1971 San Fernando Earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures. State Geologists are required to establish regulatory zones (known as Earthquake Fault Zones) around the surface traces of active faults, and to issue appropriate maps. Active and potentially active faults must be considered as potential sources of fault rupture. Numerous active and potentially active earthquake faults are mapped throughout the CRCP Plan Area.[364] The surface expression of earthquake fault rupture typically occurs in the immediate vicinity of the originating fault. The magnitude and nature of the rupture may vary across different faults, or even along different segments of the same fault.[365]

[364] See http://maps.conservation.ca.gov/cgs/fam/. Accessed 23 June 2017.

[365] California Geological Survey. 2002. Guidelines for Evaluating the Hazard of Surface Fault Rupture. CGS Note 49. Sacramento, CA.

Liquefaction and Ground Failure. Liquefaction has been responsible for ground failures during almost all of California's large earthquakes. Earthquake-induced liquefaction most often occurs in low-lying areas with soils or sediments composed of unconsolidated, saturated, clay-free sands and silts, but can also occur in dry, granular soils, or saturated soils with some clay content. Four kinds of ground failure commonly result from liquefaction: lateral spread, flow failure, ground oscillation, and loss of bearing strength. Within the CRCP Plan Area, liquefaction potential is a function of the potential level of ground shaking at a given location and depends on the geologic material at that location. Alluvial valleys and coastal regions are particularly susceptible to liquefaction. These areas can include, but are not limited to, floodplains and former wetlands such as Marina Del Rey, Playa Del Rey, and areas near the Los Angeles River, Santa Monica Bay, and Los Alamitos Bay. Other areas in the CRCP Plan Area are susceptible to liquefaction as a result of existing geological conditions.[366] They include the vicinity of the Santa Clara River and Calleguas Creek outlets to the ocean in Ventura County[367,368] and the coastal regions of Santa Barbara County and San Luis Obispo County.[369,370] Unconsolidated alluvial deposits in desert regions lying further inland, such as the San Bernardino County portion of the CRCP Plan Area, are rarely saturated because of the depth to the water table, and are thus less susceptible to liquefaction than unconsolidated alluvium adjacent to stream channels.

Earthquake-Induced Subsidence. Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid compaction and settling of subsurface materials (particularly loose, non-compacted, and variable sandy sediments) due to the rearrangement of soil particles during prolonged ground shaking. Within the CRCP Plan Area, artificial fills, unconsolidated alluvial sediments, slope washes, and areas with improperly engineered construction-fills typically underlie areas susceptible to this type of settlement (Figure 4.1.2.3-1, *General Soil Types*).

Seismically Induced Landslides. Strong ground shaking during earthquake events can generate landslides and slumps in uplands or coastal regions near the causative fault. Seismically induced landslides would be most likely to occur in areas that have previously experienced landslides or slumps, in areas of steep slopes, or in saturated hillside areas. Parts of the CRCP Plan Area are susceptible to seismically induced land sliding because of the abundance of active faults in the region and the existing landslide hazards.[371] Specifically, areas with high susceptibility to earthquake-induced landslides are concentrated along mountain ranges in the CRCP Plan Area: San Gabriel Mountains, Santa Susana Mountains, Santa Monica Mountains, Sulphur Mountain, and San Bernardino Mountains.

Earthquake-Induced Inundation and Tsunamis. Because the West Coast of the United States is seismically active, California is subject to flood hazard from tectonic activity capable of generating submarine earthquakes, volcanic eruptions, and landslides. Considering its proximity to the Pacific Ocean, the inundation by tsunamis (seismic sea waves) or seiches (oscillating waves in enclosed water bodies) can occur along the California coast in the event of a significant earthquake. The

[366] See http://gmw.consrv.ca.gov/shmp/html/pdf_maps_so.html. Accessed 23 June 2017.

[367] See http://www.venturacountymhmp.com/map/geohazard_liquefaction/. Accessed 23 June 2017.

[368] See http://www.slocounty.ca.gov/planning/zoning/Map_Image_Download_Center/Natural_Hazard_Maps.htm. Accessed 23 June 2017.

[369] See http://www.slocounty.ca.gov/planning/zoning/Map_Image_Download_Center/Safety_Element_Maps.htm. Accessed 23 June 2017.

[370] See longrange.sbcountyplanning.org/programs/genplanreformat/PDFdocs/Seismic.pdf. Accessed 23 June 2017.

[371] See http://www.conservation.ca.gov/cgs/geologic_hazards/landslides/Pages/Index.aspx#calsi. Accessed 23 June 2017.

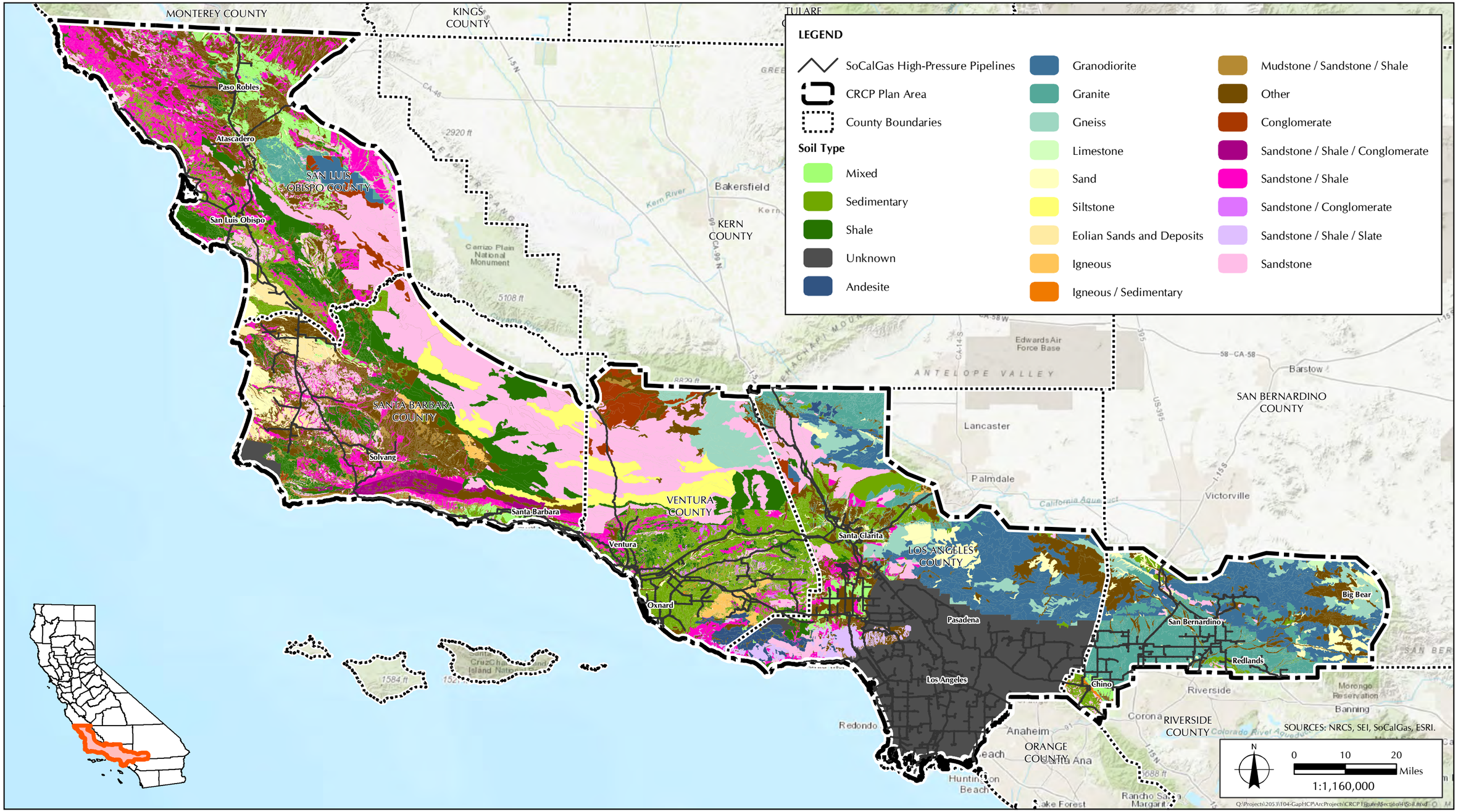

FIGURE 4.1.2.3-1

General Soil Types

coastline of the CRCP Plan Area has been mapped as being in a location potentially subject to tsunamis and the existing tsunami warning system.[372] Additionally, several large water impoundments in the CRCP Plan Area also have the potential to induce seiche inundation.[373]

4.1.2.4 Soils and Geologic Materials

Soils within the CRCP Plan Area are classified by distinguishing characteristics and are arranged within soil associations. Applicable USDA National Resources Conservation Service (NRCS) soil surveys for specific counties provide the classification and description of each soil type encountered in the CRCP Plan Area.[374] Soils throughout the region differ in origin, composition, and slope development. Individual soil characteristics are important in determining the suitability of the soil for agricultural use or urbanized development. The formation of surficial soil depends on the topography, climate, biology, local vegetation, and the material on which the soil profile is developed. Although many soils in the CRCP Plan Area are suitable for agricultural uses, each soil type may have properties that could limit its uses and represent an agricultural or development hazard.[375]

4.1.2.5 Erosion

Soil erosion is also a natural, ongoing process that transports, erodes, and displaces soil particles through a transport mechanism such as flowing water or wind by natural processes or human activities. Three soil factors are strongly associated with soil erosion potential: texture, compactness, and structure. Of these, texture plays the most dominant role. Intermediate textured soil types, such as silt, tend to be most erodible, whereas clay and particles coarser than sand are more resistant to erosion. Clay soils typically have low erodibility because the soil particles are resistant to detachment.[376] Conversely, soils having high silt content are the most erosive as the particles are easily detached, tend to crust, and produce high rates of runoff.[377] Slopes also influence the rate and amount of runoff, which in turn influences erosion. Loose texture and steep slopes primarily result in high wind erosion potential in soils; therefore, wind erosion is most severe in arid regions where sandy or loamy sediments are not covered by vegetation and are exposed to severe wind conditions.

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[372] California State Department of Conservation. n.d. Available at: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Pages/Statewide_Maps.aspx. Accessed 20 June 2017.

[373] California Geological Survey. n.d. Available at: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Pages/About_Tsunamis.aspx#historic. Accessed 20 June 2017.

[374] Soil Association: A mapping unit consisting of a group of defined and taxonomic soil units occurring together in an individual and characteristic pattern over a geographic region.

[375] U.S. Department of Agriculture, Soil Conservation Service. 1970. Soil Survey of Ventura Area, California. Washington, DC.

[376] See https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. Accessed 23 June 2017.

[377] Michigan State University, RUSLE Online Soil Erosion Assessment Tool. n.d. Available at: http://www.iwr.msu.edu/rusle/kfactor.htm. Accessed 20 June 2017.

Data on Soil Erodibility (K Factor) from the SWRCB indicates there are areas within the CRCP Plan Area with both moderate (K factor 0.25–0.45) and high susceptibility (K factor > 0.45) of erosion. The K factor combines the detachability of soil, runoff potential of the soil, and transportability of the sediment eroded from the soil into one measure for soil erodibility. The K factor is just one element of the Revised Universal Soil Loss Equation (RUSLE), which is used by government agencies to make erosion predictions for regulatory and conservation planning uses.[378]

Generally, there is a high potential for erosion in mountainous areas and areas along the margins of mountainous areas due to a higher intensity of rainfall and steeper slopes. In Ventura County, most of the Santa Monica Mountains and Topatopa Mountains are characterized by soils that are "moderately susceptible" to erosion. In Los Angeles County, most soils within the urbanized areas south of the San Gabriel Mountains are "moderately susceptible" to erosion. In San Bernardino County, the majority of soils are either "not moderately" or "highly susceptible." Santa Barbara County and San Luis Obispo County also feature soils that are characterized as both "low susceptibility" and "moderately susceptible" to erosion.[379]

Human intervention can accelerate the natural erosion process.[380] These activities can lead to increased water runoff rates and concentrated flows that have greater potential to erode exposed soils. These processes can eventually undermine adjacent structures or topography. Human activities that disturb soils in arid regions also increase wind erosion potential.

Coastal Erosion. Coastal erosion is a natural process that is typically the most visible during storm events. Beach sand is replenished both by sediment loads from rivers and gentler waves after storm events or during summer months. In areas of extreme coastal erosion, such as the cities of Rancho Palos Verdes and Malibu, slopes have been undercut by waves during storm events, causing slope failure and resulting in property damage and risks to human health and safety. The coastal regions of Los Angeles, Ventura, Santa Barbara and San Luis Obispo Counties are susceptible to wave erosion hazards. The Pacific Ocean borders the Coast Ranges Province, the Peninsular Ranges Province, and the Transverse Ranges Province. Nearly all the sea cliffs along the coast display some sign of coastal erosion attributed to various processes, including undercutting from wave action, weathering and erosion of rocks and cliffs, emergence of groundwater at the cliff face, rain-wash, and land sliding. Additionally, these naturally occurring forces can be exacerbated by human activity such as coastal road construction, channelization of surface water flows, or development on marine terraces.

4.1.2.6 Expansive Soils

Expansive soils possess a "shrink-swell" behavior that exhibits change in volume (expansion and contraction) that occurs from the process of wetting and drying in fine-grained clay sediments typically comprising the upper five feet of surficial soils. Structural damage to foundations, paved roads and streets, and concrete slabs may result over a long period of time, usually the result of

[378] See https://www.ars.usda.gov/southeast-area/oxford-ms/national-sedimentation-laboratory/watershed-physical-processes-research/docs/revised-universal-soil-loss-equation-rusle-welcome-to-rusle-1-and-rusle-2/. Accessed 23 June 2017.

[379] California Water Resources Control Board. n.d. Available at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/guidance/k_factor_map.pdf. Accessed 20 June 2017.

[380] California Water Resources Control Board. n.d. Available at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/guidance/k_factor_map.pdf. Accessed 20 June 2017.

inadequate soil and foundation engineering. Expansion and contraction of soils, depending on the season and the amount of surface water infiltration, could exert enough pressure on structures to result in cracking, settlement, and uplift. Locations of expansive soils are site-specific and can generally be remedied through standard engineering practices.

4.1.2.7 Unstable Soil Conditions

Settlement. Loose, soft soil material composed of sand, silt, and clay has the potential to settle if not properly compacted prior to placement of a building or other structure on the surface. Building settlement could lead to structural damage such as cracked foundations and misaligned or cracked walls and windows. Settlement problems are site-specific and can generally be remedied through standard engineering applications.

Land Subsidence. Land subsidence is caused by a variety of agricultural, municipal, or mining practices that contribute to the loss of support materials within a geologic formation. Agricultural practices can cause oxidation and subsequent compaction and settlement of organic clay soils or hydro-compaction allowing land elevations to lower or sink. Agricultural and municipal practices can result in the overdraft of a groundwater aquifer (water pumping from an aquifer exceeding the rate of replenishment) causing aquifer settlement. The extraction of mineral or oil resources can also result in subsidence from removal of supporting layers in the geologic formation. The impact of subsidence could include lowering of the land surface, increased potential for flooding, potential disturbance or damage to buried pipelines and associated structures, and damage to structures designed with minimal tolerance for settlement. Substantial subsidence has and continues to occur in the CRCP Plan Area due to groundwater extraction and subsequent lowering of the groundwater surface, typically beneath a confining clay stratum. Historic occurrences of land subsidence due to groundwater extraction are reported in the CRCP Plan Area within Antelope Valley, Cuyama Valley, Oxnard Plain, San Luis Obispo, Santa Clarita, and Calleguas Basin.[381] Subsidence has recently occurred in many of these areas and has caused permanent damage to many of these landscapes.[382]

Landslides. Landslides are the rapid downslope movement of a mass of material that moves as a unit and carries with it all the loose material above bedrock. Landslides occur more frequently on steep slopes or after periods of heavy rain due to the additional weight of water and its lubricating qualities. The material in the slope and external processes such as climate, topography, slope geometry, and human activity can render a slope unstable and eventually initiate slope movements and failures. Changes in slope material such as improperly engineered fill slopes can alter water movement and lead to chemical and physical changes within the slope. Unfavorable fracture or joint orientation and density may develop as a rock material responds to reduced weight or strain relief that can occur by man-made activity such as excavations for road- cuts located along a hillside. Factors that decrease resistance to movement in a slope include pore-water pressure, material changes, and structure.[383] Landslide-susceptible areas within the CRCP Plan Area are those with low-strength soil material on hilly topography, for example, Point Fermin areas of the Palos Verdes Peninsula, areas within the coastal Santa Monica Mountains including areas of Malibu and Leo Carrillo State Park, Point Mugu State Park, and the Blackhawk slide area on the north slope of the San Bernardino Mountains.[384]

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[381] See http://www.water.ca.gov/groundwater/maps_and_reports/DroughtReport_November2014/Figure_14.pdf. Accessed 23 June 2017.

[382] State of California Department of Water Resources. 2014. Summary of Recent, Historical, and Estimated Potential for Future Land Subsidence in California 2014. Available at: http:// www.water.ca.gov/. Accessed 20 June 2017.

[383] See http://www.conservation.ca.gov/cgs/geologic_hazards/landslides/Pages/Index.aspx#calsi. Accessed 23 June 2017.

[384] See http://maps.conservation.ca.gov/cgs/lsi/. Accessed 23 June 2017.

4.1.2.8 Paleontological Resources

Paleontological resources are nonrenewable resources that are important in our understanding of the prehistoric and geological development of Southern California. Fossilized remains are predominately found in sedimentary rock deposits.

There are three broad categories of paleontological resources that are known to exist in the CRCP Plan Area:

- True Fossils—Lithified or replaced remains of plants and animals preserved in a rock matrix (e.g., microfossils, shells, animal bones and skeletons, and whole tree trunks)
- Trace Fossils—Molds, casts, tracks, trails and burrow impressions made in soft clays and muds which subsequently were turned to stone, preserving the images of past life (e.g., shells, footprints, leaf prints, and worm tubes)
- Breas—Seeps of natural petroleum that trapped extinct animals and preserved and fossilized their remains.

Geologic formations form complex relationships below the surface and may range in thickness from a few feet to hundreds of thousands of feet. Sedimentary formations were initially deposited one atop the other although over time the layers have been squeezed, tilted, folded, cut by faults, and vertically and horizontally displaced, so that today, any one rock unit does not usually extend in a simple horizontal layer. A sensitive formation bearing fossils can be found at the surface in a rock outcrop or that same formation may extend many feet down into the ground and also extend for miles just below the surface. Thus, predicting which areas may contain buried paleontologically sensitive resources can be challenging.

Paleontologists consider all vertebrate fossils to be of significance. Other types of fossils are considered significant if they represent a new record, new species, an oldest occurring species, the most complete specimen of its kind, a rare species worldwide, or a species helpful in the dating of formations.

Fossil-bearing sedimentary formations and crystalline basement rocks (metamorphic and plutonic) overlain by sedimentary and volcanic rocks are prevalent throughout Southern California. A total of 49 fossil bearing formations have been identified within the CRCP Plan Area that have demonstrated a moderate to high potential to yield unique paleontological resources as defined by CEQA. The age of the resources range from 541 million years ago to 11,700 years ago. Fossil resources range from early Cambrian trilobites and brachiopods, to plesiosaurs, mammoths, saber tooth cats, camels, rhinos, and lemurs[385] (Table 4.1.2.8-1, *Significant Fossil Formations in the CRCP Plan Area*). The exact fossil localities have been excluded from this report, as the exact resource locales are not relevant for the purposes of this analysis.

TABLE 4.1.2.8-1
SIGNIFICANT FOSSIL FORMATIONS IN THE CRCP PLAN AREA

Formation	County	Age
Anaverde	Los Angeles	Miocene
Anita	Santa Barbara	Eocene
Avenal	San Luis Obispo	Miocene
Barstow	San Bernardino	Miocene
Bedrock Spring	San Bernardino	Miocene
Bird Spring	San Bernardino	Permian
Briones	Los Angeles	Miocene
Caliente	Ventura	Miocene
Chambless	San Bernardino	Early Cambrian
Chico	Los Angeles	Cretaceous
Cozy Dell	Santa Barbara / Ventura	Eocene
Domengine	San Luis Obispo	Eocene
Fernando	Los Angeles / Ventura	Pliocene/ Pleistocene
Gaviota	Santa Barbara	Eocene
Jalama	Santa Barbara	Late Cretaceous
Latham Shale	San Bernardino	Cambrian
Llajas	Los Angeles	Eocene
Lodo	Ventura	Paleocene
Lomita/Upper San Pedro	Los Angeles	Pleistocene
Manix	San Bernardino	Pleistocene
Markley	Santa Barbara	Eocene
Martinez	Los Angeles / Ventura	Paleocene
Mint Canyon	Los Angeles	Miocene
Mitilija	Santa Barbara	Eocene
Modelo	Los Angeles / Ventura	Miocene
Monterey	Los Angeles / Ventura / San Luis Obispo / Santa Barbara	Miocene
Old Woman SS	San Bernardino	Miocene
Pancho Rico	San Luis Obispo	Pliocene
Peace Valley	Los Angeles	Miocene
Pico	Los Angeles/Ventura	Pliocene/ Miocene
Pismo	San Luis Obispo	Pliocene
Puente	Los Angeles	Miocene
Punchbowl	San Bernardino	Miocene
Rancho La Brea	Los Angeles	Pleistocene
Repetto	Los Angeles	Miocene
Ricardo	San Bernardino	Pliocene
Rincon	Ventura	Oligocene/ Miocene
Sacate	Santa Barbara	Eocene
San Pedro	Los Angeles	Recent/ Quaternary
Santa Barbara	Santa Barbara	Pleistocene
Santa Cruz	Santa Barbara	Pleistocene
Santa Susana	Los Angeles / Ventura	Paleocene
Saugus	Ventura	Pliocene/ Pleistocene
Sespe	Ventura	Eocene
Tejon	Los Angeles	Eocene
Temblor	Los Angeles	Miocene
Tick Canyon	Los Angeles	Tertiary

TABLE 4.1.2.8-1
SIGNIFICANT FOSSIL FORMATIONS IN THE CRCP PLAN AREA

Formation	County	Age
Topanga	Los Angeles	Miocene
Towsley	Los Angeles	Miocene
Vaqueros	Los Angeles / Ventura / San Luis Obispo / Santa Barbara	Miocene

4.1.3 Hydrology—Streams, Rivers, and Drainages

This section describes the general water resources of the region in which the CRCP Plan Area is located, including surface hydrology, watersheds and hydrological characteristics, flood hazards and control, seiche, tsunami, and mudflow. The CRCP Plan Area includes five hydrologic regions regulated by six RWQCBs that provide oversight of the hydrologic and water quality conditions within the CRCP Plan Area. The six RWQCBs with jurisdictions on the CRCP Plan Area are Central Coast, Central Valley, Colorado River, Lahontan, Los Angeles, and Santa Ana. Although the CRCP Plan Area includes areas of the Central Valley, Colorado River, and Lahontan RWQCBs, the percentage of the CRCP Plan Area that includes these RWQCBs is very small when compared with the total area of the RWQCBs themselves. The percentage of the Central Valley RWQCB in the CRCP Plan Area is 0.03 percent. The percentage of the Colorado River RWQCB in the CRCP Plan Area is 0.53 percent. The percentage of the Lahontan RWQCB in the CRCP Plan Area is 1.39 percent (Figure 4.1.3-1, *Regional Water Quality Control Boards*). The five hydrologic regions within the project area are Central Coast, South Coast, Tulare Lake, South Lahontan, and Colorado River (Figure 4.1.3.2, *Hydrologic Regions*). Each major watershed within the CRCP Plan Area has a Water Quality Control Plan that designates the beneficial uses for water bodies in the region.

There are 20 watersheds that are completely or partially within the project boundary: San Luis Obispo, Salinas, Estrella, San Antonio, Santa Maria, Santa Ynez, Santa Barbara Coastal, Cuyama, Ventura, Middle Kern-Upper Tehachapi-Grapevine, Santa Clara, Antelope-Fremont Valleys, Calleguas, Santa Monica Bay, Los Angeles, San Gabriel, Mojave, Santa Ana, Southern Mojave, and Whitewater River. Several of the above listed watersheds, including the Middle Kern-Upper Tehachapi-Grapevine, Antelope-Fremont Valleys, Mojave, Southern Mojave, and Whitewater River, have only a very small portion of their total area represented in the CRCP Plan Area (Figure 4.1.3-3, *Watershed, Lakes and Reservoirs*).

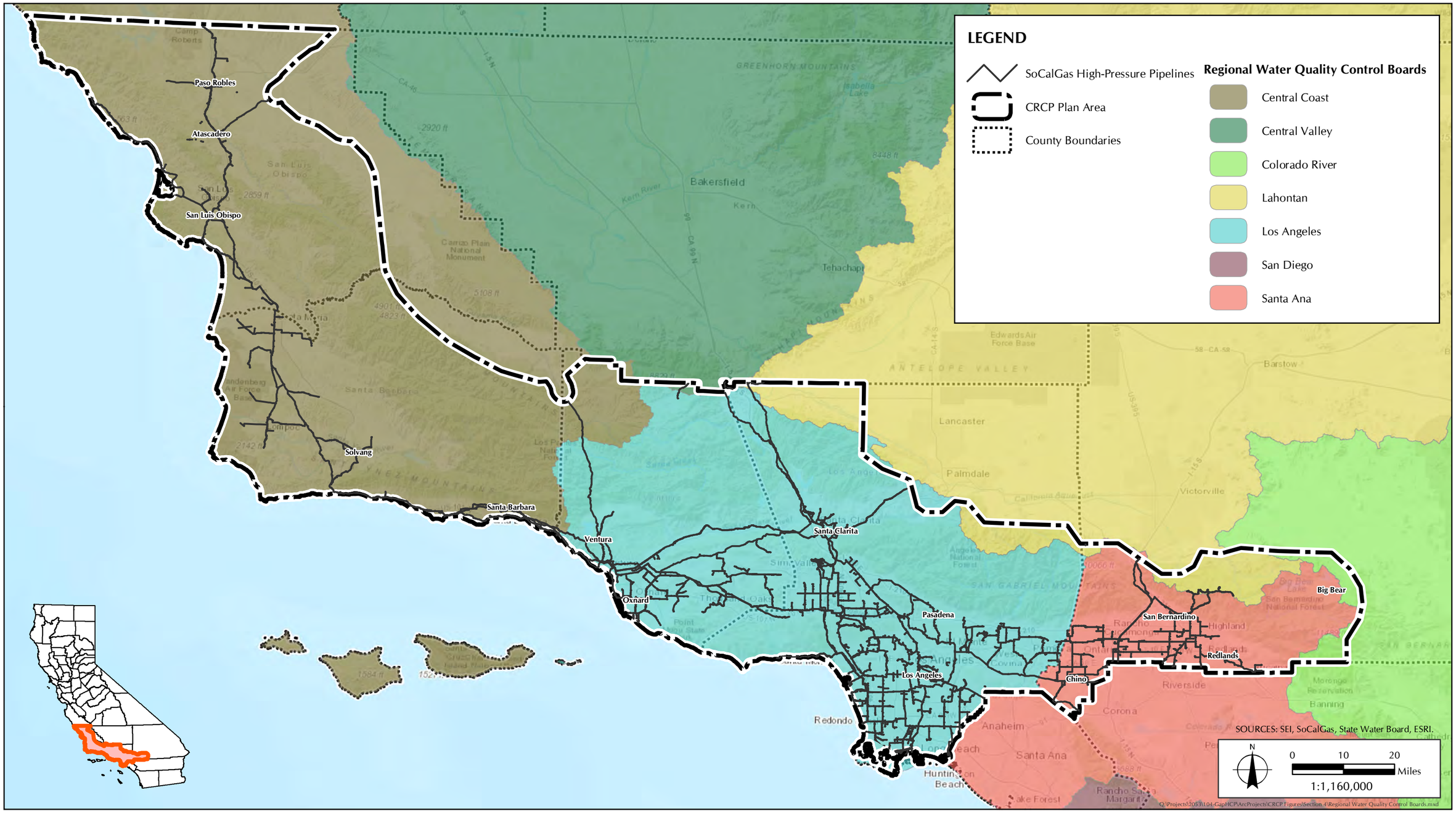

FIGURE 4.1.3-1

Regional Water Quality Control Boards

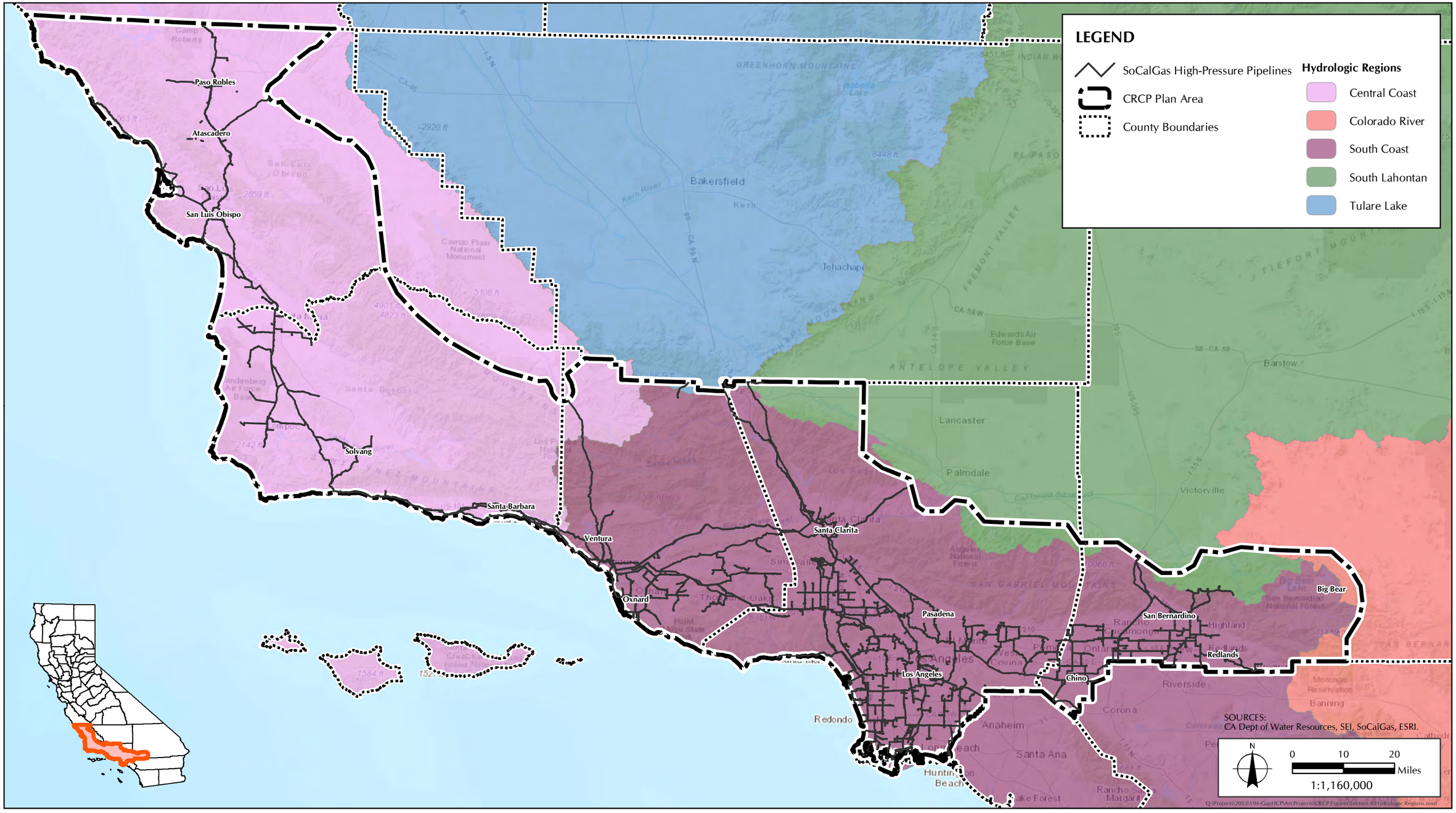

FIGURE 4.1.3-2

Hydrologic Regions

FIGURE 4.1.3-3

Watersheds, Lakes and Resevoirs

4.1.3.1 Surface Hydrology, Drainage Patterns, and Erosion and Siltation

In addition to the Pacific Ocean, the CRCP Plan Area includes a diverse array of surface water resources including rivers, lakes and reservoirs, and coastal waters (Table 4.1.3.1-1, *Major Surface Water Resources in the CRCP Plan Area*). Surface water resources in the CRCP Plan Area include creeks and rivers, lakes and reservoirs. Reservoirs serving flood control and water storage functions exist throughout the region. Because the climate of Southern California is predominantly arid, many of the natural rivers and creeks are intermittent or ephemeral, drying up in the summer or flowing only in reaction to precipitation. For example, annual rainfall amounts vary depending on elevation and proximity to the coast. Some waterways such as Ballona Creek and the Los Angeles River maintain a perennial flow due to agricultural irrigation and urban landscape watering.

TABLE 4.1.3.1-1
MAJOR SURFACE WATER RESOURCES IN THE CRCP PLAN AREA

Central Coast (REGION 3)
Lake Nacimiento
Salinas River
Estrella River
Twitchell Reservoir
Santa Maria River
Cuyama River
Sisquoc River
Santa Ynez River
LOS ANGELES BASIN (REGION 4)
Ventura River Estuary Sespe Creek Lake Casitas
Santa Clara River Estuary Piru Creek Lake Piru
McGrath Lake Ventura River Pyramid Lake
Ormond Beach Wetlands Santa Clara River Castaic Lake
Mugu Lagoon Los Angeles River Bouquet Reservoir
Trancas Lagoon Big Tujunga Canyon Los Angeles Reservoir
Topanga Lagoon San Gabriel River Chatsworth Reservoir
Los Cerritos Wetlands
Sepulveda Reservoir
Ballona Lagoon Hansen Reservoir
Los Angeles River San Gabriel Reservoir
Ballona Wetlands Morris Reservoir
Whittier Narrows Reservoir
Santa Fe Reservoir
Calleguas Creek
Ventura River
SANTA ANA BASIN (REGION 8)
Lake Arrowhead
Big Bear Lake
Santa Ana River
Lytle Creek
City Creek

Rivers. Major natural surface waters in the CRCP Plan Area include the Ventura River, Santa Clara River, Los Angeles River, San Gabriel River, Salinas River, Cuyama River, and Santa Ana River along with Lytle Creek and City Creek in San Bernardino County. The Ventura River is fed by Matilija Creek and Lake Casitas on the western border of Ventura County and empties into the ocean. It is the northernmost river system in Southern California, supporting a large number of sensitive aquatic species. Water quality decreases in the lower reaches due to urban and industrial impacts. The Santa Clara River flows through the center of Ventura County and remains in a relatively natural state. Threats to water quality include increasing development in floodplain areas, flood control measures such as channeling, erosion, and loss of habitat. The Los Angeles River is a highly disturbed system due to the flood control features along much of its length. Due to the high urbanization in the area around the Los Angeles River, runoff from industrial and commercial sources as well as illegal dumping contribute to reduce the channel's water quality. The San Gabriel River is similarly altered with concrete flood control embankments and impacted by urban runoff. Complete lists of surface water resources within the CRCP Plan Area along with the beneficial uses associated with them are contained in each of the Basin Plans prepared by the RWQCBs. The Salinas River is located partially in the CRCP Plan Area. The Salinas River starts in southern San Luis Obispo County, within the CRCP Plan Area, and extends north through Monterey County, which is not in the CRCP Plan Area. The Cuyama River extends through a large portion of the CRCP Plan Area including portions of southern San Luis Obispo County, northern Santa Barbara County, and northern Ventura County. The Cuyama flows into the Twitchell Reservoir after its confluence with the Sisquoc River.

Lakes and Reservoirs. Since Southern California is a semiarid region, many of its lakes are drinking water reservoirs, created either through damming of rivers, or manually dug and constructed. Reservoirs also serve as flood control for downstream communities. Some of the most significant lakes and reservoirs in the CRCP Plan Area are Big Bear Lake, Lake Arrowhead, Lake Cachuma, Lake Casitas, Castaic Lake, Lake Piru, Pyramid Lake, Twitchell Reservoir, and the northern section of the Prado Reservoir (Prado Park Lake). Big Bear Lake is a reservoir in San Bernardino County, in the San Bernardino Mountains. It was created by a granite dam in 1884, which was expanded in 1912, and holds back approximately 73,000 acre-feet (AF) of water. The lake has no tributary inflow, and is replenished entirely by snowmelt. It provides water for the community of Big Bear, as well as nearby communities. Lake Arrowhead is also in San Bernardino County, at the center of an unincorporated community also called Lake Arrowhead. The lake was created as a reservoir, with a capacity of approximately 48,000 AF. The dam at Lake Arrowhead was completed in 1922. It is now used for recreation and as a potable water source for the surrounding community. Lake Casitas is in Ventura County, and was formed by the Casitas Dam on the Coyote Creek just before it joins the Ventura River. The dam, completed in 1959, holds back nearly 255,000 AF of water. The water is used for recreation, as well as drinking water and irrigation. Castaic Lake receives inflow from Castaic Creek, and was formed by the completion of the Castaic Dam. The lake is in northwestern Los Angeles County. It is the terminus of the West Branch of the California Aqueduct, and holds over 323,000 AF of water. Much of the water is distributed throughout northern Los Angeles County, though some is released into Castaic Lagoon, which feeds Castaic Creek. The creek is a tributary of the Santa Clara River. Pyramid Lake is located just north of Castaic Lake. Water flows from Pyramid Lake into Castaic Lake through a pipeline system, generating electricity during the day. At night, when electricity demand and prices are low, water is pumped back up into Pyramid Lake. Pyramid Lake is fed by Piru Creek, and holds 180,000 AF of water.

Coastal Waters. Coastal waters in the CRCP Plan Area include bays, harbors, estuaries, beaches, and open ocean. Santa Monica Bay dominates a large portion of the region's open coastal waters. Deep-draft commercial harbors include the Los Angeles/Long Beach Harbor complex and Port Hueneme.

Shallower, small-craft harbors, such as Marina Del Rey, King Harbor, and Ventura Marina, occur at a number of locations.

Important estuaries are represented by coastal lagoons such as Mugu Lagoon and numerous small coastal wetlands such as Ballona Wetlands and Los Cerritos Wetlands. Recreational beaches occur along large stretches of the coastal waters. These coastal waters are impacted by a variety of activities, including:

- Municipal and industrial wastewater discharges
- Cooling water discharges
- Non-point source runoff (urban and agricultural runoff in particular), including leaking septic systems, construction, pesticides, herbicides, fertilizers, and recreational activities
- Oil spills
- Aqueduct vessel wastes
- Dredging, increased development, and loss of habitat
- Offshore operations, illegal dumping
- Natural oil seeps

4.1.3.2 Hydrologic Regions

The California Department of Water Resources (DWR) has divided the State into 10 hydrologic regions (North Coast, San Francisco, Central Coast, South Coast, Sacramento River, San Joaquin River, Tulare Lake, North Lahontan, South Lahontan, and Colorado River), corresponding to the State's major water drainage basins. Five of these are, in whole or in part, within the CRCP Plan Area: Central South Lahontan), South Coast, Colorado River, and Tulare Lake.

Central Coast Hydrologic Region. The total area of this region is 7,370,682 acres, which includes all of Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara Counties and parts of San Benito, San Mateo, Santa Clara, and Ventura Counties. The CRCP Plan Area is located within 3,076,912 acres of the Central Coast Hydrologic Region. The region is located, as its name implies, along the central coast of California, extending from southern San Mateo County in the north to Santa Barbara in the south and from the Pacific Ocean in the west to the edge of the Central Valley in the east. The most significant geological features are the Coast Ranges and the Plain. The Coastal Branch California Aqueduct—part of the State Water Project (SWP)—brings approximately 32,000 AF of water annually into Southern California through the Central Coast Region. This hydrologic region currently uses more water resources than it gains throughout the year. Groundwater is the major source of water in the region, which experiences annual reductions in its groundwater storage. The region, therefore, is subject to saltwater intrusion into its aquifers, a problem documented as far back as the 1930s.

South Lahontan Hydrologic Region. This region covers 17,066,005 acres encompassing the southeastern portion of the State. The CRCP Plan Area is only partially contained within 291,133 acres of the southwestern portion of the region. The portion of the CRCP Plan Area contained within the region extends to the westernmost boundary of the South Lahontan bordered by the City of Big Bear Lake to the east and the City of Redlands to the south.

South Coast Hydrologic Region. This region comprises 7,120,644 acres of the southwest portion of the State. It is California's most urbanized and populous area. Most of the CRCP Plan Area is located within the 3,347,055 acres of the region, including portions of Ventura, Los Angeles, and San

Bernardino Counties. The topography of the CRCP Plan Area located within this region includes a series of nearly flat coastal plains and valleys, broad interior valleys, and several mountains of low and moderate elevation. The region extends from the Santa Barbara–Ventura County line south to San Diego and the U.S. international border with Mexico. Several prominent rivers exist within the region and throughout the CRCP Plan Area, including Ventura River, Santa Clara River, Los Angeles River, San Gabriel River, and Santa Ana River.

Tulare Lake Hydrologic Region. This region is 10,771,633 acres in area and includes all of Kings and Tulare Counties with most of Fresno and Kern Counties. The CRCP Plan Area encompasses 9,913 acres of the region. The region corresponds to approximately the southern one-third of RWQCB 5. Significant geographic features include the southern half of the San Joaquin Valley, the Temblor Range to the west, the Tehachapi Mountains to the south, and the southern Sierra Nevada to the east. The region is home to more than 1.7 million people as of 1995. Major population centers include Fresno, Bakersfield, and Visalia. The Cities of Fresno and Visalia are entirely dependent on groundwater for their supply, with Fresno being the second largest city in the United States reliant solely on groundwater.[386]

The Cuddy Canyon Valley subbasin is within the CRCP Plan Area at the northern edge of Ventura County. The subbasin lies at the eastern end of a series of east-west trending intermountain valleys formed along the trace of the San Andreas Fault in the San Emigdio Mountains located in southernmost Kern County. The valley is at an elevation of 4,500 to 5,000 feet above MSL. The south flank of Tecuya Mountain bounds the basin to the north, and the north flank of Frazier Mountain bounds it to the south. Cuddy Creek, an intermittent stream, drains the basin eastward into Castaic Lake Valley. Average annual precipitation ranges from 14 to 16 inches. The primary water bearing unit of the Cuddy Canyon Valley basin is the Recent and older alluvium deposited in the Cuddy Creek drainage. A review of available well logs and field observation of drainage cut banks in the western basin suggests the near surface deposits consist of poorly sorted silty sand, gravel, and cobbles. The presence of sand and gravel mining operations in the eastern basin suggests the existence of similar materials in areas not observed during field inspection or not represented by well logs on file with the San Joaquin District. A thin veneer of older alluvium consisting of consolidated and poorly sorted sand, silt, and gravel exists on topographically high areas adjacent to the creek valley. This older alluvium was deposited by mainly debris flow mechanisms and dips below the Recent age alluvium. The older alluvium rests on gneissic bedrock on the south side of the valley and on granitic bedrock on the north side.[387]

Colorado River Hydrologic Region. This region covers 12,708,981 acres in southeastern California. The CRCP Plan Area includes 66,776 acres of this region. The region is bounded on the east by Nevada and Arizona; the south by the Republic of Mexico; the west by the Laguna, San Jacinto, and San Bernardino Mountains; and the north by the New York, Providence, Granite, Old Dad, Bristol, Rodman, and Ord Mountain ranges. An average annual precipitation of 5.5 inches and average annual runoff of only 200,000 AF makes this the most arid hydrologic region of California. Surface runoff drains to many closed basins or to the Colorado River. This hydrologic region includes all of Imperial, most of Riverside, much of San Bernardino, and part of San Diego Counties. Many of the alluvial valleys in the region are underlain by groundwater aquifers that are the sole source of water for local communities. About 533,000 people live within the region. The largest population centers are Palm Springs, Palm Desert, Indio, Coachella, and El Centro.[388]

[386] California Department of Water Resources. 2016. Bulletin 118, 2016.

[387] California Department of Water Resources. 2016. Bulletin 118, 2016.

[388] California Department of Water Resources. 2003. Bulletin 118, 2003.

The earliest groundwater development in California may have been prehistoric water wells dug by the Cahuilla Indians in Coachella Valley within this region. Sixty-four groundwater basins/subbasins are delineated in this hydrologic region. The Deadman Valley, Johnson Valley Area, and Coachella Valley Groundwater Basins have been divided into subbasins. Groundwater basins underlie about 8.68 million acres or about 26 percent of this hydrologic region. Groundwater provides about 8 percent of the water supply in normal years for agricultural and urban uses. In smaller basins, groundwater is found in unconfined alluvial aquifers. In some of the larger basins, particularly near dry lakes, aquifers may be separated by aquitards that create confined groundwater conditions. Depths of basins range from tens or hundreds of feet in smaller basins and along arms of ephemeral rivers to thousands of feet in larger basins. The thickness of aquifers varies from tens to hundreds of feet. Well yields vary in this region depending on aquifer characteristics and well location, size, and use. Some aquifers are capable of yielding thousands of gallons per minute to municipal wells. Conjunctive use of surface water and groundwater is a long-standing practice in the region. Water is imported from the Colorado River for irrigation in Imperial, Coachella, and Palo Verde Valleys and from groundwater recharge in Coachella Valley. Water imported from Northern California is used to replenish Warren and Joshua Tree Groundwater Basins. Many agencies have erected systems of barriers to allow more efficient percolation of ephemeral runoff from surrounding mountains. The concept of utilizing groundwater basins in this sparsely populated hydrologic region for storing water that would be pumped during drought years is getting much attention (Figure 4.1.3-4, *Groundwater Basins*).[389]

The eastern edge of the CRCP Plan Area boundary falls within the Helendale Fault Valley subbasin of the region. The Helendale Valley Groundwater Basin underlies Lone Valley in San Bernardino County at the northwestern boundary of the region. The basin is bounded by non-water-bearing rocks of the eastern San Bernardino Mountains and receives about 18 to 20 inches of precipitation each year.[390]

4.1.3.3 Watersheds

The CRCP Plan Area is bounded peripherally by a drainage divide and features leading to bodies of water. The boundary that separates neighboring drainage basins from one another is called a watershed boundary. An area in which all waterways drain to one specific outlet or body of water, such as a river, lake, ocean, or wetland is defined as a watershed. Watersheds have topographical divisions such as ridges, hills, or mountains. All precipitation that falls within a given watershed, or basin, eventually drains into the same body of water.

The CRCP Plan Area contains 20 major watersheds within the South Coast, South Lahontan, and Central Coast hydrologic regions. Given the physiographic characteristics of the CRCP Plan Area, most of the watersheds are located along the Transverse and Peninsular Ranges, and only a small number are in the desert areas (Mojave and Colorado Desert). The following watersheds are labeled with their corresponding Hydraulic Unit Code or HUC, which is a unique identifier for all drainage basins contained within the United States.

[389] California Department of Water Resources. 2003. Bulletin 118, 2003.

[390] California Department of Water Resources. 2003. Bulletin 118, 2003.

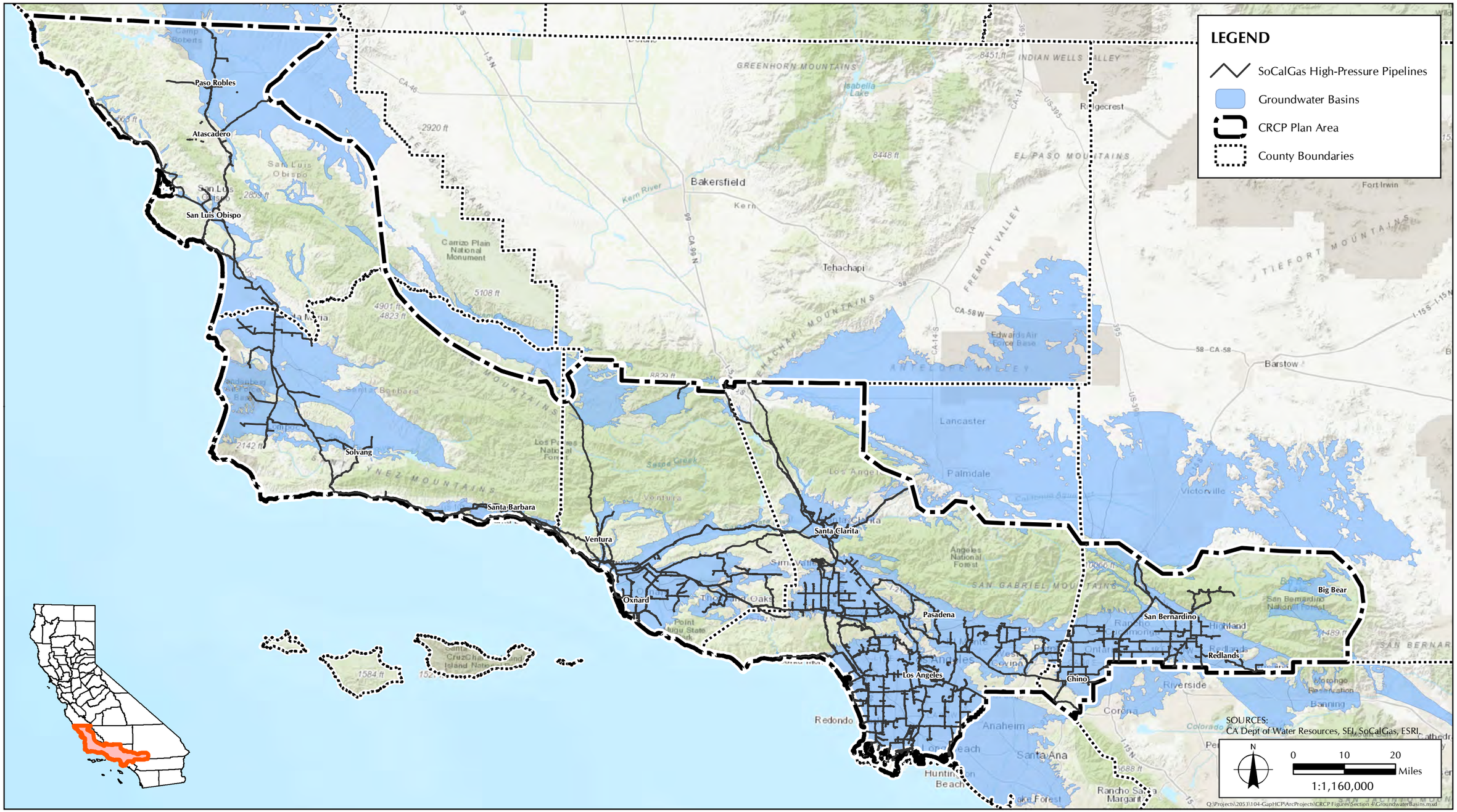

FIGURE 4.1.3-4

Groundwater Basins

Salinas Watershed (HUC 18060005). The watershed of the Salinas River and its tributaries is 2,135,878 acres in area. The CRCP Plan Area includes 534,941 acres of this watershed in the vicinity of San Luis Obispo and Monterey Counties. The Salinas River, which originates in San Luis Obispo County, flows northwestward into Monterey County, through the entire length of the Salinas Valley and empties into Monterey Bay. The watershed's main tributaries are the Arroyo Seco, Nacimiento, San Antonia, and Estrella Rivers. The two primary ground water basins within the Salinas watershed are the Salinas Valley Ground Water Basin and the Paso Robles Groundwater Basin.[391]

Estrella Watershed (HUC 18060004). The total area of the Estrella Watershed is 608,735 acres and is located east of the Salinas River. The CRCP Plan Area includes 233,915 acres of the Estrella Watershed. A portion of the watershed is located in Monterey County, with the majority of acreage located within San Luis Obispo County. The Estrella River is a perennial underground flowing river that is a tributary of the Salinas River. The Estrella River forms from the confluence of San Juan Creek and Cholame Creek near Shandon in the foothills of the Coast Ranges. The confluence of the Salinas and Estrella Rivers occurs in Northern San Luis Obispo County, within the town of San Miguel. The highest elevation in the watershed is approximately 2,854 feet, and the lowest elevation is around 607 feet. Vineyards slightly predominate over oak woodlands and grassland communities as agriculture is the dominant use.

San Antonio Watershed (HUC 18060009). The San Antonio Watershed is 190,406 acres in area and is located in southern Sonoma County with a portion in northeastern Marin County. The CRCP Plan Area includes 138,846 acres of the San Antonio Watershed. The watershed is approximately 19 miles long and 13 miles wide with the City of Petaluma near its center. The largest sub-watershed of the Petaluma River, San Antonio Creek, is located south of Petaluma and is one of three major creeks that drain the western side of the watershed. The mainstem of San Antonio Creek delineates a portion of the border between Sonoma and Marin Counties. San Antonio Creek flows from near Laguna Lake in Chileno Valley easterly to the Petaluma Marsh. The mainstem of San Antonio Creek drains approximately 36.5 square miles, which comprises 24 percent of the entire Petaluma River watershed. The main channel and riparian corridor are approximately 11 miles long, with 13 miles of significant tributary on the north side and another 26 miles of significant tributary on the south side. "Significant tributary" in this case is a "blueline" stream as found on the USGS 7.5-minute topographic map. The confluence of San Antonio Creek and the Petaluma River is in marshland east of Highway 101 at the Marin-Sonoma county line. In the lower watershed, small tributaries drain into the river and into the Petaluma Marsh.[392]

Santa Maria Watershed (HUC 18060008). The Santa Maria Watershed is one of the largest coastal drainage basins in California. This watershed is 438,372 acres in area, and the CRCP Plan Area encompasses the entire Santa Maria Watershed. The Santa Maria Watershed drains approximately 1,880 square miles (1.2 million acres) and includes all areas tributary to the Cuyama River, Sisquoc River, and Santa Maria River. Although much of the upper watershed is minimally populated and comprises mostly agricultural and natural forested areas, the Santa Maria Valley is home to the moderately sized urban and agricultural areas that include the city, its surroundings, and the unincorporated areas of Sisquoc and Garey. The valley is in the lower Santa Maria Watershed just downstream of the confluence of the Sisquoc and Cuyama Rivers where the Santa Maria River begins.

[391] Salinas River Watershed Management Action Plan. 22 October 1999. Central Coast Regional Water Quality Control Board.

[392] San Antonio Creek Watershed Plan. March 2009.

Major activities in the valley include irrigated and dry-land agriculture, oil production, and urban development.[393]

Santa Ynez Watershed (HUC 18060010). The Santa Ynez Watershed is 574,434 acres in area, and the Santa Ynez River flows westerly approximately 90 miles to the Pacific Ocean, draining a nearly 900-square-mile watershed in southern Santa Barbara County. The CRCP Plan Area includes the entire Santa Ynez Watershed. The watershed is bounded on the south by the Santa Ynez Mountains, on the north and east by the Santa Rosa Mountains and on the west by the Pacific Ocean. Between 1920 and 1952, three reservoirs were constructed on the river to capture and store river water. The three reservoirs currently have a combined storage capacity of about 200,000 AF. Two of the reservoirs are owned and operated by local entities while the third and largest of these, Cachuma Reservoir, was constructed by the Federal Bureau of Reclamation. None of the reservoirs are operated on a safe yield basis and, therefore, reservoir water users rely on other water sources to meet demands at times when the reservoirs cannot deliver their normal draft. Currently, the combined draft on the three reservoirs is about 32,700 AF per year.[394]

Santa Barbara Coastal Watershed (HUC 18060013). The Santa Barbara Coastal Watershed is located within Santa Barbara County as well as a small portion of Ventura County. The total area for the watershed is approximately 429,695 acres. The CRCP Plan Area includes 233,121 acres of the Santa Barbara Coastal Watershed. It contains over 40 blue-line streams, with the three largest being Jalama Creek, San Jose Creek, and Canada Honda Creek, respectively. It drains to the southwest from the Santa Ynez Mountains into the Pacific Ocean. The area is mainly urban, with some agricultural production taking place in the easternmost portion of the watershed. The major cities within the watershed include the cities of Santa Barbara, Goleta, and Carpinteria.

Middle Kern-Upper Tehachapi-Grapevine Watershed (HUC 18030003). This watershed is 1,675,003 acres in area and is located northeast of Los Padres National Forest, south of Sequoia National Forest, east of the City of Bakersfield, and west of the City of Mojave. The CRCP Plan Area includes 9,976 acres of the Middle Kern-Upper Tehachapi-Grapevine Watershed. This watershed drains from its southern boundary at the San Emigdio Mountains closest to the CRCP Plan Area. The watershed is almost entirely outside and to the north of the CRCP Plan Area, with the exception of a small portion of the watershed located in Ventura and Los Angeles Counties.

Antelope-Fremont Valleys Watershed (HUC 18090206). The Antelope-Fremont Valley Watershed is 2,154,045 acres in size and straddles Kern and Los Angeles Counties. The CRCP Plan Area located in the northernmost portion of Los Angeles County includes 169,836 acres of the southern portion of the watershed. It is bordered on the southwest by the San Gabriel Mountains, on the northwest by the Tehachapi Mountains, and on the east by a series of hills and buttes that follow the San Bernardino County line. Numerous streams originate in the mountains and foothills surrounding the Antelope Valley and flow across the valley floor before eventually pooling in the dry lakes adjacent to the Los Angeles/San Bernardino County line. It is located in the South Lahontan Hydrologic region. The watershed drains a total of 12,000 square miles within Los Angeles County. Three of the major tributaries are Big Rock Creek and Little Rock Creek, which originate within the San Gabriel Mountains, and Oak Creek, which originates within the Tehachapi Mountains. The Los Angeles Aqueduct also runs 180 miles through the watershed. Reservoirs include the California Aqueduct,

[393] Santa Maria Valley Watershed Characterization for Hydromodification Management Within the City of Santa Maria. 7 September 2010. Tetra Tech.

[394] Description of the Santa Ynez River Watershed. n.d. William Mills, Jr., R.G. P.E. Cachuma Member Units Exhibit No. 201.

Fairmont Reservoir, and Littlerock Reservoir. Major cities within the watershed include Lancaster and Palmdale.

Los Angeles Watershed (HUC 18070105). The total acreage of the Los Angeles Watershed is 531,578 acres. Approximately 531,462 acres of the Los Angeles Watershed is contained within the CRCP Plan Area. The Los Angeles Watershed is bounded by the Santa Susana Mountains to the west, the San Gabriel Mountains to the north and east, and the Santa Monica Mountains and Los Angeles coastal plain to the south. The Los Angeles River originates at the confluence of Bell Creek and Calabasas Creek in the San Fernando Valley. It drains eastward from its headwaters to the northern corner of Griffith Park in the City of Los Angeles, where the channel then turns southward through the rocky bottleneck of Glendale Narrows. After crossing the coastal plain, the river finally drains into San Pedro Bay near Long Beach. The drainage area of the watershed is 834 square miles, and the entire watershed falls within the South Coast Hydrologic Region. Major tributaries of the watershed are Burbank Western Channel, Pacoima Wash, Tujunga Wash, and Verdugo Wash in the San Fernando Valley and the Arroyo Seco, Compton Creek, and Rio Hondo south of the Glendale Narrows. There are numerous lakes and reservoirs in the watershed, including Big Tujunga Reservoir, Chatsworth Reservoir, Encino Reservoir, Echo Park Lake, Los Angeles Reservoir, and Silver Lake Reservoir. The upper 57 percent of the watershed is covered by forest and open space, while the remaining 43 percent is highly developed with residential and urban use. Major cities within the watershed include Long Beach and Los Angeles.

San Gabriel Watershed (HUC 18070106). The San Gabriel Watershed lies mostly in Los Angeles County, with the western one-third of the watershed lying within Ventura County. The watershed is 579,626 acres in area, and 464,180 acres are within the CRCP Plan Area. The San Gabriel Watershed is bounded by the San Gabriel Mountains to the north, Puente-Chino Hills to the southeast, the division of the Los Angeles River from the San Gabriel River to the west, and the Pacific Ocean to the south. From the mouth of San Gabriel Canyon in the City of Azusa, the San Gabriel River flows south across the San Gabriel Valley and passes through Whittier Narrows, a natural gap in the hills that form the southern boundary of the San Gabriel Valley. It continues across the Pacific Coastal Plain, through the Cities of Pico Rivera, Downey, Bellflower, and Lakewood, to eventually meet the Pacific Ocean. Geology of the San Gabriel Valley creates an unusual flow pattern that keeps the San Gabriel River along the western edge of the watershed for most of its length. The major tributaries are San Jose Creek, San Dimas Creek, and Walnut Creek. The watershed falls within the South Coast Hydrologic Region. The watershed drains 640 square miles. Twenty-six percent of the watershed is developed, leaving the rest as open space. The river system runs through lands in the Angeles National Forest, as well as highly urbanized lands in the San Gabriel, Walnut, and Pomona Valleys. Major cities include Covina, Pomona, Whittier, Los Angeles, and Long Beach.

Santa Monica Bay Watershed (HUC 18070104). This watershed is 430,856 acres in area. The CRCP Plan Area includes 274,206 acres of the Santa Monica Bay Watershed. The majority of the watershed is in Los Angeles County and contained within the South Coast Hydrologic Region. In the north, the watershed reaches eastward from the Santa Monica Mountains to downtown Los Angeles. From there, it extends south and west across the Los Angeles plain to include the area east of Ballona Creek and north of the Baldwin Hills. South of Ballona Creek, the natural drainage area is a narrow strip of wetlands between Playa del Rey and Palos Verdes. The watershed is comprised of many sub-watersheds that cover broad alluvial valleys, coastal dunes, coastal mountains, and a number of deep and narrow canyons that flow to the Pacific Ocean. The major sub-watersheds include Ballona Creek, Malibu Creek, Topanga Canyon Creek, and Solstice Creek Watersheds. The total drainage area is 414 square miles. The Santa Monica Bay Watershed is one of the nation's most highly urbanized

watersheds. Major cities within the watershed include Agoura Hills, Calabasas, Malibu, Los Angeles, Culver City, Beverly Hills, Inglewood, Santa Monica, and West Hollywood.

Central Coastal Watershed (HUC 18060006). The Central Coastal Watershed is 1,235,102 acres in area and is contained along the coastline of Monterey and San Luis Obispo Counties. The CRCP Plan Area includes 477,960 acres of the Central Coastal Watershed. This watershed contains the National Estuary Program for the Morro Bay. It also connects the Carmel Watershed to the north and the San Antonio Watershed to the south. The bottom one-third of the watershed is located within the CRCP Plan Area.

Cuyama Watershed (HUC 18060007). The Cuyama Watershed is 732,526 acres in area and is located in Ventura and San Luis Obispo Counties. The CRCP Plan Area includes 435,604 acres of the watershed. The Cuyama Watershed generally flows northward and then westward to a point of confluence with the Sisquoc River. The watershed contains primarily rural and agricultural land with many ranches, orchards, vineyards, and row crops. In addition to the agricultural production within the watershed, some land is used for oil and gas extraction. The Los Padres National Forest and lands administered by the BLM are also located within the watershed.

Mojave Watershed (HUC 18090208). The Mojave Watershed is composed of high desert, mountains, and valleys. It is entirely located within San Bernardino County and the South Lahontan Hydrologic Region. This watershed is 2,953,737 acres in area. The southeastern tip of the CRCP Plan Area includes 119,672 acres of the western portion of the Mojave Watershed. It drains a total of 1,600 square miles. The San Bernardino, Granite, and Bristol Mountains form the southwestern borders of the watershed. Mountains in this region include Butler Peak, which is the highest point with an elevation of 8,500 feet. The San Bernardino Mountains are the headwaters for the Mojave River system, which is born of Deep Creek and West Fork, the two perennial tributaries to the Mojave River. The Mojave River traverses the watershed for 120 miles until its terminus at Soda Lake and Silver Dry Lake. Flow is from the southwest to the northeast across the watershed. Land in the Mojave Watershed is largely recreational areas and rangeland. A small amount of the land is irrigated agricultural land and "rural urban" areas. Major population centers in the watershed include Victorville, Hesperia, Apple Valley, and Adelanto.

Southern Mojave Watershed (HUC 18100100). The Southern Mojave Watershed encompasses 5,672,813 acres of area. The CRCP Plan Area includes 39,827 acres of the Southern Mojave Watershed. It is located entirely within San Bernardino County. The total population in the watershed is increasing every year and is expected to grow to nearly one-half million by the year 2015. Much of the existing and projected future population is concentrated in the Victor Valley, which includes the incorporated cities of Victorville, Hesperia, Apple Valley, and Adelanto. The primary geographic and hydrologic feature of the watershed is the Mojave River. The headwaters of the Mojave River are in the San Bernardino Mountains, which annually receive greater than 40 inches of precipitation at the highest elevations. Much of the winter precipitation in the San Bernardino Mountains falls in the form of snow that provides spring recharge to the Mojave River system. Historically, the annual recharge from the headwaters is approximately 75,000 AF. The Mojave River channel, through both surface and subsurface flow, transects the watershed a linear distance of approximately 120 miles to its terminus at Silver Dry Lake near the Community of Baker. Aside from intense storm events, the Mojave River channel is typically dry downstream of the Mojave Forks Dam except in select locations where ground water is forced to the surface by geologic structures.

Whitewater River Watershed (HUC 18100201). The total area of this watershed is 959,644 acres. The CRCP Plan Area includes 27,257 acres of the Whitewater Watershed. The Whitewater River

flows freely from the 11,503-foot-high summit of Mount San Gorgonio in the San Bernardino Mountains for more than 30 miles to the Coachella Valley. An area of high ecological significance, the Whitewater River is one of the most pristine and remote watersheds in Southern California. A critical biological link between the San Bernardino Mountains and the Coachella Valley and San Jacinto Mountains to the south, the river provides important habitat for such diverse species as the California spotted owl, Nelson's bighorn sheep, and arroyo toad. The river's rich riparian vegetation provides a seasonal home to endangered neotropical songbirds, including least Bell's vireo and southwest willow flycatcher. The Whitewater River is also an important ceremonial and cultural area for traditional Cahuilla Indians, who visit the river to collect and gather native materials.

Santa Ana Watershed (HUC 18070203). This watershed is 1,083,424 acres in area and includes much of Orange County, the northwestern corner of Riverside County, the southwestern corner of San Bernardino County, and a small portion of Los Angeles County. The CRCP Plan Area includes 657,642 acres of the Santa Ana Watershed. This watershed drains a total of 2,065 square miles. Only the sections of the watershed contained within the southwestern corner of San Bernardino County and the northern portion of Los Angeles County are within the CRCP Plan Area. The watershed is located within the South Coast Hydrologic Region. The Santa Ana River has varied geography and natural features that provide habitat for a number of federal and state listed species. The Santa Ana Integrated Watershed Plan (IWP) focuses on conserving resources such as listed species in and around the Santa Ana River. Listed or sensitive species that are found in the watershed include the Santa Ana sucker, least Bell's vireo, and slender-horned spine flower.[395] The watershed is bounded on the south by the San Jacinto Watershed, on the east by the Salton Sea and Southern Mojave watersheds, and on the north and west by the Mojave and San Gabriel Watersheds. The highest elevations in the watershed occur in the San Bernardino Mountains at San Gorgonio Peak at 11,503 feet and the eastern San Gabriel Mountains at Mt. Baldy at 10,080 feet. Surface waters start in this mountainous zone and flow northeast to southwest. Further downstream, the Santa Ana Mountains and the Chino Hills form a topographic high before the river flows onto the Coastal Plain in Orange County and outlets into the Pacific Ocean at Huntington Beach. Major tributaries to the Santa Ana River include San Timoteo Creek and Santiago Creek. The Santa Ana Watershed is home to the most developed portion of Orange County and much of the built-up portions of Riverside and San Bernardino Counties. Major cities include Santa Ana, Rancho Cucamonga, Corona, and San Bernardino.

Calleguas Watershed (HUC 18070103). Nearly the entire Calleguas Watershed is within the CRCP Plan Area: 241,300 acres of the total 280,122 acres. Calleguas Creek and its tributaries are located in southeast Ventura County and a small portion of western Los Angeles County. The watershed falls within the South Coast Hydrologic Region. Calleguas Creek drains an area of approximately 343 square miles from the Santa Susana Pass in the east to Mugu Lagoon in the southwest. The watershed drains from the mountains in the northeast part of the watershed toward the southwest where it flows through the Oxnard Plain before emptying into the Pacific Ocean through Mugu Lagoon. The Santa Susana Mountains, South Mountain, and Oak Ridge form the northern boundary of the watershed. The southern boundary is formed by the Simi Hills and Santa Monica Mountains. The watershed is characterized by three major sub-watersheds: the Arroyo Simi/Las Posas in the north, Conejo Creek in the south, and Revolon Slough in the west. Major tributaries of Calleguas Creek include Arroyo Simi, Arroyo Conejo, and Arroyo Santa Rosa. The watershed includes the Cities of Simi Valley, Moorpark, Thousand Oaks, and Camarillo.

[395] Santa Ana Watershed Project Authority. 2012. Chapter 3 Watershed Setting. Available at: http://www.sawpa.org/wp-content/uploads/2012/05/Chapter-3-Final.pdf.

Santa Clara Watershed (HUC 18070102). Most of the watershed is located within the CRCP Plan Area: 1,003,384 acres of a total 1,040,381 acres. The Santa Clara River and its tributaries run through Ventura County and the northwestern part of Los Angeles County, and are located in the South Coast Hydrologic Region. The portion of the watershed within Los Angeles County is referred to as Upper Santa Clara, and the portion within Ventura County is referred to as Lower Santa Clara. The Santa Clara River drains an area of 1,634 square miles from the mountains in northern Los Angeles County to the Pacific Ocean. The watershed drains from Pacifico Mountain in the San Gabriel Mountains westward through the Angeles National Forest System before emptying into the Pacific Ocean near the City of Ventura. Ninety percent of the watershed consists of rugged mountains. The remainder of the watershed consists of valley floor and coastal plains. Major cities located in this watershed include Acton, Santa Clarita, Fillmore, Santa Paula, Ventura, and Oxnard.

Ventura Watershed (HUC 18070101). The Ventura Watershed is 214,629 acres in area and it lies entirely in Ventura County. The CRCP Plan Area includes 179,957 acres of the Ventura Watershed. Rugged mountains are present within the upper basin, giving way to flat valleys in the lower downstream areas. Nearly half of the watershed lies within the boundaries of the Los Padres National Forest. Ventura Watershed drains 223 square miles, from its headwaters in the mountains to its outlet in the Pacific Ocean. The Ventura River bisects the watershed, flowing from north to south. Major tributaries include Matilija Creek, North Fork Matilija Creek, Creek, Coyote Creek, and Cañada Larga. Lake Casitas and Matijila Reservoir are two major reservoirs within the watershed. The Ventura Watershed falls within the South Coast Hydrologic Region. Land in the Ventura Watershed is largely open space with little urbanization. Eighty-seven percent is open space, 10 percent agriculture, and 3 percent urban. Major communities are Ojai, Oak View, and the western portion of the City of San Buenaventura.

4.1.3.4 Federally Protected Wetlands and Waterways

Current National Wetlands Inventory maps and USGS blue-line drainage data for the CRCP Plan Area were reviewed for potential wetlands and waterways subject to protection under Section 404 of the CWA and coastal areas subject to Section 10 of the Rivers and Harbors Act. A total of 26,805 acres and 584.8 linear miles of wetlands and waterways potentially subject to the jurisdiction of the USACE were determined to be present in the CRCP Plan Area (Table 4.1.3.4-1, *Federally Protected Wetlands and Waterways in the CRCP Plan Area*). The ability to discern precise area subject to the jurisdiction of the USACE pursuant to Section 10 of the Rivers and Harbors Act or Section 404 of the CWA normally requires to preparation of a jurisdictional delineation, in accordance with the most recent *Wetland Delineation Manual*.

TABLE 4.1.3.4-1
FEDERALLY PROTECTED WETLANDS AND WATERWAYS
IN THE CRCP PLAN AREA

Major River or Lake	Acres	Linear Miles
Los Angeles County		
Castaic Lake	2,266	—
Morris Reservoir	282	—
Puddingstone Reservoir	244	—
Pyramid Lake	1,177	—
San Gabriel Reservoir	526	—
Los Angeles River	—	50.7
San Gabriel River	—	59.2
Santa Clara River	—	36.4
San Bernardino County		
Big Bear Lake	2,881	—
Lake Arrowhead	735	—
Prado Park Lake	59	—
Silverwood Lake	203	—
City Creek	—	9.7
Lytle Creek	—	20.9
Santa Ana River	—	43.9
San Luis Obispo		
Lopez Lake	935	—
Nacimiento Reservoir	5,520	—
Santa Margarita Lake	717	—
Twitchell Reservoir	2,785	—
Whale Rock Reservoir	283	—
Atascadero Creek	—	10.1
Cuyama River	—	21.1
Estrella River	—	23.9
Salinas River	—	70.6
Santa Maria River	—	11.5
Santa Barbara County		
Lake Cachuma	3,170	—
Gibraltar Reservoir	364	—
Jameson Lake	122	—
Twitchell Reservoir	851	—
Atascadero Creek	—	6.2
Cuyama River	—	17.4
Matilija Creek	—	1.1
Santa Maria River	—	13.1
Santa Ynez River	—	92.8
Ventura County		
Lake Casitas	2,464	—
Lake Piru	1,221	—
Calleguas Creek	—	13.2
Cuyama River	—	11.1
Matilija Creek	—	16.2
Santa Clara River	—	39.3
Ventura River	—	16.4
TOTAL	**26,805**	**584.8**

4.1.3.5 Floodplains and Flood Hazards

Over 228,000 acres in the CRCP Plan Area are located within areas mapped in the 100-year floodplain, that are subject to unique hazards associated with infrequent high-magnitude flood waters resulting from low-frequency high-magnitude storms (Figure 4.1.3.5-1, *100-Year Floodplains*; Table 4.1.3.5-1, *100-Year Floodplains*). Although flooding from rain-swollen rivers can occur in valley bottoms, a more common floodplain hazard is debris flow. Debris flows are common in mountain foothill areas, especially after fire and heavy rain events, when wet, heavy soils and rock slide down steep slopes and into valleys below. Areas with a history of such slides can often be identified by sloping, fan-shaped landforms at the base of mountains and hillsides.

TABLE 4.1.3.5-1
100-YEAR FLOODPLAINS

County	Acres
Los Angeles	39,805.1
San Bernardino	42,114.8
Ventura	48,181.3
San Luis Obispo	56,840.8
Santa Barbara	41,321.4
Total	**228,263.4**

SOURCE: Federal Emergency Management Agency (FEMA) GIS Data. 2017. Available at: https://www.fema.gov/faq-details/GIS-Data.-.

Flood control channels are typically designed to move large volumes of water from one place to another rapidly, without property damage. A fully modified channel is usually concrete, severely limiting the aquatic habitat beneficial uses. Partially improved channels may only have levees on either side, but other flood control activities (such as channel straightening, vegetation clearing, and weed control using copper or other toxic materials) can reduce or eliminate aquatic habitat. Storm flows themselves, not necessarily part of flood events, can and do eliminate streamside habitat in parts of the river through occasional sheer scouring force.

4.1.3.6 Seiche

A seiche is an oscillation of a body of water in an enclosed or semienclosed basin, such as a reservoir, harbor, lake, or storage tank.

Southern California is a semiarid region, and many of its lakes are drinking water reservoirs, created either through damming of rivers, or manually dug and constructed. Reservoirs also serve as flood control for downstream communities. Some of the most significant lakes, including reservoirs in the CRCP Plan Area are; Castaic Lake, Pyramid Lake, San Gabriel Reservoir, Morris Reservoir, and Puddingstone Reservoir in Los Angeles County; Big Bear Lake, Lake Arrowhead, Prado Park Lake, and Silverwood Lake in San Bernardino County; Nacimiento Reservoir, Twitchell Reservoir, Lopez Lake, Santa Margarita Lake, and Whale Rock Reservoir in San Luis Obispo County; Lake Cachuma, Gibraltar Reservoir, and Jameson Lake In Santa Barbara County; and Lake Casitas, and Lake Piru in Ventura County (Table 4.1.3.4-1; Figure 4.1.3-1).

FIGURE 4.1.3.5-1

100-year Flood Plains

4.1.3.7 Tsunami

More than 22,000 acres within the four coastal counties within the CRCP Plan Area are susceptible to inundation risk from tsunami (Table 4.1.3.7-1, *Tsunami Inundation by County*): San Luis Obispo, Santa Barbara, Los Angeles, and Ventura Counties. Tsunamis are defined as ocean waves caused by large earthquakes and landslides that occur near or under the ocean. With the potential for tectonic plate movement, the potential for a tsunami is still present although very minimal. Tsunami waves are unlike typical ocean waves generated by wind and storms. When tsunamis approach shore, they behave like a very fast moving tide that extends far inland. Inundation by tsunamis can occur along the California coast in the event of a significant earthquake. Relatively local earthquakes and landslides off the California coast pose the greatest threat.

TABLE 4.1.3.7-1
TSUNAMI INUNDATION BY COUNTY

County	Sum of Acres
Los Angeles	8,832.5
Ventura	4,289.7
San Luis Obispo	5,964.6
Santa Barbara	3,735.0
Total	**22,821.8**

SOURCE: California Department of Conservation. n.d. Available at: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Pages/Index.aspx. Accessed 18 July 2017.

4.1.3.8 Mudflow

Strong ground shaking during earthquake events can generate landslides or mudflow and slumps in uplands or coastal regions near the causative fault. Seismically induced mudflow has typically been found to occur within 75 miles of the epicenter of a magnitude 6.5 earthquake. Seismically induced mudflow would be most likely to occur in areas that have previously experienced mudflow or slumps, in areas of steep slopes, or in saturated hillside areas. Areas of the CRCP Plan Area are susceptible to seismically induced mudflow because of the abundance of active faults in the region and the existing mudflow hazards.

4.1.4 Water Quality and Quantity

4.1.4.1 Water Supply

The California SWP is a water storage and delivery system of reservoirs, aqueducts, power plants and pumping plants. It extends for more than 600 miles, two-thirds the length of California. It supplies water to regional wholesalers, such as the Metropolitan Water District (MWD) of Southern California. MWD of Southern California delivers water to 26 member public agencies, which in turn provides water to 19 million people in Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura Counties.[396]

[396] See http://www.mwdh2o.com/WhoWeAre/Mission/Pages/default.aspx. Accessed 27 July 2017.

Metropolitan receives water from the SWP through the California Aqueduct and from the Colorado River through the Colorado River Aqueduct. The MWD imports water from the SWP, transporting Feather River in Northern California, to supplement local supplies.[397] As a result of ongoing extraordinary dry conditions throughout the State of California, the SWP allocation to MWD for calendar year 2014 was 5 percent, which represents about 96,000 AF, the lowest in the history of the SWP.[398] The Colorado River was MWD's original source of water after its establishment in 1928. MWD has a legal entitlement to receive water from the Colorado River under a permanent service contract with the Secretary of the Interior. The Colorado River Aqueduct, which has a capacity of 1.2 million AF per year, is owned and operated by MWD.[399] MWD also helps its member agencies develop water recycling, storage and other local resource programs to provide additional supplies and conservation programs to reduce regional demands. MWD provides more than 50 percent of the region's water, delivering an average of 1.5 billion gallons of water per day to a 5,200-square-mile service area.[400] Approximately 50 percent of the region's water supplies come from resources controlled or operated by local water agencies. These resources include water extracted from local groundwater basins, catchment of local surface water, non-MWD-imported water supplied through the Los Angeles Aqueduct, and Colorado River water exchanged for MWD supplies.[401]

Eighteen water purveyors supply water to Santa Barbara County. The County is served by four major reservoirs: Lake Cachuma, Twitchell Reservoir, Gibraltar Reservoir, and Jameson Lake. The three reservoirs on the Santa Ynez River supply most of the water used in the south coast area of Santa Barbara County. Gibraltar Reservoir was completed in 1920 with a storage capacity of 14,000 AF. Water from the reservoir is transported through the Mission Tunnel to the south coast. Although the dam was raised 23 feet in 1948, the current storage capacity of the reservoir has been reduced to 5,303 AF, with an annual yield of 4,600 AF per year. The reservoir is the source of about one-third of the City of Santa Barbara's water supply.[402] Jameson Lake was dedicated in 1930 with a storage capacity of 7,500 AF. Water is transported to the south coast through the Doulton Tunnel. Currently, it has a surface area of 138 acres when full and stores 5,291 AF. The unincorporated community of Montecito receives 45 percent of its water supply from Jameson Lake and Fox and Alder Creeks via the Doulton Tunnel, so loss of storage capacity is an issue of concern. Lake Cachuma was completed in 1956 with a storage capacity of about 205,000 AF, but its capacity has been reduced to about 195,000 AF due to the accumulation of silt in the reservoir. The principal features of the Cachuma Project are Bradbury Dam, Lake Cachuma, Tecolote Tunnel, and the South Coast Conduit distribution systems. Included in the main conduit system are four regulating reservoirs and Sheffield

[397] Metropolitan Water District of Southern California. 2015. 2015 Urban Water Management Plan, p. 1-19. Available at: http://www.mwdh2o.com/PDF_About_Your_Water/2.4.2_Regional_Urban_Water_Management_Plan.pdf. Accessed 27 July 2017.

[398] Metropolitan Water District of Southern California. 2015. 2015 Urban Water Management Plan, p. 1-25. Available at: http://www.mwdh2o.com/PDF_About_Your_Water/2.4.2_Regional_Urban_Water_Management_Plan.pdf. Accessed 27 July 2017.

[399] Metropolitan Water District of Southern California. 2015. 2015 Urban Water Management Plan, p. 1-19. Available at: http://www.mwdh2o.com/PDF_About_Your_Water/2.4.2_Regional_Urban_Water_Management_Plan.pdf. Accessed 27 July 2017.

[400] See http://www.mwdh2o.com/WhoWeAre/Mission/Pages/default.aspx. Accessed 27 July 2017.

[401] See http://www.mwdh2o.com/WhoWeAre/Mission/Pages/default.aspx. Accessed 27 July 2017.

[402] County of Santa Barbara. 2013. Santa Barbara County IRWM Plan 2013, p. 3-29. Available at: http://cosb.countyofsb.org/uploadedFiles/pwd/Water/IRWMP/2013_Plan/Chapter%203%20Regional%20Description.pdf. Accessed 27 July 2017.

Tunnel. The South Coast Conduit is constricted between Tecolote Tunnel and Cater Treatment Plant due to decreased pipeline capacity since other facilities were added to that reach of the conduit.[403]

Twitchell Dam construction began in July 1956 and was completed in October 1958. The reservoir and dam were designed to provide the Santa Maria Valley with flood protection and water conservation. The dam catches excess rain runoff from the Cuyama watershed (1,600 square miles) and stores it in the reservoir. The Santa Maria River serves as the main recharge source for the local aquifer and primary water supply. The aquifer provides water for the entire Santa Maria Valley, including the City of Santa Maria, Guadalupe, unincorporated areas of Santa Barbara County, and the surrounding agricultural communities in northern Santa Barbara and southern San Luis Obispo County. The Twitchell Reservoir produces 32,000 AF per year of water for recharge into the Santa Maria Groundwater Basin (Table 4.1.4.1-1, *Water Sources by Water Purveyor for Santa Barbara County, 2012*).[404]

In San Luis Obispo County, water is drawn from a number of supply sources, both inside and outside of the county. County reservoirs have a significant role in water supply, drainage and flood control, potential hydro-power, and recreation for the region. There are six local surface water sources: the Nacimiento Reservoir (storage capacity 377,900 AF), Whale Rock Reservoir (40,662 AF), Lopez Lake (49,388 AF), Santa Margarita Lake/Salina Reservoir (23,843 AF), Chorro Reservoir (90 AF), and Twitchell Reservoir (224,300 AF).[405] The availability of fresh groundwater supplies remains the primary staple for most of the county's communities and, especially, for the private well owners living in rural and agricultural areas (Table 4.1.4.1-2, *Groundwater Basin Yields*).[406] The region is also served by the SWP. In 1963, the San Luis Obispo County Flood Control and Water Conservation District contracted with DWR for 25,000 AF per year of State Water. However, the Central Coast was not served State Water until 1997 when the Coastal Branch conveyance and treatment facilities, serving Santa Barbara and San Luis Obispo Counties, were completed (Table 4.1.4.1-3, *State Water Project Water Service Amount*).[407]

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[403] County of Santa Barbara. 2013. Santa Barbara County IRWM Plan 2013, p. 3-29. Available at: http://cosb.countyofsb.org/uploadedFiles/pwd/Water/IRWMP/2013_Plan/Chapter%203%20Regional%20Description.pdf. Accessed 27 July 2017.

[404] County of Santa Barbara. 2013. Santa Barbara County IRWM Plan 2013, p. 3-29. Available at: http://cosb.countyofsb.org/uploadedFiles/pwd/Water/IRWMP/2013_Plan/Chapter%203%20Regional%20Description.pdf. Accessed 27 July 2017.

[405] County of San Luis Obispo. n.d. San Luis Obispo Integrated Regional Water Management Plan, p. D-3. Available at: https://www.slocountywater.org/site/Frequent%20Downloads/Integrated%20Regional%20Water%20Management%20Plan/IRWM%20Plan%20Update%202014/pdf/Section%20D%20Water%20Supply%20Demand%20and%20Budget%2020140723_coverproof_accepted.pdf. Accessed 27 July 2017.

[406] County of San Luis Obispo. n.d. San Luis Obispo Integrated Regional Water Management Plan, p. D-4. Available at: https://www.slocountywater.org/site/Frequent%20Downloads/Integrated%20Regional%20Water%20Management%20Plan/IRWM%20Plan%20Update%202014/pdf/Section%20D%20Water%20Supply%20Demand%20and%20Budget%2020140723_coverproof_accepted.pdf. Accessed 27 July 2017.

[407] County of San Luis Obispo. n.d. San Luis Obispo Integrated Regional Water Management Plan, p. D-8. Available at: https://www.slocountywater.org/site/Frequent%20Downloads/Integrated%20Regional%20Water%20Management%20Plan/IRWM%20Plan%20Update%202014/pdf/Section%20D%20Water%20Supply%20Demand%20and%20Budget%2020140723_coverproof_accepted.pdf. Accessed 27 July 2017.

TABLE 4.1.4.1-1
WATER SOURCES BY WATER PURVEYOR FOR SANTA BARBARA COUNTY, 2012

Total Water Supply by Subregion (AF per Year)							
Subregion	**Groundwater**	**SWRCB Water Rights Diversions**	**Imported Surface Water**	**Reuse / Recycled**	**Desalinated**	**Other Cooperative Supply Opportunities**	**Subregion Totals**
North Coast	5,028	3,609	0	300	645	600	10,182
North County	24,093	7,672	66	475	0	1,700	34,006
South County	10,205	11,749	1,735	2,635	0	7,919	34,243
Region total	39,326	23,030	1,801	3,410	645	10,219	78,431

SOURCE: County of San Luis Obispo. n.d. San Luis Obispo Integrated Regional Water Management Plan. Available at: https://www.slocountywater.org/site/Frequent%20Downloads/Integrated%20Regional%20Water%20Management%20Plan/IRWM%20Plan%20Update%202014/pdf/Section%20D%20Water%20Supply%20Demand%20and%20Budget%2020140723_coverproof_accepted.pdf. Accessed 27 July 2017.

TABLE 4.1.4.1-2
GROUNDWATER BASIN YIELDS

WPA	Total Water Supply (AF per Year) by Water Planning Area (WPA)						Totals
	Groundwater	SWRCB Water Rights Diversions	Imported Surface Water	Reuse/ Recycled	Desalinated	Other Cooperative Supply Opportunities	
North Coast							
1. San Simeon	140	—	—	—	—	—	140
2. Cambria	673	—	—	—	—	—	673
3. Cayucos	—	661	—	—	—	—	661
4. Morro Bay	328	2,508	—	200	258	—	3,294
5. Los Osos	2,156	—	—	—	—	—	2,156
North Coast Total	3,297	3,169	—	200	258	—	6,924
North County							
10. Carrizo	—	—	—	—	—	—	—
11. Rafael/Big Spring	—	—	—	—	—	—	—
12. Santa Margarita	1,785	22	—	—	—	—	1,807
13. Atascadero / Templeton	12,452	2,250	—	132	—	—	14,834
14. Salinas / Estrella	6,898	—	66	—	—	—	6,964
15. Cholame	—	—	—	—	—	—	—
16. Nacimiento	—	—	—	—	—	1,700	1,700
North County Total	21,135	2,272	66	132	—	1,700	25,305
South County							
6. San Luis Obispo / Avila	238	11,749	—	151	—	23	12,161
7. South Coast	10,432	—	1,571	76	—	5,379	17,458
8. Huasna Valley	—	—	—	—	—	—	—
9. Cuyama Valley	—	—	—	—	—	—	—
South County Total	10,670	11,749	1,571	227	—	5,402	29,619
IRWM Total Urban	35,102	17,190	1,637	559	258	7,102	61,848

SOURCE: County of San Luis Obispo. n.d. San Luis Obispo Integrated Regional Water Management Plan. Available at: https://www.slocountywater.org/site/Frequent%20Downloads/Integrated%20Regional%20Water%20Management%20Plan/IRWM%20Plan%20Update%202014/pdf/Section%20D%20Water%20Supply%20Demand%20and%20Budget%2020140723_coverproof_accepted.pdf. Accessed 27 July 2017.

TABLE 4.1.4.1-3
STATE WATER PROJECT WATER SERVICE AMOUNT (IN AF)

Purveyor	Groundwater	Local Surface Water	Cachuma Project	State Water Project	Recycled	Total
City of Buellton	695			527		1,222
Carpinteria Valley Water District	1,192		2,923	433		4,548
Casmalia County Sanitation District (CSD)	11					11
Cuyama CSD	171					171
Golden State Water Company	7,981			330		8,311
Goleta Water District	306		10,984	972	907	13,169
City of Guadalupe	521			403		924
La Cumbre Mutual Water Company	1,364			361		1,725
City of Lompoc	4,695					4,695
Los Alamos CSD	317					317
Misson Hills CSD	657					657
Montecito Water District	253	2,150	3,230	647		6,280
City of Santa Barbara	1,157	3,623	7,859	647	819	14,105
City of Santa Maria	1,787			11,410		13,197
Santa Ynez River Water Conservation District	2,310		2,771	420		5,501
City of Solvang	287			1,146		1,433
Vandenberg Air Force Base						
Vandenberg Village CSD	1,547					1,547
Total	25,245	5,783	27,767	17,296	1,726	77,813

NOTE: State Water Shown is amount before exchange. For the City of Lompoc, local surface water is outside of City limits. Complete data for Vandenberg Air Force Base is not available.
SOURCE: County of Santa Barbara. 2013. Santa Barbara County IRWM Plan 20139. Available at: http://cosb.countyofsb.org/uploadedFiles/pwd/Water/IRWMP/2013_Plan/Chapter%203%20Regional%20Description.pdf. Accessed 27 July 2017.

4.1.4.2 Water Quality

Major surface waters of the CRCP Plan Area originate within undeveloped, mountainous areas (largely in two national forests and the Santa Monica Mountains), flow through urbanized foothill and valley areas, high-density residential and industrial coastal areas, and ultimately terminate at highly utilized recreational beaches and harbors. Uncontrolled pollutants from nonpoint sources are believed to be the greatest threats to rivers and streams within the CRCP Plan Area.

There are five hydrologic regions and 20 watersheds within the CRCP Plan Area. The water quality for each hydrologic region is unique to that respective region based on corresponding soil type, geological formations, land usage, and population.

There are 245 impaired water bodies in the CRCP Plan Area (Table 4.1.4.2-1, *Section 303(d) Impaired Water Bodies*; Figure 4.1.4-1, *Streams and Impaired Water Bodies*).

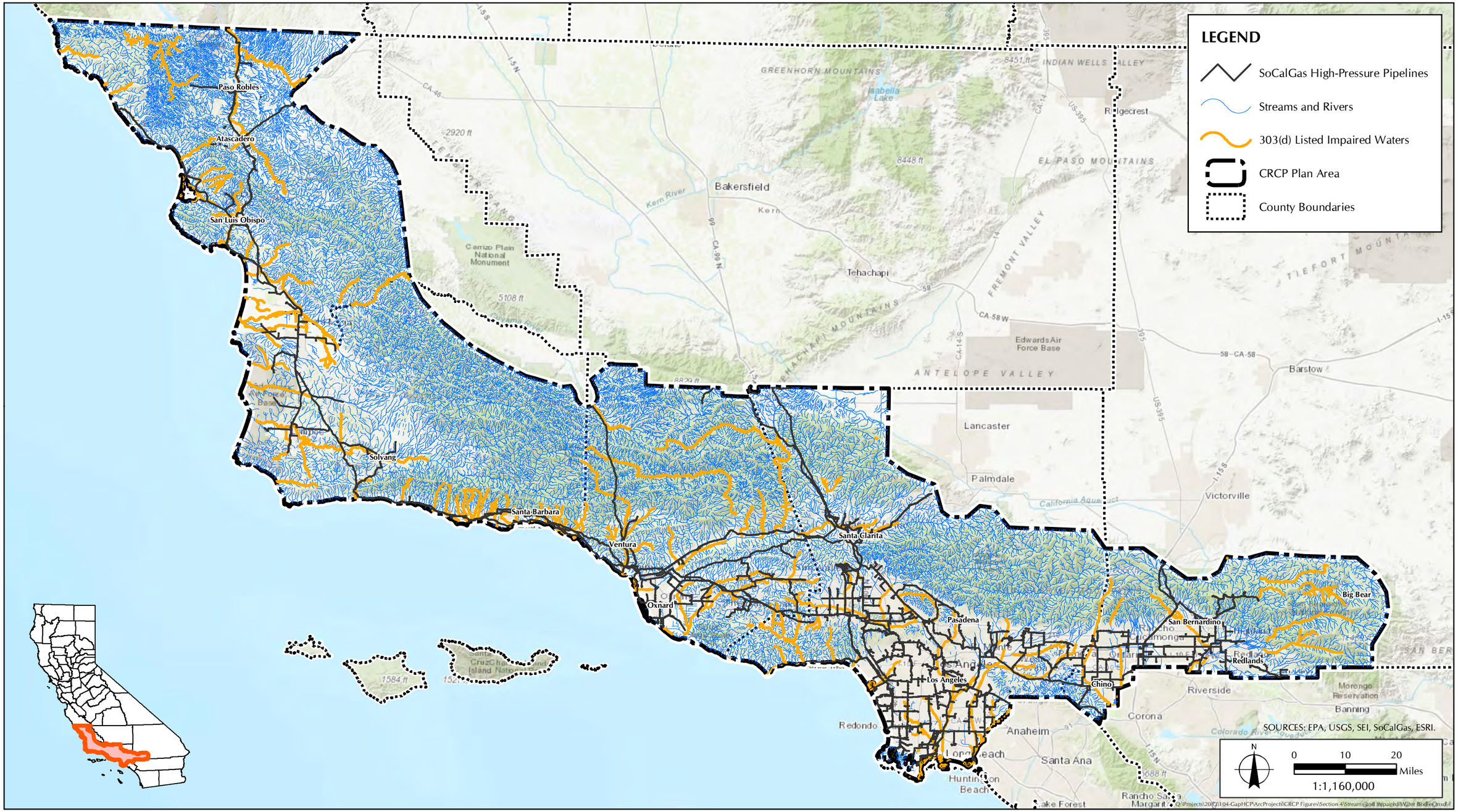

FIGURE 4.1.4-1

Streams and Impaired Water Bodies

TABLE 4.1.4.2-1
SECTION 303(D) IMPAIRED WATER BODIES

No.	303(d) Listed Impaired Waters Name
1	ALAMITOS BAY
2	ALAMO CREEK
3	ALISO CANYON WASH
4	AMARILLO BEACH
5	ARROYO BURRO CREEK
6	ARROYO DE LA CRUZ
7	ARROYO GRANDE CREEK (BELOW LOPEZ LAKE)
8	ARROYO PAREDON
9	ARROYO SECO REACH 1 (LA RIVER TO WEST HOLLY AVE.)
10	ARROYO SECO REACH 2 (FIGUEROA ST. TO RIVERSIDE DR.)
11	ARTESIA-NORWALK DRAIN
12	ATASCADERO CREEK (SAN LUIS OBISPO COUNTY)
13	ATASCADERO CREEK (SANTA BARBARA COUNTY)
14	BALLONA CREEK
15	BALLONA CREEK ESTUARY
16	BALLONA CREEK WETLANDS
17	BELL CREEK
18	BELL CREEK (SANTA BARBARA CO)
19	BIG BEAR LAKE
20	BIG ROCK BEACH
21	BLOSSER CHANNEL
22	BLUFF COVE BEACH
23	BRADLEY CANYON CREEK
24	BRADLEY CHANNEL
25	BULL CREEK
26	BURBANK WESTERN CHANNEL
27	CALLEGUAS CREEK REACH 2 (ESTUARY TO POTRERO RD- WAS CALLEGUAS CREEK REACHES 1 AND 2 ON 1998 303D LIST)
28	CALLEGUAS CREEK REACH 3 (POTRERO ROAD UPSTREAM TO CONFLUENCE WITH CONEJO CREEK ON 1998 303D LIST)
29	CALLEGUAS CREEK REACH 4 (WAS REVOLON SLOUGH MAIN BRANCH: MUGU LAGOON TO CENTRAL AVENUE ON 1998 303D LIST)
30	CALLEGUAS CREEK REACH 5 (WAS BEARDSLEY CHANNEL ON 1998 303D LIST)
31	CALLEGUAS CREEK REACH 6 (WAS ARROYO LAS POSAS REACHES 1 AND 2 ON 1998 303D LIST)
32	CALLEGUAS CREEK REACH 7 (WAS ARROYO SIMI REACHES 1 AND 2 ON 1998 303D LIST)
33	CALLEGUAS CREEK REACH 8 (WAS TAPO CANYON REACH 1)
34	CALLEGUAS CREEK REACH 9A (WAS LOWER PART OF CONEJO CREEK REACH 1 ON 1998 303D LIST)
35	CALLEGUAS CREEK REACH 9B (WAS PART OF CONEJO CREEK REACHES 1 AND 2 ON 1998 303D LIST)
36	CALLEGUAS CREEK REACH 10 (CONEJO CREEK (HILL CANYON)-WAS PART OF CONEJO CRK REACHES 2 & 3, AND LOWER CONEJO CRK/ARROYO CONEJO N FK ON 1998 303D LIST)
37	CALLEGUAS CREEK REACH 11 (ARROYO SANTA ROSA, WAS PART OF CONEJO CREEK REACH 3 ON 1998 303D LIST)
38	CANADA DE LA GAVIOTA
39	CANADA DEL REFUGIO
40	CANADA LARGA (VENTURA RIVER WATERSHED)
41	CARBON BEACH
42	CARNEROS CREEK
43	CARPINTERIA CREEK
44	CARPINTERIA MARSH (EL ESTERO MARSH)
45	CASITAS, LAKE
46	CASMALIA CANYON CREEK

TABLE 4.1.4.2-1
SECTION 303(D) IMPAIRED WATER BODIES

No.	303(d) Listed Impaired Waters Name
47	CASTAIC LAKE
48	CHINO CREEK REACH 1B (MILL CREEK CONFL TO START OF CONCRETE LINED CHANNEL)
49	CHINO CREEK REACH 2 (BEGINNING OF CONCRETE CHANNEL TO CONFL W SAN ANTONIO CREEK)
50	CHUMASH CREEK
51	CIENEGUITAS CREEK
52	COMPTON CREEK
53	COYOTE CREEK
54	COYOTE CREEK, NORTH FORK
55	CRAB CREEK
56	CUCAMONGA CREEK REACH 1 (VALLEY REACH)
57	CUCAMONGA CREEK REACH 2 (MOUNTAIN REACH)
58	CUYAMA RIVER (ABOVE TWITCHELL RESERVIOR)
59	DEVEREUX CREEK
60	DOMINGUEZ CHANNEL (LINED PORTION ABOVE VERMONT AVE)
61	DOMINGUEZ CHANNEL ESTUARY (UNLINED PORTION BELOW VERMONT AVE)
62	DOS PUEBLOS CANYON CREEK
63	DRY CANYON CREEK
64	ESCONDIDO BEACH
65	ESTRELLA RIVER
66	FLAT ROCK POINT BEACH AREA
67	FRANKLIN CREEK
68	GLEN ANNIE CANYON
69	GOLETA SLOUGH/ESTUARY
70	GREENE VALLEY CREEK (SANTA BARBARA COUNTY)
71	GROUT CREEK
72	HOLCOMB CREEK
73	HOPPER CREEK
74	INSPIRATION POINT BEACH
75	JALAMA CREEK
76	KNICKERBOCKER CREEK
77	LA COSTA BEACH
78	LAKE HUGHES
79	LAKE SHERWOOD
80	LAS FLORES BEACH
81	LAS TABLAS CREEK
82	LAS TABLAS CREEK, NORTH FORK
83	LAS TABLAS CREEK, SOUTH FORK
84	LAS TUNAS BEACH
85	LAS VIRGENES CREEK
86	LEGG LAKE
87	LINDERO CREEK REACH 1
88	LINDERO CREEK REACH 2 (ABOVE LAKE)
89	LITTLE OSO FLACO CREEK
90	LONG BEACH CITY BEACH
91	LOS ANGELES HARBOR - CONSOLIDATED SLIP
92	LOS ANGELES RIVER ESTUARY (QUEENSWAY BAY)
93	LOS ANGELES RIVER REACH 1 (ESTUARY TO CARSON STREET)
94	LOS ANGELES RIVER REACH 2 (CARSON TO FIGUEROA STREET)
95	LOS ANGELES RIVER REACH 4 (SEPULVEDA DR. TO SEPULVEDA DAM)
96	LOS ANGELES RIVER REACH 5 (WITHIN SEPULVEDA BASIN)
97	LOS ANGELES RIVER REACH 6 (ABOVE SEPULVEDA FLOOD CONTROL BASIN)
98	LOS ANGELES/LONG BEACH INNER HARBOR
99	LOS BERROS CREEK
100	LOS CERRITOS CHANNEL

TABLE 4.1.4.2-1
SECTION 303(D) IMPAIRED WATER BODIES

No.	303(d) Listed Impaired Waters Name
101	LOS OSOS CREEK
102	LYTLE CREEK
103	MAIN STREET CANAL
104	MALAGA COVE BEACH
105	MALIBU BEACH
106	MALIBU CREEK
107	MALIBU LAGOON BEACH (SURFRIDER)
108	MARIA YGNACIO CREEK
109	MARINA DEL REY HARBOR - BACK BASINS
110	MATILIJA CREEK REACH 1 (JCT. WITH N. FORK TO RESERVOIR)
111	MATILIJA CREEK REACH 2 (ABOVE RESERVOIR)
112	MATILIJA RESERVOIR
113	MCCOY CANYON CREEK
114	MEDEA CREEK REACH 1 (LAKE TO CONFL. WITH LINDERO)
115	MEDEA CREEK REACH 2 (ABV CONFL. WITH LINDERO)
116	MILL CREEK (PRADO AREA)
117	MILL CREEK REACH 1
118	MILL CREEK REACH 2
119	MISSION CREEK
120	MOJAVE RIVER (MOJAVE FORKS RESERVOIR OUTLET TO UPPER NARROWS)
121	MORRO BAY
122	MOUNTAIN HOME CREEK
123	MOUNTAIN HOME CREEK, EAST FORK
124	NACIMIENTO RESERVOIR
125	NICHOLAS CANYON BEACH
126	NIPOMO CREEK
127	NORTH MAIN STREET CHANNEL
128	ORCUTT CREEK
129	ORMOND BEACH
130	OSO FLACO CREEK
131	OSO FLACO LAKE
132	PACIFIC OCEAN AT ARROYO BURRO BEACH (SANTA BARBARA COUNTY)
133	PACIFIC OCEAN AT AVILA BEACH (AVILA PIER)
134	PACIFIC OCEAN AT AVILA BEACH (SLO CREEK MOUTH)
135	PACIFIC OCEAN AT CARPINTERIA STATE BEACH (CARPINTERIA CREEK MOUTH, SANTA BARBARA COUNTY)
136	PACIFIC OCEAN AT CAYUCOS (CAYUCOS CREEK MOUTH)
137	PACIFIC OCEAN AT EAST BEACH (MOUTH OF MISSION CREEK, SANTA BARBARA COUNTY)
138	PACIFIC OCEAN AT GOLETA BEACH (SANTA BARBARA COUNTY)
139	PACIFIC OCEAN AT HAMMONDS BEACH (SANTA BARBARA COUNTY)
140	PACIFIC OCEAN AT HASKELLS BEACH (SANTA BARBARA COUNTY)
141	PACIFIC OCEAN AT HOPE RANCH BEACH (SANTA BARBARA COUNTY)
142	PACIFIC OCEAN AT JALAMA BEACH (SANTA BARBARA COUNTY)
143	PACIFIC OCEAN AT LEADBETTER BEACH (SANTA BARBARA COUNTY)
144	PACIFIC OCEAN AT OCEAN BEACH (SANTA BARBARA COUNTY)
145	PACIFIC OCEAN AT OLDE PORT BEACH (AT RESTROOMS)
146	PACIFIC OCEAN AT PISMO STATE BEACH (SAN LUIS OBISPO COUNTY), SOUTH OF PISMO PIER
147	PACIFIC OCEAN AT POINT RINCON (MOUTH OF RINCON CR, SANTA BARBARA COUNTY)
148	PARADISE COVE BEACH
149	PECK ROAD PARK LAKE
150	PENINSULA BEACH
151	PENNINGTON CREEK
152	PICO CREEK
153	PIRU CREEK (FROM GAGING STATION BELOW SANTA FELICIA DAM TO HEADWATERS)
154	PISMO CREEK

TABLE 4.1.4.2-1
SECTION 303(D) IMPAIRED WATER BODIES

No.	303(d) Listed Impaired Waters Name
155	POINT DUME BEACH
156	POLE CREEK (TRIB TO SANTA CLARA RIVER REACH 3)
157	PORTUGUESE BEND BEACH
158	PREFUMO CREEK
159	PROMENADE PARK BEACH
160	PUDDINGSTONE RESERVOIR
161	PUENTE CREEK
162	PYRAMID LAKE
163	RATHBONE (RATHBUN) CREEK
164	REDONDO BEACH
165	RINCON BEACH
166	RINCON CREEK
167	RIO DE SANTA CLARA/OXNARD DRAIN NO. 3
168	RIO HONDO REACH 1 (CONFL. LA RIVER TO SNT ANA FWY)
169	RIO HONDO REACH 2 (AT SPREADING GROUNDS)
170	ROBERT H. MEYER MEMORIAL BEACH
171	ROMERO CREEK
172	SALINAS RIVER (UPPER, CONFLUENCE OF NACIMIENTO RIVER TO SANTA MARGARITA RESERVOIR)
173	SALSIPUEDES CREEK (SANTA BARBARA COUNTY)
174	SAN ANTONIO CREEK
175	SAN ANTONIO CREEK (SAN ANTONIO WATERSHED, RANCHO DEL LAS FLORES BRIDGE AT HWY 135 TO DOWNSTREAM AT RAILROAD BRIDGE)
176	SAN ANTONIO CREEK (TRIBUTARY TO VENTURA RIVER REACH 4)
177	SAN ANTONIO RESERVOIR
178	SAN BERNARDO CREEK
179	SAN BUENAVENTURA BEACH
180	SAN GABRIEL RIVER ESTUARY
181	SAN GABRIEL RIVER REACH 1 (ESTUARY TO FIRESTONE)
182	SAN GABRIEL RIVER REACH 2 (FIRESTONE TO WHITTIER NARROWS DAM
183	SAN GABRIEL RIVER REACH 3 (WHITTIER NARROWS TO RAMONA)
184	SAN JOSE CREEK (SANTA BARBARA COUNTY)
185	SAN JOSE CREEK REACH 1 (SG CONFLUENCE TO TEMPLE ST.)
186	SAN JOSE CREEK REACH 2 (TEMPLE TO I-10 AT WHITE AVE.)
187	SAN LUIS OBISPO CREEK
188	SAN LUIS OBISPO CREEK (BELOW W MARSH STREET)
189	SAN LUISITO CREEK
190	SAN MIGUELITO CREEK
191	SAN PEDRO CREEK (SANTA BARBARA COUNTY)
192	SAN SIMEON CREEK
193	SANTA ANA RIVER REACH 6
194	SANTA ANA RIVER, REACH 4
195	SANTA CLARA RIVER ESTUARY
196	SANTA CLARA RIVER REACH 1 (ESTUARY TO HWY 101 BRIDGE)
197	SANTA CLARA RIVER REACH 3 (FREEMAN DIVERSION TO A STREET)
198	SANTA CLARA RIVER REACH 5 (BLUE CUT GAGING STATION TO WEST PIER HWY 99 BRIDGE) (WAS NAMED SANTA CLARA RIVER REACH 7 ON 2002 303(D) LIST)
199	SANTA CLARA RIVER REACH 6 (W PIER HWY 99 TO BOUQUET CYN RD) (WAS NAMED SANTA CLARA RIVER REACH 8 ON 2002 303(D) LIST)
200	SANTA CLARA RIVER REACH 7 (BOUQUET CANYON RD TO ABOVE LANG GAGING STATION) (WAS NAMED SANTA CLARA RIVER REACH 9 ON 2002 303(D) LIST)
201	SANTA CLARA RIVER REACH 11 (PIRU CREEK, FROM CONFLUENCE WITH SANTA CLARA RIVER REACH 4 TO GAGING STATION BELOW SANTA FELICIA DAM)
202	SANTA MARIA RIVER
203	SANTA MARIA RIVER ESTUARY

TABLE 4.1.4.2-1
SECTION 303(D) IMPAIRED WATER BODIES

No.	303(d) Listed Impaired Waters Name
204	SANTA MONICA CANYON
205	SANTA MONICA CREEK
206	SANTA ROSA CREEK (SAN LUIS OBISPO COUNTY)
207	SANTA YNEZ RIVER (BELOW CITY OF LOMPOC TO OCEAN)
208	SANTA YNEZ RIVER (CACHUMA LAKE TO BELOW CITY OF LOMPOC)
209	SAWPIT CREEK
210	SEA LEVEL BEACH
211	SEPULVEDA CANYON
212	SESPE CREEK (FROM 500 FT BELOW CONFLUENCE WITH LITTLE SESPE CR TO HEADWATERS)
213	SHEEP CREEK
214	SHUMAN CANYON CREEK
215	SOLSTICE CANYON CREEK
216	STENNER CREEK
217	SUMMIT CREEK
218	SURFERS POINT AT SEASIDE
219	SYCAMORE CREEK
220	TECOLOTE CREEK (SANTA BARBARA COUNTY)
221	TOPANGA BEACH
222	TOPANGA CANYON CREEK
223	TORO CANYON CREEK
224	TORO CREEK
225	TORRANCE CARSON CHANNEL
226	TRANCAS BEACH (BROAD BEACH)
227	TRIUNFO CANYON CREEK REACH 1
228	TRIUNFO CANYON CREEK REACH 2
229	TUJUNGA WASH (LA RIVER TO HANSEN DAM)
230	VENTURA HARBOR: VENTURA KEYS
231	VENTURA MARINA JETTIES
232	VENTURA RIVER ESTUARY
233	VENTURA RIVER REACH 1 AND 2 (ESTUARY TO WELDON CANYON)
234	VENTURA RIVER REACH 3 (WELDON CANYON TO CONFL. W/ COYOTE CR)
235	VENTURA RIVER REACH 4 (COYOTE CREEK TO CAMINO CIELO RD)
236	VERDUGO WASH REACH 1 (LA RIVER TO VERDUGO RD.)
237	VERDUGO WASH REACH 2 (ABOVE VERDUGO ROAD)
238	WALNUT CREEK WASH (DRAINS FROM PUDDINGSTONE RES)
239	WALTERS CREEK
240	WARDEN CREEK
241	WESTLAKE LAKE
242	WHEELER CANYON/TODD BARRANCA
243	WHITES POINT BEACH
244	WILMINGTON DRAIN
245	ZUMA BEACH (WESTWARD BEACH)

4.1.5 Existing Land Use

The CRCP Plan Area extends over portions of five counties: Los Angeles, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura. The portions of these counties within the CRCP Plan Area include many diverse land uses, including agriculture, urban areas, and open space. The CRCP Plan Area also includes approximately 417.6 miles of coastline.

Land Use/Land Cover. Despite including the nation's second largest city, Los Angeles, the most prevalent land cover in the CRCP Plan Area is open space (Figure 4.1.5-1, *CRCP Plan Area 2016 Land Cover by County*; Table 4.1.5-1, *CRCP Plan Area Land Cover by County*). The CRCP Plan Area includes three National Forests: Los Padres, Angeles, and San Bernardino; and other open space administered by federal, state, county, and local public agencies, including the Santa Monica Mountains National Recreation Area. The CRCP Plan Area also includes extensive open space in private ownership. Three counties, San Luis Obispo, Santa Barbara, and Ventura, have open space land cover in excess of 75 percent and large areas dedicated to agricultural land cover. Los Angeles has the highest urban land cover.[408] Urban, built-up, or disturbed land generally consists of residential, commercial, and industrial land uses, but also includes areas of disturbance from mining and mineral extraction activities.

[408] In order to simplify the Fire Resource and Assessment Program (FRAP) source data, all categories of native and non-native plant communities were included in the open space category.

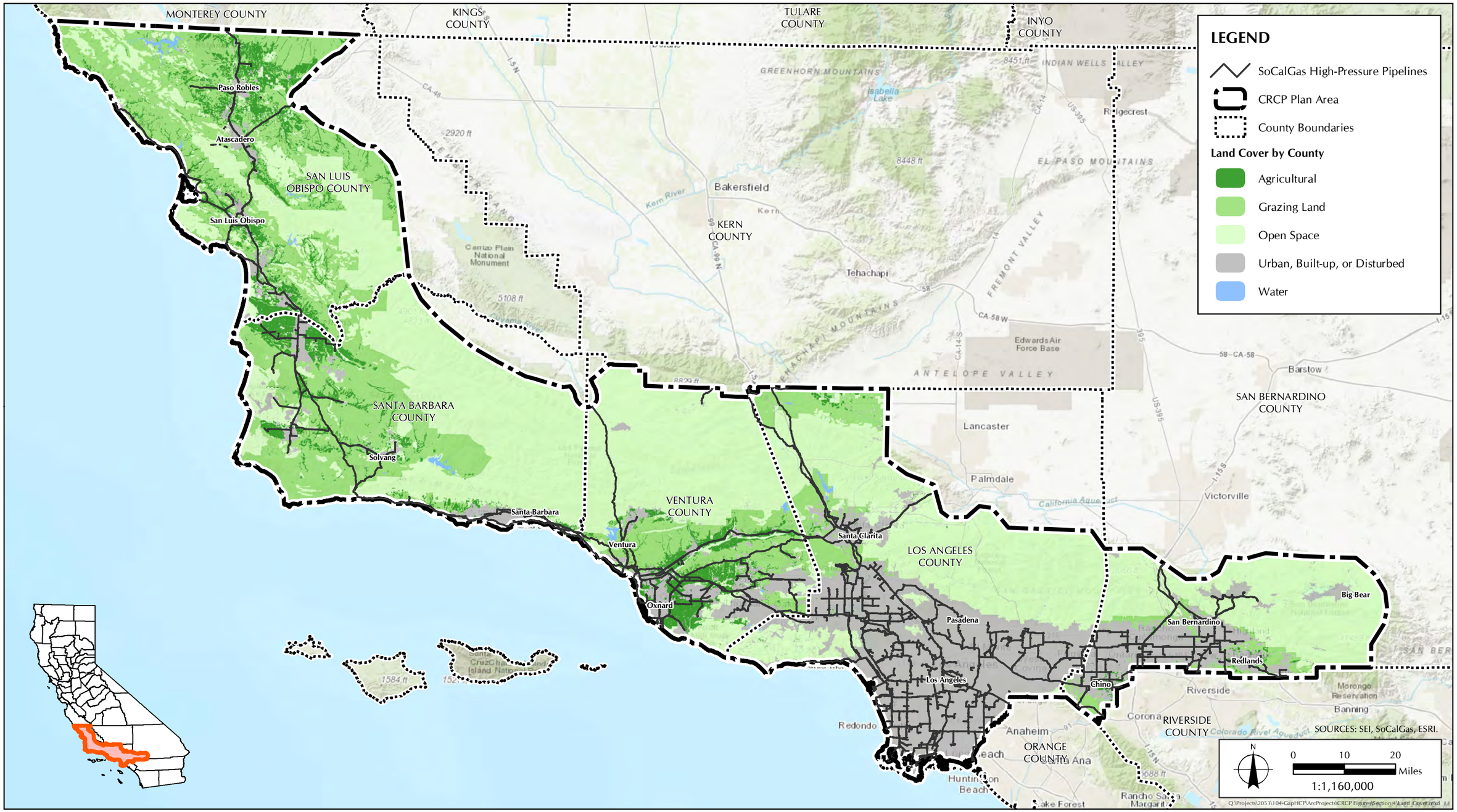

FIGURE 4.1.5-1

CRCP Plan Area 2016 Land Cover by County

TABLE 4.1.5-1
CRCP PLAN AREA LAND COVER BY COUNTY

Land Use/Cover Type	Square Miles	Percentage of County Total (within CRCP Plan Area)
Los Angeles	**2,913.45**	**100**
Agriculture	11.66	<1
Grazing Land	266.40	9
Open Space	1,271.08	44
Urban, Built-Up, or Disturbed	1,359.67	47
Water	4.65	<1
San Bernardino	**1,295.88**	**100**
Agriculture	15.81	1
Grazing Land	120.23	9
Open Space	750.85	58
Urban, Built-Up, or Disturbed	408.90	32
Water	0.09	<1
San Luis Obispo	**2,264.13**	**100**
Agriculture	335.83	15
Grazing Land	1,106.12	49
Open Space	692.12	31
Urban, Built-Up, or Disturbed	116.34	5
Water	13.73	<1
Santa Barbara	**2,320.14**	**100**
Agriculture	166.17	7
Grazing Land	763.48	33
Open Space	1,240.66	53
Urban, Built-Up, or Disturbed	144.01	6
Water	5.82	<1
Ventura	**1,809.34**	**100**
Agriculture	179.65	10
Grazing Land	303.94	17
Open Space	1,073.89	59
Urban, Built-Up, or Disturbed	245.72	14
Water	6.15	<1
Grand Total	**10,602.96**	**100**

SOURCE: 2002 Forest and Range Assessment, California Natural Resources Agency. 2016 Urbanized Area Boundary, US Census Bureau. 2016 California Department of Conservation Farmland Mapping and Monitoring Program, California Department of Conservation.
NOTE: Totals do not necessarily correspond to other tables in this section as a result of data sourced from different agencies.

Land Ownership. Land ownership varies between counties within the CRCP Plan Area, with some counties dominated by lands administered by federal agencies, while others are dominated by privately owned land (Figure 4.1.5-2, *CRCP Plan Area Land Ownership by County*; Table 4.1.5-2, *CRCP Plan Area Land Ownership by County*).[409] Two counties, Ventura and San Bernardino, are dominated by lands administered by federal agencies. The remaining three counties are dominated by privately held property.

[409] Lnd_SurfaceEstate.shp. 2010. BLM, California State Office. 2-11-2010.

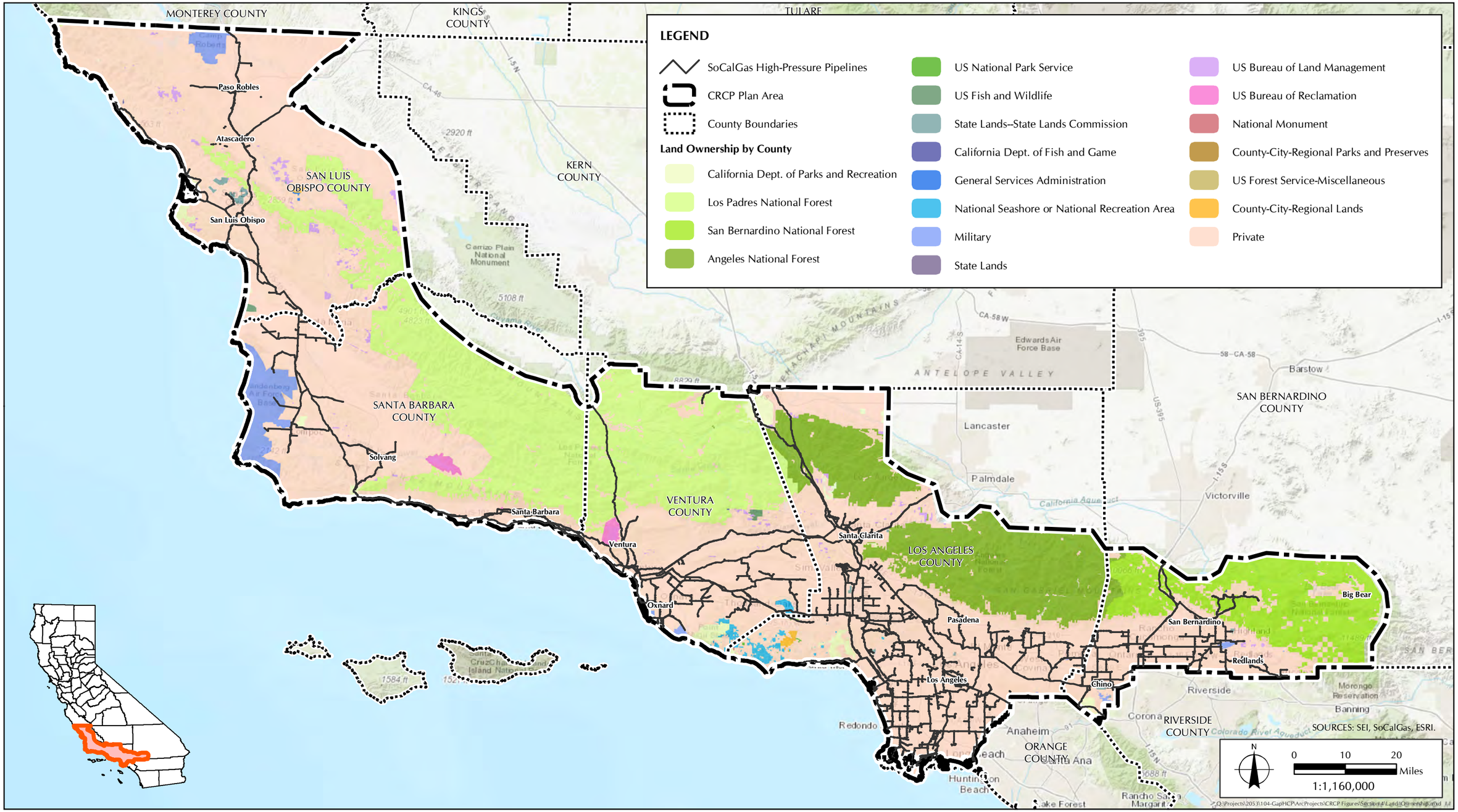

FIGURE 4.1.5-2

CRCP Plan Area Land Ownership by County

TABLE 4.1.5-2
CRCP PLAN AREA LAND OWNERSHIP BY COUNTY

Ownership Type	Sum of Square Miles	Sum of Percentage of County Total (within CRCP Plan Area)
Los Angeles	**2,913.45**	**100**
County-City	142.66	4.90
Federal	1,035.15	35.53
Private	1,660.80	57.00
State	74.85	2.57
San Bernardino	**1,295.88**	**100**
County-City	18.94	1.46
Federal	675.91	52.16
Private	585.63	45.19
State	15.41	1.19
San Luis Obispo	**2,264.13**	**100**
County-City	27.21	1.20
Federal	352.45	15.57
Private	1,848.61	81.65
State	35.86	1.58
Santa Barbara	**2,320.14**	**100**
County-City	23.07	0.99
Federal	1,098.87	47.36
Private	1,174.57	50.62
State	23.63	1.02
Ventura	**1,809.34**	**100**
County-City	44.35	2.45
Federal	909.42	50.26
Private	814.82	45.03
State	40.75	2.25
Grand Total	**10,602.96**	

SOURCE: BLM, California State Office.
NOTE: Totals do not necessarily correspond to other tables in this section as a result of data sourced from different agencies.

Williamson Act. The California Land Conservation Act of 1965—commonly referred to as the Williamson Act—enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. In return, landowners receive property tax assessments that are much lower than normal because they are based upon farming and open space uses as opposed to full market value.[410] Much of the agricultural area of San Luis Obispo, Santa Barbara, and to a lesser extent, Ventura and San Bernardino Counties, have extensive areas under Williamson Act contract. Los Angeles County does not participate in a Williamson Act program (Table 4.1.5-3, *Williamson Act Contracts by County*).[411]

[410] California Department of Conservation. Division of Land Resource Protection. n.d. Available at: http://www.conservation.ca.gov/dlrp/lca. Accessed 22 June 2017.

[411] California Department of Conservation. Farmland Mapping and Monitoring Program. n.d. Available at: http://www.conservation.ca.gov/dlrp/Pages/qh_maps.aspx. Accessed 22 June 2017.

TABLE 4.1.5-3
WILLIAMSON ACT CONTRACT BY COUNTY

County	Square Miles	Percentage of County (within CRCP Plan Area)
Los Angeles	**2,913.5**	
Not in Williamson Act	2,913.5	100.0
Williamson Act	0	0.0
San Bernardino	**1,295.9**	
Not in Williamson Act	1,293.8	99.8
Williamson Act	2.1	0.2
San Luis Obispo	**2,264.2**	
Not in Williamson Act	1,309.1	57.8
Williamson Act	955.1	42.2
Santa Barbara	**2,320.1**	
Not in Williamson Act	1,556.6	67.1
Williamson Act	763.5	32.9
Ventura	**1,809.3**	
Not in Williamson Act	1,604.9	88.7
Williamson Act	204.4	11.3
Grand Total	**10,603.0**	

SOURCE: California Department of Conservation. Farmland Mapping and Monitoring Program.
NOTE: Totals do not necessarily correspond to other tables in this section as a result of data sourced from different agencies.

Coastal Zone. The CRCP Plan Area includes approximately 417.6 linear miles of coastline and over 10,000 square miles that are located in the coastal zone and subject to the jurisdiction of the California Coastal Commission (Figure 4.1.5-3, *Coastal Zone Area by County*; Table 4.1.5-4, *Coastal Zone Area by County*).[412] San Luis Obispo has the largest area of Coastal Zone, followed by Santa Barbara County. San Bernardino County does not include any coastline area, and therefore does not include any areas of Coastal Zone jurisdiction.

[412] California Coastal Commission. n.d. Maps Coastal Zone Boundary. Available at: https://www.coastal.ca.gov/maps/. Accessed 21 June 2017.

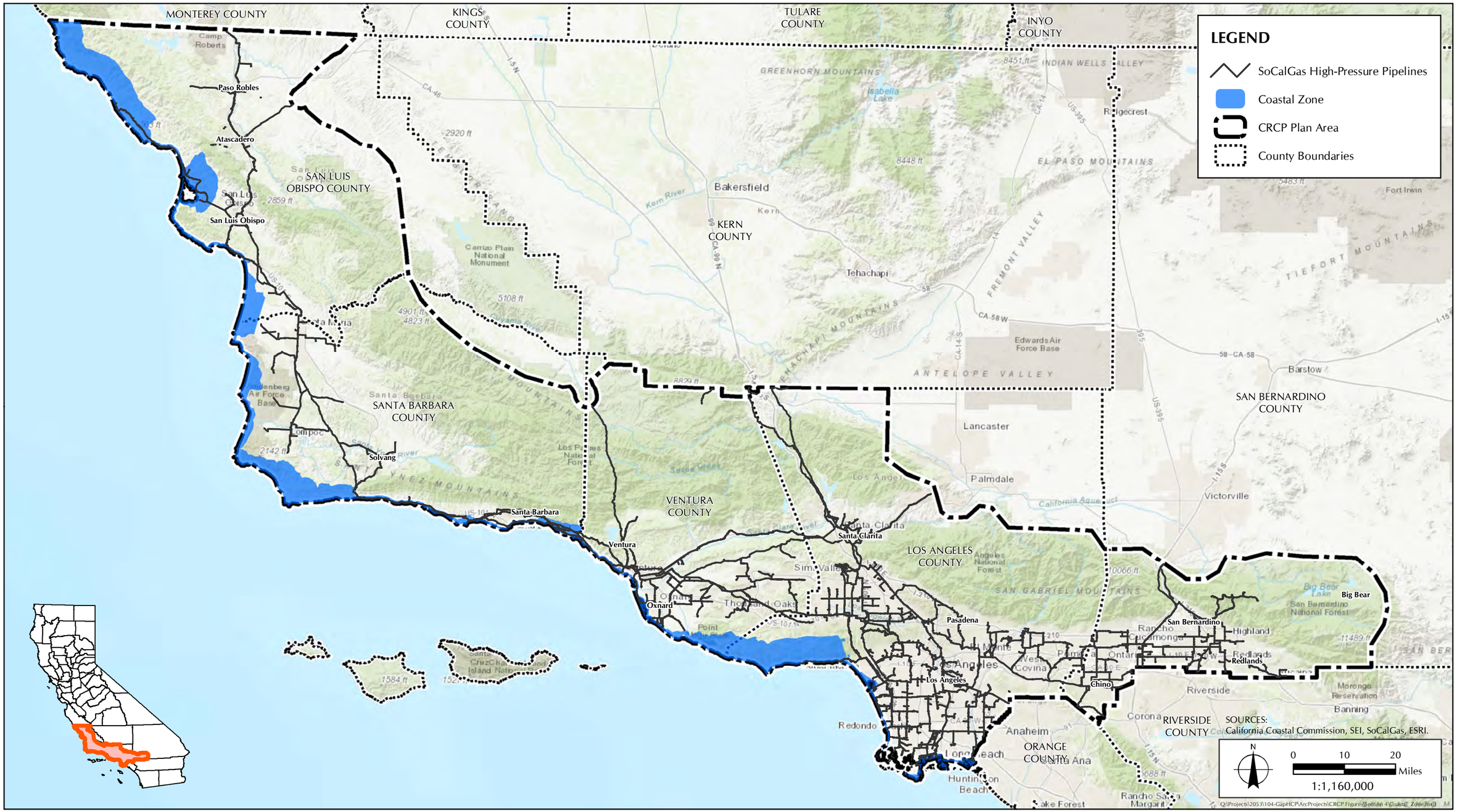

FIGURE 4.1.5-3

CRCP Coastal Zone Area by County

TABLE 4.1.5-4
COASTAL ZONE AREA BY COUNTY

Coastal Zone	Linear Miles of Coastline	Square Miles	Percentage of County (within CRCP Plan Area)
Los Angeles County	**125.84**	**2,913.45**	
Coastal Commission Zone	-	133.93	4.60
Outside Coastal Zone	-	2,779.52	95.40
San Bernardino County	**0.00**	**1,295.88**	
Outside Coastal Zone	-	1,295.88	100.00
San Luis Obispo County	**115.43**	**2,264.13**	
Coastal Commission Zone	-	239.91	10.60
Outside Coastal Zone	-	2,024.22	89.40
Santa Barbara County	**116.63**	**2,320.14**	
Coastal Commission Zone	-	176.33	7.60
Outside Coastal Zone	-	2,143.82	92.40
Ventura County	**59.72**	**1,809.34**	
Coastal Commission Zone	-	51.10	2.82
Outside Coastal Zone	-	1,758.25	97.18
Grand Total	**417.62**	**10,602.96**	

SOURCE: California Coastal Commission.
NOTE: Totals do not necessarily correspond to other tables in this section as a result of data sourced from different agencies.

Tribal Lands. Tribal reservations located within the CRCP Plan Area include the Santa Ynez Reservation located in central Santa Barbara County and the San Manuel Reservation located in southwestern San Bernardino County.[413]

4.1.5.1 CRCP Plan Area Counties

Los Angeles County. Of the five CRCP Plan Area counties, Los Angeles County contains the largest population and overall area. As of July 2016, 10,137,915 people resided within its 3,947-square-mile area, of which 2,913.45 square miles are in the CRCP Plan Area.[414] The Los Angeles Basin comprises the 16th largest economy in the world, and the City of Los Angeles is the second largest city in the United States. The main economic activities in the area include, but are not limited to, aerospace, entertainment, fashion, biomedical services, consumer products, and tourism.[415] Los Angeles County contains 85 incorporated cities within the CRCP Plan Area. Land use/land cover in the CRCP Plan Area portion of Los Angeles County consists of approximately 58 percent open space, 0.7 percent agriculture, 41 percent urban built up, or disturbed, and 0.3 percent water (Table 4.1.5-1). Land ownership in the CRCP Plan Area portion of Los Angeles County is approximately 63 percent private, 35 percent federal, 2 percent state, and 0.2 percent county-city (Table 4.1.5-2). Los Angeles County does not have a Williamson Act contract program, and therefore does not have any areas

[413] United States Environmental Protection Agency. n.d. Tribal Lands in Region 9. Available at: https://www.epa.gov/sites/production/files/2015-07/r9tribes.gif. Accessed 22 June 2017.

[414] Data Access and Dissemination Systems (DADS). May 2017. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2016. American Fact Finder. United States Census Bureau. Available at: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml?src=bkmk#. Accessed 23 June 2017.

[415] Sacramento Business Journal. 15 July 2014. Los Angeles is nation's 4th largest economy; Bay Area ranks as 6th largest. Available at: http://www.bizjournals.com/sacramento/news/2014/07/15/los-angeles-is-nations-4th-largest-economy-bay.html. Accessed 20 June 2017.

under Williamson Act Contract (Table 4.1.5-3). Los Angeles County has approximately 5 percent of land within Coastal Zone jurisdiction for the portions of the County within the CRCP Plan Area (Table 4.1.5-4). Los Angeles Air Force Base is a nonflying U.S. Air Force Base located in El Segundo, California. Los Angeles Air Force Base houses and supports the headquarters of the Air Force Space Command's Space and Missile Systems Center.[416] There are no tribal lands within Los Angeles County.[417]

San Bernardino County. San Bernardino County contains a population of 2,140,096, and is 20,104.6 square miles in area, of which 1,295.88 square miles are in the CRCP Plan Area.[418] Cities in the CRCP Plan Area include Big Bear Lake, Chino, Chino Hills, Colton, Fontana, Grand Terrace, Hesperia, Highland, Loma Linda, Montclair, Ontario, Rancho Cucamonga, Redlands, Rialto, San Bernardino, Upland, and Yucaipa. Major employers in the County include the Arrowhead Regional Medical Center, BNSF Railway Company, California State University San Bernardino, and the Amazon Fulfillment Center.[419] Land use/land cover in the CRCP Plan Area portion of San Bernardino County consists of approximately 70 percent open space, 0.7 percent agriculture, 28 percent urban built up, or disturbed, and 0.5 percent water (Table 4.1.5-1). Land ownership in the CRCP Plan Area portion of San Bernardino County is approximately 47 percent private, 51 percent federal, and 2 percent state (Table 4.1.5-2). San Bernardino County has approximately 0.2 percent of the CRCP Plan Area portion of the County under Williamson Act Contract (Table 4.1.5-3). San Bernardino County does not include any coastline area, and therefore does not include any areas of Coastal Zone jurisdiction. There is an Army National Guard base located in San Bernardino County. Tribal lands within the CRCP Plan Area of San Bernardino County include the San Manuel Reservation.[420]

San Luis Obispo County. San Luis Obispo County is the northernmost county in the CRCP Plan Area, and contains the smallest population of the five counties at 282,887.[421] Major employers in San Luis Obispo County include California Polytechnic San Luis Obispo University, Arroyo Grande Community Hospital, Cuesta College, and San Luis Obispo County.[422] The economy of San Luis Obispo County is primarily based on tourism and agriculture. San Luis Obispo County is the third largest producer of wine in California, surpassed only by Sonoma and Napa Counties. Wine grapes are the second largest agricultural crop in the county.[423] The county is 3,319 square miles in size, including 2,264.13 square miles in the CRCP Plan Area. Cities within the CRCP Plan Area of San Luis Obispo County include Arroyo Grande, Atascadero, Grover Beach, Morro Bay, Paso Robles,

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[416] United States Air Force. n.d. Los Angeles Air Force Base. Available at: http://www.losangeles.af.mil/. Accessed 22 June 2017.

[417] United States Environmental Protection Agency. n.d. Tribal Lands in Region 9. Available at: https://www.epa.gov/sites/production/files/2015-07/r9tribes.gif. Accessed 22 June 2017.

[418] Data Access and Dissemination Systems (DADS). May 2017. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2016. American Fact Finder. United States Census Bureau. Available at: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml?src=bkmk#. Accessed 22 June 2017.

[419] State of California Employment Development Department. n.d. Major Employers in San Bernardino County. Available at: http://www.labormarketinfo.edd.ca.gov/majorer/countymajorer.asp?CountyCode=000071. Accessed 23 June 2017.

[420] United States Environmental Protection Agency. n.d. Tribal Lands in Region 9. Available at: https://www.epa.gov/sites/production/files/2015-07/r9tribes.gif. Accessed 22 June 2017.

[421] Data Access and Dissemination Systems (DADS). May 2017. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2016. American Fact Finder. United States Census Bureau. Available at: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml?src=bkmk#. Accessed 22 June 2017.

[422] State of California Employment Development Department. n.d. Major Employers in San Luis Obispo County. Available at: http://www.labormarketinfo.edd.ca.gov/majorer/countymajorer.asp?CountyCode=000079. Accessed 23 June 2017.

[423] Settevendemie, Marty. 2012 Crop Report. San Luis Obispo County Department of Agriculture.

Pismo Beach, and the largest city, San Luis Obispo. Land use/land cover in the CRCP Plan Area portion of San Luis Obispo County consists of approximately 85 percent open space, 11 percent agriculture, 4 percent urban built up, or disturbed, and 0.3 percent water (Table 4.1.5-1). Land ownership in the CRCP Plan Area portion of San Luis Obispo County is approximately 83 percent private, 15 percent federal, and 1 percent state (Table 4.1.5-2). The county has the largest amount of land under Williamson Act Contract, with approximately 43 percent of the CRCP Plan Area portion of the county under contract (Table 4.1.5-3). Of the five CRCP Plan Area counties, San Luis Obispo County has the most area within Coastal Zone jurisdiction, at 11 percent of the County within the CRCP Plan Area (Table 4.1.5-4). Military uses in the county include Camp Roberts located on the northern boundary of the CRCP Plan Area. There are no tribal lands within San Luis Obispo County.[424]

Santa Barbara County. Santa Barbara County contains a population of 446,170, and is 2,551 square miles in area, of which 2,320.14 square miles are in the CRCP Plan Area.[425] The economy of Santa Barbara County is characterized by engineering, resource extraction (particularly petroleum extraction and diatomaceous earth mining), winemaking, agriculture, and education. Cities within the CRCP Plan Area include Buellton, Carpinteria, Goleta, Guadalupe, Lompoc, Santa Barbara, Santa Maria, and Solvang. Land use/land cover in the CRCP Plan Area portion of Santa Barbara County consists of approximately 86 percent open space, 9 percent agriculture, 5 percent urban built up, or disturbed, and 0.2 percent water (Table 4.1.5-1). Land ownership in the CRCP Plan Area portion of Santa Barbara County is approximately 53 percent private, 47 percent federal, and 0.4 percent state (Table 4.1.5-2). Santa Barbara County has approximately 33 percent of the CRCP Plan Area portion of the county under Williamson Act Contract (Table 4.1.5-3). Santa Barbara County has approximately 11 percent of the CRCP Plan Area portion of the county within Coastal Zone jurisdiction (Table 4.1.5-4). Vandenberg Air Force Base near the City of Lompoc is the largest military-owned land in the county. The Santa Ynez Reservation is the only tribal land located within the county.[426]

Ventura County. Ventura County contains a population of 849,738, and is 1,832 square miles in area, of which 1,809.34 square miles are in the CRCP Plan Area.[427] Major employers in Santa Barbara County include the Air National Guard, Anthem Blue Cross, Moorpark College, and Boskovich Farms Inc.[428] Cities within the CRCP Plan Area include Camarillo, Fillmore, Moorpark, Ojai, Oxnard, Port Hueneme, Santa Paula, Simi Valley, Thousand Oaks, and the largest city, Ventura. Land use/land cover in the CRCP Plan Area portion of Ventura County consists of approximately 79 percent open space, 13 percent agriculture, 8 percent urban, or disturbed, and 0.3 percent water (Table 4.1.5-1). Land ownership in the CRCP Plan Area portion of the county is approximately 48 percent private, 50 percent federal, and 1 percent state (Table 4.1.5-2). Ventura County has approximately 11 percent of the CRCP Plan Area portion of the County under Williamson Act Contract (Table 4.1.5-3). Ventura

[424] United States Environmental Protection Agency. n.d. Tribal Lands in Region 9. Available at: https://www.epa.gov/sites/production/files/2015-07/r9tribes.gif. Accessed 22 June 2017.

[425] Data Access and Dissemination Systems (DADS). May 2017. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2016. American Fact Finder. United States Census Bureau. Available at: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml?src=bkmk#. Accessed 22 June 2017.

[426] United States Environmental Protection Agency. n.d. Tribal Lands in Region 9. Available at: https://www.epa.gov/sites/production/files/2015-07/r9tribes.gif. Accessed 22 June 2017.

[427] Data Access and Dissemination Systems (DADS). May 2017. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2016. American Fact Finder. United States Census Bureau. Available at: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml?src=bkmk#. Accessed 22 June 2017.

[428] State of California Employment Development Department. n.d. Major Employers in Ventura County. Available at: http://www.labormarketinfo.edd.ca.gov/majorer/countymajorer.asp?CountyCode=000111. Accessed 20 June 2017.

County has approximately 3 percent of the CRCP Plan Area portion of the county within Coastal Zone jurisdiction (Table 4.1.5-4). Point Mugu Naval Air Station is the largest military installation in the county. There are no tribal lands within Ventura County.[429]

4.2 Biological Resources: Bioregions, Wildlife, Fish, and Vegetation

This MSHCP addresses 19 wildlife species and 22 plant species. These species were identified on the basis of an initial assessment of the potential occurrence of listed and nonlisted but sensitive species and their habitat in the CRCP Plan Area, and the potential effect of proposed Covered Activities and conservation measures on listed species or species that could become listed during the term of the MSHCP. A total of 123 special-status species with the potential to occur in the CRCP Plan Area were evaluated for coverage in the Plan and screened according to specific criteria. From this list, 41 species were selected for coverage.

Prior to the approval of an MSHCP, USFWS is required to undertake an internal Section 7 consultation because issuance of an ITP is a federal action. Elements specific to the Section 7 process (e.g., analysis of impacts on designated critical habitat, analysis of impacts on listed plant species, and analysis of indirect and cumulative impacts on listed species) are included in the MSHCP to meet the requirements of Section 7.

4.2.1 Bioregions

The CRCP Plan Area encompasses two of the 10 Bioregions of California identified by the U.S. Geological Survey (USGS) Western Ecological Research Center: the Central Western California Bioregion and the Southwestern California Bioregion. These regions have been adopted and slightly modified from the 1993 USFS National Hierarchical Framework of Ecological Units, which are mapped based on associations of those biotic and environmental factors that regulate the structure and function of ecosystems.

The 10 USGS bioregions coincide with the 10 regions of the Jepson Manual's California Floristic Provinces that further divide the broad bioregion classification into subregions and districts that are based primarily on landforms and topography that which dictate vegetation types. Based upon the Jepson classification, the Central Western California Bioregion is divided into the Central Coast and South Coast Ranges Subregions, and the Southwestern California Bioregion into the South Coast and Transverse Ranges Subregion. The climatic and floristic characteristics of these areas are described in the following sections.

4.2.1.1 Central Western California

The Central Coast Subregion is comprised of the coastal areas of San Luis Obispo County and most of Santa Barbara County north of Point Conception. This area is dominated by grasslands, coastal scrub, and coast live oak woodlands, along with a variety of marsh, estuary, wetland, riparian, savanna, and broadleaf and conifer forest communities. The cooling marine marine-influenced climate in this subregion dictates the expression of these varied plant communities.

[429] United States Environmental Protection Agency. n.d. Tribal Lands in Region 9. Available at: https://www.epa.gov/sites/production/files/2015-07/r9tribes.gif. Accessed 22 June 2017.

The inland portions of San Luis Obispo and Santa Barbara Counties are classified as the South Coast Ranges, and are comprised almost entirely of the Inner South Coast Ranges District of the Jepson classification. The warmer inland climate dictates the expression of extensive grasslands amongst a mosaic of blue oak/foothill pine woodland, juniper woodland, chaparral, and elements of desert scrub.

4.2.1.2 Southwestern California

The Southwestern California Bioregion includes the South Coast Subregion, which encompasses the coastal south facing edge of Santa Barbara and Ventura counties, and coastal and inland portions of Los Angeles and western Riverside and San Bernardino Counties. Coastal sage scrub, chaparral, and grassland are the dominant vegetation types along this narrow band influenced by the marine climate.

The inland portions of the Southwestern California Bioregion are classified as the Transverse Ranges Subregion that includes three districts: the Western Transverse Ranges, the San Gabriel Mountains, and the San Bernardino Mountains. This bioregion is highly diverse in the landforms, topography, geology, and climatic influences which dictate the varied mosaic of grasslands, shrub/scrub, woodland, and higher elevation coniferous plant communities. Additionally, this bioregion is dominated by urbanization with the habitat areas in the surrounding hills and mountains primarily occurring outside of the municipalities.

4.2.2 CRCP Plan Area Natural Resources Setting by County

Southern California is the second largest metropolitan area in the U.S., with over 17 million people.[430] Urban sprawl has perpetually limited the amount of land held for wildlife preservation purposes throughout California.[431] Each of the five counties in the CRCP Plan Area has its own characterized wildlife including urban, non-urban, resident and/or migratory species. Local programs may be in place to successfully integrate biological resources into urban areas to maintain wildlife preservation and educate the residents on the importance of maintaining this preservation. The general natural resources descriptions for each county are described below.

4.2.2.1 Los Angeles County

Los Angeles County borders 75 miles of Pacific Ocean coastline and encompasses numerous other natural landscapes including towering mountain ranges, deep valleys, forests, islands, lakes, rivers, and desert. The majority of the county, including the coast, is predominately urbanized. In contrast, there are large expanses of lesser populated areas inland within the Santa Clarita Valley and to the north along Interstate 5 and east towards the Mojave Desert. The portion of Los Angeles County within the Mojave Desert, including Palmdale, Lancaster, and the Antelope Valley, are outside of the CRCP Plan Area. Within the central and southern portions of the county are the San Gabriel Mountains, containing Angeles National Forest. The majority of southern Los Angeles County, south of the San Gabriel Mountains, is heavily urbanized.

[430] U.S. Fish and Wildlife Service. SoCal Urban Wildlife Refuge Project Summary; San Diego, CA. Available at: https://www.fws.gov/urban/refugePDFs/SoCalUrbanWildlifeRefugeProjectSummary.pdf.

[431] California State Parks – Inland Empire District. 2000. Urban Edge Effects and their relationship with the natural environment. Available at: http://www.parks.ca.gov/pages/21280/files/urbanedge.pdf.

The northern part of the county contains the largest amount of unincorporated county land, includes large sections of the Angeles and Los Padres National Forests, and contains most of the remaining agricultural land in Los Angeles County. The western and coastal parts of unincorporated Los Angeles County include the Santa Monica Mountains Region and its associated coastline that stretches along the Pacific Ocean. This area contains some of the most scenic parts of the county, including the Santa Monica Mountain National Recreation Area. The southern part of the county includes the Los Angeles Basin, where there are very few natural areas and open spaces.

Approximately 200 plant and animal species that live in Los Angeles County habitats are listed on the federal and/or state endangered, threatened, or species of special concern lists. Within the Santa Monica Mountains National Recreation Area alone, 26 plant and animal species are classified as rare, threatened, or endangered, and 58 more have been placed on the list of species of special concern. Aside from developed urban areas, the county has a rich biodiversity, principally within mountain and coastal habitats. There are a number of wildlife corridors in Los Angeles County that connect the Mojave Desert, San Gabriel Mountains, Santa Susana Mountains, Santa Monica Mountains, and Puente Hills with other core wildlife habitat areas.

4.2.2.2 San Bernardino County

San Bernardino County is located in the southeastern portion of the state. The deserts and mountains of this vast county stretch from the outskirts of the densely populated Riverside-San Bernardino Area (Valley Region), to the Nevada border and the Colorado River. The CRCP Plan Area encompasses the Valley and Mountain Regions located in the southwestern portion of San Bernardino County.

The Valley Region of the county is approximately 50 miles long from east to west and encompasses 480 square miles. This region is almost entirely urbanized, with few natural open space areas still existing. The predominant vegetation types within the undeveloped areas of the valley are chaparral, coastal sage scrub, deciduous woodlands, grasslands, and wetlands. The most sensitive vegetation types are wetlands. The largest and most well-known example of riparian woodland in the Valley Region of San Bernardino County is within federal and state protected areas, such as at Prado Basin. The dominant aquatic feature within the Valley Region is the Santa Ana River Watershed. The upstream reaches are located within San Bernardino County. The alluvial sage scrub habitat in the Santa Ana River, Lytle Creek, and Cajon washes has adapted to frequent flooding and therefore supports a unique diversity of plant species. Another sensitive plant community is the Riversidian alluvial fan sage scrub found on the alluvial fans at the base foothills of the San Bernardino Mountains, which has adapted to episodic flood.

CDFW recognizes 14 Areas of Special Biological Importance (ASBIs) within the Mountain Region of the county. However, the most pristine habitat occurs within the San Gorgonio Mountain area. CDFW also recognizes principal wintering area for waterfowl migrating along the Pacific Flyway. Within the Mountain Region, waterfowl have been observed at Baldwin Lake and Big Bear Lake. The lake areas also provide wintering habitat for the bald eagle, and both Lake Arrowhead and Lake Big Bear are therefore recognized by CDFW as ASBI.

The Mountain Region of San Bernardino County includes the headwater, upper reaches of the Santa Ana River watershed. Deep Creek and Bear Creek are CDFW-designated wild trout streams, and contain high quality riparian resources. Also within the Mountain Region, the USFS manages both the Cucamonga Wilderness Area (8,580 acres) and the San Gorgonio Wilderness Area (56,749 acres). The latter is the largest established wilderness area in southern California. Aside from ASBI, CDFW has an established ecological preserve at Baldwin Lake that totals 125 acres, and the Nature

Conservancy has four preserves in the Mountain Region: Baldwin Lake Preserve, Castle Glen Bald Eagle Sanctuary, the Sugarloaf Biota Bank, and the Big Bear Valley Preserve.

4.2.2.3 San Luis Obispo County

San Luis Obispo County is topographically diverse, with mountains, rich agricultural valleys, and distinct urban areas, all within close proximity of the Pacific Ocean. The small size of the County's communities, scattered along the beaches, coastal hills, and mountains of the Santa Lucia range, provides a wide variety of coastal and inland hill ecologies.

The coastal zone of San Luis Obispo County is known throughout the state for its beauty and diversity. The north coast is characterized by the rugged headlands to Big Sur. The rocky shoreline along the Hearst Ranch is highly valued for the offshore views of the sea otter as well as scenic cliffs and rocky points. The beach, sands pit, and extensive wetlands of Morro Bay form a unique setting as well as a laboratory for wetland habitat study. The sheltered coves and beaches of Avila and Pismo Beach State Parks provide a contrast to the marine terrace and offshore rocks of the north county coastline. The county is the third largest producer of wine in California, surpassed only by Sonoma and Napa Counties. Wine grapes are by far the largest agricultural crop in the county.

4.2.2.4 Santa Barbara County

Santa Barbara County has a mountainous interior abutting a coastal plains area. Most of the mountainous area is within the Los Padres National Forest, and includes two wilderness areas: the San Rafael Wilderness and the Dick Smith Wilderness.

North of the mountains is the arid and sparsely populated Cuyama Valley, portions of which are in San Luis Obispo and Ventura Counties. Oil production, ranching, and agriculture dominate the land use in the privately owned parts of the Cuyama Valley; the Los Padres National Forest is adjacent to the south, and regions to the north and northeast are owned by the BLM and the Nature Conservancy.

4.2.2.5 Ventura County

Ventura County is located on California's Pacific coast. The diverse topography and climate of the county provide an environment where a range of vegetation communities (from coastal sage scrub to subalpine forest, and from desert chaparral to riparian woodland) can maintain successful populations. Most native vegetation in the north half of the county has been preserved as a result of the low level of development in this area (outside of Lockwood Valley). The exceptions are the large expanses of native grasslands that were eliminated by cattle ranching operations several decades ago. Development in the Lockwood Valley area has impacted the pinyon-juniper community; however, the higher elevations surrounding the valley contain nearly undisturbed stands of timber-conifer vegetation. A large portion of the native vegetation in the south half of Ventura County has been displaced as a result of urban and agricultural development. For the most part, this development is confined to the fertile valleys and plains, and along the coastline. Consequently, most of the mountainous areas in the south half still support significant native plant communities.

North of Highway 126, the county is mountainous and mostly uninhabited, and contains some of the most pristine and rugged wilderness remaining in Southern California. Most of this land is in the Los Padres National Forest, and includes the Chumash Wilderness in the northernmost portion, adjacent to Kern County, as well as the large Sespe Wilderness and portions of both the Dick Smith

Wilderness and Matilija Wilderness. All of the wilderness areas are within the jurisdiction of Los Padres National Forest. The highest peaks in Ventura County include Mount Pinos (8,831 feet above MSL), Frazier Mountain (8,017 feet), and Reyes Peak (7,525 feet). The uplands are well timbered with coniferous forests, and receive plentiful snow in the winter. Mount Pinos is the highest peak in the vicinity with a view, unimpeded in three directions. The Santa Clara River is the principal waterway. Lake Casitas is an artificial reservoir that is the largest body of water in the County.

The naturally vegetated areas of Ventura County provide shelter, food, and nesting areas to create habitats for a wide variety of animal species. Each plant community has different characteristics, which support different species of wildlife; although an animal species may use various habitats at different times of the year or at various stages in the animal's life cycle. The low-elevation, drier plant communities, such as the grasslands, coastal sage-scrub, and chaparral, support a wildlife population which includes rodents, insectivores, hares, foxes, coyotes, raptors (such as hawks, falcon, owls, and eagles), and numerous perching birds, from hummingbirds to ravens. The upland plant communities, such as the oak woodlands, pinyon-juniper, and timber/conifer, provide habitats for larger animals, and include populations of bobcat and mountain lion, mule deer, and black bear, in addition to a game population. Reptiles are commonly found throughout the county. Several hundred species of vertebrates find permanent and transitory range in the varied habitats and topography of the Los Padres National Forest. Riparian areas support a great intensity and diversity of species.[432]

Ventura County contains several unique habitats that support a variety of plants and animals found nowhere else in the country. The coastal wetlands and lagoons found along the south coast of the county provide shelter, forage, and nesting areas for thousands of birds, fish, mollusks, crabs, seals, and many other marine organisms and plants. The wetland area with the richest diversity is the Mugu Lagoon, which shelters the remnants of many plant, bird, fish, and insect populations that once inhabited the coast from the Ventura River to the Santa Monica Mountains. These areas are considered significant biological resources. The county also has two large areas set aside as sanctuaries for the California condor (Matilija and Sespe Condor Sanctuaries). The Sespe Creek is designated as a "Wild Trout Stream" by the state. Steelhead trout and Pacific lamprey use Sespe Creek and the Santa Clara River for spawning. The creeks also support a significant population of rainbow trout, cousin to the steelhead.

4.2.3 Wildlife

SoCalGas is proposing to include 15 federally listed endangered or threatened and 4 nonlisted wildlife species for take authorization under the ITP.

4.2.3.1 Federally Listed Endangered or Threatened Wildlife Species

DSFF (*Rhaphiomidas terminatus abdominalis*), ESBB (*Euphilotes battoides allyni*), MSS (*Helminthoglypta walkeriana*), SAS (*Catostomus santaanae*), arroyo toad (*Anaxyrus californicus*), CRLF (*Rana draytonii*), CTS (*Ambystoma californiense*), MYLF (*Rana muscosa*), CAGN (*Polioptila californica californica*), LBV (*Vireo bellii pusillus*), SWF (*Empidonax trailii ectimus*), WYBC (*Coccyzus americanus occidentalis*), SBKR (*Dipodomys merriami parvus*), SJKF (*Vulpes macrotis mutica*), and SKK (*Dipodomys stephensi*).

[432] Ventura County Planning Division. 2008.

4.2.3.2 Non-Federally Listed Wildlife Species

SRB (*Charina bottae umbratica*), SWPT (*Actinemys pallida*), BSS (*Passerculus sandwishensis beldingi*), and burrowing owl (*Athene cunicularia*).

4.2.4 Vegetation

Take, as defined by the ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Harm is defined as "any act that kills or injures the species, including significant habitat modification." Section 9 prohibits the "removal or reduction to possession" of any listed plant species "under federal jurisdiction" (i.e., on federal land). Even though take under the ESA does not apply to plants and there is no prohibition of take of plants, the MSHCP covers 22 plant species. These plants are covered in order to meet regulatory obligations under Section 7 of the ESA and to comply with the CESA. Plants are also included as Covered Species to provide no-surprises assurances for these species.

There is no take prohibition for listed plants; however, certain actions are prohibited with regard to plants under the ESA. Under Section 9(a)(2)(B) of the ESA, endangered plants are protected from "removal, reduction to possession, and malicious damage or destruction" in areas that are under federal jurisdiction. Section 9(a)(2)(B) of the ESA also provides protection to plants from removal, cutting, digging up, damage, or destruction where the action takes place in violation of any state law or regulation or in violation of a state criminal trespass law. Similar protections have been extended to federally listed threatened plant species by regulation at 50 CFR 17.71. Thus, the ESA does not prohibit the take of federally listed plants but does prohibit certain actions on private or other nonfederal lands in violation of state law. Therefore, Section 10 incidental take permits are necessary only for take of wildlife species. The Section 7(a)(2) prohibition against jeopardy, however, applies to plants, and USFWS may not issue a Section 10(a)(1)(B) ITP if the issuance of that permit would result in jeopardy to a listed plant species.

SoCalGas is proposing to include 20 federally listed endangered or threatened and two nonlisted plant species for coverage on the ITP in recognition of the conservation benefits provided by the MSHCP.

4.2.4.1 Federally Listed Endangered or Threatened Plant Species

BMV (*Astragalus brauntonii*), California seablite (*Suaeda californica*), CCBT (*Cirsium fontinale* var. *obispoense*), conejo dudleya (*Dudleya abramsii* spp. *parva*), GWC (*Nasturtium gambelii*), Gaviota tarplant (*Deinandra increscens* ssp. *villosa*), IKM (*Eriodictyon altissimum*), LYS (*Eriodictyon capitatum*), Lyon's pentachaeta (*Pentachaeta lyonii*), marcescent dudleya (*Dudleya cymosa* ssp. *marcescens*), Morro manzanita (*Arctostaphylos morroensis*), Nevin's barberry (*Berberis nevinii*), NML (*Lupinus nipomensis*), Pismo clarkia (*Clarkia speciosa* ssp. *immaculata*), SARW (*Eriastrum densifolium* ssp. *sanctorum*), SHS (*Dodecahema leptoceras*), SMMD (*Dudleya cymosa* ssp. *ovatifolia*), Vandenberg monkeyflower (*Diplacus vandenbergensis*), VMMV (*Astragalus pycnostachyus* var. *lanosissimus*), and Verity's dudleya (*Dudleya verityi*).

4.2.4.2 Non-Federally Listed Plant Species

SBB (*Cordylanthus rigidus* ssp. *littoralis*), SFVS (*Chorizanthe parryi* var. *fernandina*).

Chapter 5.0
POTENTIAL BIOLOGICAL IMPACTS AND TAKE ASSESSMENT

This chapter describes the potential direct and indirect impacts to the Covered Species and their predicted suitable habitat and, where applicable, to their designated critical habitat, that could occur as a result of the implementation of SoCalGas' Covered Activities. The take assessment considers the potential for direct and indirect effects. The acreage of effects presented in this chapter represent total effects allowable under the Plan. Throughout the 30-year permit term of the CRCP MSHCP, implementation of SoCalGas' Covered Activities (please see Chapter 2) would occur on an as-needed basis at locations along the SoCalGas pipeline network and associated facilities within the CRCP Plan Area, with the potential for temporary and permanent impacts:

- Facilities
  - Temporary Impacts
  - Permanent Impacts
- Non-Facilities
  - Temporary Impacts
  - Permanent Impacts

In no instance will the take allowed pursuant to this MSHCP adversely affect the ability of any of the covered species to survive or recover in the wild.

Future Impact Determination

The majority of Covered Activities would be expected to occur in conjunction with existing SoCalGas facilities: pipelines, stations, storage fields, and telecommunications facilities. The CRCP MSHCP also considers the potential for Covered Activities to be undertaken at other locations, non-facilities, that do not currently have SoCalGas facilities. Projects in non-facilities areas are capped at not to exceed one acre per year. Examples of such projects include poles for the advanced metering communication system and emergency telecommunication facilities. Therefore, in order to complete an effects analysis in support of the permit, SoCalGas developed a robust approach to estimating future impacts (please see Appendix D, *Effects Analysis Methods*). The prediction of anticipated impacts relies on projections based on an analysis of empirical data for past activities documented during the period 2003–2009[433] and 2013–2015[434] from the SoCalGas GEARS database, for all projects involving biological resources in the CRCP Plan Area. In addition, available data for projects where SoCalGas engaged in informal or formal consultations with the Ventura Field Office of the USFWS between 1995 and 2017 was reviewed and considered.[435] In order to determine potential impacts, documentation of the construction of roads in the San Joaquin Valley Plan Area in support of the Pipeline Safety and Enhancement Plan (PSEP) was incorporated as a means of estimating

[433] SoCalGas. March 2016. Preliminary CRCP HCP 2013 draft. Data provided to Sapphos Environmental, Inc.

[434] SoCalGas. August 10, 2017. 2013-2015 Project List. Data provided to Sapphos Environmental, Inc.

[435] U.S. Fish and Wildlife Service. 31 July 2017. USFWS Completed SoCalGas Projects, VFWO and CFWO. Data provided to Sapphos Environmental, Inc.

comparable activity in the CRCP Plan Area.[436] Additional coordination was undertaken with input from SoCalGas O&M personnel and the PSEP program manager to quantify the expected magnitude of impacts, including the proportion of temporary versus permanent, with a probabilistic analysis to determine the likely effects on each Covered Species.

Where the analysis anticipated no impact or very low impacts to species due to their limited distribution in the CRCP Plan Area, or distance from existing infrastructure, a standard project footprint of 100 feet by 50 feet (0.115 acre) was applied to establish a minimum anticipated impact area (referred to as the impact override).

Definitions

The terms below are defined for the purposes of this Plan.

Effects are actions that affect biological resources, specifically undeveloped land cover types and Covered Species, in the CRCP Plan Area. Effects can be direct or indirect; they can also be cumulative.

Direct effects are defined as activities or projects that remove or alter land cover types or Covered Species habitat, populations, or occurrences (or portions thereof). Direct effects (e.g., ground disturbance, inundation) are caused by Covered Activities and occur at the time and place that the O&M activity is undertaken. Direct effects can be either permanent or temporary.

Permanent effects are direct effects that permanently remove or alter a land cover type or affect a land cover type for more than one year (e.g., road widening into a grassland habitat).

Temporary effects are direct effects (e.g., construction staging areas, temporary access roads) that alter land cover for less than one year and allow the disturbed area to recover to pre-project or ecologically improved conditions within one year of completing construction.

Indirect effects are caused by or a result of a project action. Indirect effects can occur later in time and possibly at some distance, or they may occur at the time of the proposed action but beyond the footprint of a project or activity (i.e., the effects are beyond the area of land cover disturbance but still reasonably foreseeable). Although more difficult to detect and track, indirect effects can undermine species viability or habitat quality, especially if multiple indirect or direct effects work cumulatively to impair the species or degrade the habitat.

Cumulative impacts result from the proposed action's incremental impact when viewed together with past, present, and reasonably foreseeable future actions. Cumulative impacts are defined under both the ESA and NEPA. HCPs do not require a discussion of cumulative effects, as analyzed under NEPA. However, as stated in the HCP handbook, "the applicant should help ensure that those considerations required of the Services by Section 7 have been addressed in the HCP."[437] Accordingly, the Plan includes an analysis of cumulative effects, as defined under ESA regulations, of non-federal activities that are reasonably certain to occur.

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[436] Rodgers, Derek, Southern California Gas Company, Los Angeles, CA. E-mail to Marie Campbell, Sapphos Environmental, Inc., Pasadena, CA. Subject: CRCP Permanent Impacts.

[437] U.S. Fish and Wildlife Service. n.d. Habitat Conservation Plan Handbook. Available at: https://www.fws.gov/midwest/endangered/permits/hcp/hcphandbook.html. Accessed September 2017.

5.1 Impacts

This section describes the scope of anticipated impacts in acres to biological resources (e.g., vegetation communities, wildlife, and plant species) resulting from the implementation of the Covered Activities. It includes information on direct impacts and indirect impacts (e.g., change in water quality, increased traffic, fragmentation of habitat) (Table 5.1-1, *Summary of Direct Effects*). Although there is substantial overlap in the suitable habitat for the 41 Covered Species, the impact analysis evaluated the potential for permanent and temporary impacts for each species independently.

TABLE 5.1-1
SUMMARY OF DIRECT EFFECTS

	Permanent (acres)	Temporary (acres)
Invertebrates (3)		
Facilities	0.364	1.312
Non-Facilities	0.547	2.836
Fish (1)		
Facilities	0.115	0.115
Non-Facilities	0.115	0.511
Amphibians (4)		
Facilities	47.394	112.412
Non-Facilities	51.572	98.272
Reptiles (2)		
Facilities	3.635	27.530
Non-Facilities	4.168	31.568
Birds (6)		
Facilities	37.642	283.742
Non-Facilities	15.389	115.045
Mammals (3)		
Facilities	1.920	14.532
Non-Facilities	2.000	14.810
Plants (22)		
Facilities	8.766	57.839
Non-Facilities	6.735	46.261
Total (41)	**180.363**	**806.785**

NOTE: Overlap between species ranges exists. Compensatory mitigation for CRLF is determined by season (wet and dry) and habitat type (dispersal and breeding). Refer to Chapter 6.2.9.

5.1.1 Direct Effects

The Covered Activities are expected to result in permanent direct effects on biological resources such as conversion of occupied and potentially suitable habitat for Covered Species, mortality of individual animals, grading and removal of vegetation, and armoring of unarmored surfaces. The work areas for Covered Activities are relatively small, typically addressing 100 feet and up to one mile of pipeline. O&M activities would normally be concentrated on the gas transmission pipeline. Pipelines range from 8 to 36 inches in diameter. Covered Activities at stations and storage fields would be undertaken within the limits of the facility. Since Covered Activities are largely connected with existing SoCalGas facilities, there are relatively low levels of permanent impacts. Most permanent impacts would be expected to occur when new paved or dirt roads are required to

achieve access to locations of the Covered Activities. The evaluation is based on up to 0.25 mile of 20-foot-wide new road construction per year.

The potential for other direct effects was evaluated based on a review of the Covered Activities, SOPs, AMMs, estimated effects to biological resources, and compensatory mitigation measures specified in Section 6 of the CRCP MSHCP. No substantial direct effects were found as a result of the research, modeling, and evaluation undertaken, due to the SOPs employed by SoCalGas to avoid and minimize impacts, and the requirement for AMMs and compensatory mitigation specified in Chapter 6.

Temporary direct effects on land cover are also expected as a result of temporary staging areas and other temporary uses of non-developed land, such as installation of BMPs. The analysis considers the potential for temporary impacts within an allowable work area of up to 25 feet of centerline of the pipeline and within 50 feet of the boundary of stations. Covered activities at the telecommunication sites are assumed to occur within a 100-foot radius of the structure. Covered Activities, including temporary staging at storage fields, would be completed within the limits of the area operated as a storage field. Due to limited duration and area of the Covered Activities, ranging from 0.115 acre to 6 acres per activity, most temporary impacts can be fully resolved *in situ*.

5.1.2 Indirect Effects

Indirect effects on biological resources typically include the consideration of alteration of natural drainages, degradation of downstream water quality, habitat invasion by non-native exotic pest plants, and noise. Due to the relatively short duration and size of the area for Covered Activities, it is anticipated that the indirect effects would largely be coterminous with the area of temporary impacts. However, where new roads are constructed, effects on wildlife can extend outward for up to 300 feet for regularly travelled service roads and highways.[438] The limited distance of 0.25 mile per year (road density <0.001 per square mile) is substantially below the road density of 0.125 mile per square mile where researchers have observed the lower limits of habitat fragmentation in conjunction with roads.[439] Application of erosion control and soil stabilization measures is a SoCalGas SOP. The evaluation of impacts considered other comparable projects completed by SoCalGas in the last five years: a pipeline replacement project and erosion control project in Matilija Springs in the vicinity of Ojai; L8105 MP 13.47 Deep Well Anode Project in Cuyama, San Luis Obispo County; and the L103 Right-of-Way Maintenance Project on Coles Levee Ecological Reserve in the southern San Joaquin Valley.

In North America, road densities below 1.0 mile have been shown to support continually sustained populations of large-bodied mammals, and large areas with an overall low road density are indicative of suitable habitat and importance for other ecological aspects (please see Erosion Control and Soil Stabilization measures for required erosion control measures in Chapter 6).[440] This evaluation includes an additional 20-foot buffer around up to 0.25 mile of new road construction per year to account for indirect impacts, such as noise and vibrations that may be caused during the construction.

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[438] Jochimsen, D.M., C.R. Peterson, K.M Andrews, and J.W. Gibbons. 2004. *A Literature Review of the Effects of Roads on Amphibians and Reptiles and the Measures Used to Limit the Effects*. Idaho Fish and Game Department, USDA Forest Service. Available at: http://fishandgame.idaho.gov/public/wildlife/collisionAmphibRep.pdf.

[439] Sellers, A. 2001. Ecological Effects of Roads: A Review. Uppsala Grimsö Wildlife Research Station, Dept. of Conservation Biology, University of Agricultural Sciences, S-730 91, Riddarhyttan, Sweden.

[440] Forman, R.T., and L.E. Alexander. 1998. Roads and Their Major Ecological Effects. *Annual Review of Ecology and Systematics* 29: 207.

With greater access, fires may increase in frequency yet decrease in their impact due to the more efficient firefighting access and road barrier ffect.[441] SoCalGas BMPs would be used to limit indirect effects to within the temporary impact area; thus, there would be no increase in adverse effects beyond the limits of the temporary impact area for natural drainages, degradation of water quality, habitat invasion by non-native exotic plants, or noise.

5.1.3 Cumulative and Growth-Inducing Effects

Covered Activities are required to be fully mitigated so there is no net loss of habitat functions or values within the Plan Area; therefore, there is no net contribution to cumulative impacts expected to result from the maintenance of the existing gas transmission and distribution system that maintains safe and reliable service within the SoCalGas service area. Specific analysis of each of the 41 Covered Species is provided in Section 5.3, below.

5.1.4 Invertebrates

There are three invertebrate Covered Species within the CRCP Plan Area: DSFF, ESBB, and MSS.

Direct Impacts

Direct impacts to covered invertebrate species could result from Covered Activities within and near occupied habitat. Activities within or directly proximate to occupied habitat would have the potential to directly affect all life stages of covered invertebrates. Impacts on covered invertebrates could result from vehicle strikes or changes in water quality due to pollutant releases. Equipment leaks, discharges of hydrostatic test water, and stormwater runoff from spoil piles could potentially represent pollutant sources. Pollution of watercourse could affect covered invertebrates at all life stages. Additionally, individuals could be crushed or buried during ground-disturbing activities (e.g., grading and excavations) or adversely affected as a result of vegetation management activities. Direct impacts could also occur as a result of herbicide drift, nighttime lighting, activity-related fires, vehicular strikes, recontouring of earth, covering an area with substrate, or locating staging/stockpile areas or access routes within areas occupied by the covered invertebrate species.

Indirect Impacts

Indirect impacts could occur as a result of introduction of invasive weeds that outcompete an invertebrate's host plant. Specifically, removal or alteration of the host plants required by each species could impact breeding success, which would in turn reduce reproductive rates and population sizes.

5.1.5 Fish

There is one fish Covered Species within the CRCP Plan Area: SAS.

[441] Forman, R.T.T., D.S. Friedman, D. Fitzhenry, J.D. Martin, A.S. Chen, and L.E. Alexander. 1997. Ecological Effects of Roads: Toward Three Summary Indices and an Overview for North America.

Direct Impacts

Direct impacts to SAS could result from Covered Activities within and near occupied habitat. Activities within or directly proximate to occupied habitat would have the potential to directly affect all life stages of SAS. Impacts on SAS could result from changes in water quality due to pollutant release or increased turbidity and hydrologic and sediment changes caused by temporary impoundments or diversion. Excessive flow velocities can also displace egg masses. Equipment leaks, discharges of hydrostatic test water, and storm water runoff from spoils piles are potential pollutant sources. In streams, water quality–related effects would be most severe at the point of pollutant entry, but would also affect downstream areas as pollutants dissipate. In ponds, potential pollutant effects could be more severe due to the lack of natural forces (stream flow) acting to disperse and dilute pollutants. Additional impacts could also occur as a result of ground-disturbing activities (e.g., grading and excavations) or vegetation management activities taking place within riparian or aquatic habitat, in-stream fills or diversions, herbicide drift, sedimentation, and activity-related fires. Potential effects to SAS behavior may include impairment of spawning site-building and disruption to feeding activities by adults and juveniles.

In the event that temporary dewatering of streams or ponds is necessary, all life stages of SAS could potentially be affected. Effects could include desiccation of egg masses, stranding of aquatic life stages of covered fishes in the dewatered area, and physical impacts to individuals resulting from pumping operations.

Indirect Impacts

Indirect impacts, such as the introduction of invasive species, including weeds that outcompete native aquatic vegetation, direct removal/modification of aquatic and riparian plants, or temporarily suspended or added sediment, to SAS could occur and could negatively influence the development of fry and in-stream migration of juveniles and adults.

5.1.6 Amphibians

There are four amphibian Covered Species within the CRCP Plan Area: arroyo toad, CRLF, CTS, and MYLF.

Direct Impacts

Direct impacts to covered amphibian species could result from Covered Activities within and near aquatic breeding habitats.[442] Generally, activities within or directly proximate to breeding habitat would have the potential to directly affect all life stages of covered amphibians, while activities occurring in adjacent uplands would have direct effects on adults and juveniles (not eggs, tadpoles, or metamorphs). Impacts on covered amphibians in aquatic habitats could result from vehicle strikes, changes in water quality due to pollutant releases or increased turbidity, and hydrologic changes caused by temporary impoundments or diversion (excessive flow velocities can displace egg masses and tadpoles). Equipment leaks, discharges of hydrostatic test water, and storm water runoff from spoils piles could potentially represent pollutant sources. In streams, water quality–related effects would be most severe at the point of pollutant entry but would also affect downstream areas as

[442] Impacts for California Red-Legged Frog are summed up differently than the effects analysis for the other covered species due to the separated upland and breeding habitat locations. Please see Table 6.2.3.2-1 for more details.

pollutants dissipate. In ponds, potential pollutant effects could be more severe due to the lack of natural forces (stream flow) acting to disperse and dilute pollutants. Nocturnal amphibians could be crushed or entombed in burrows, as proposed activities would be conducted primarily during daytime hours when individuals are not visible aboveground. In-stream habitat characteristics could also be altered, potentially resulting in loss of access to sheltering sites. Presence of humans and construction equipment, noise, and vibration could temporarily disrupt normal behavior patterns and/or movement.

In the event that temporary dewatering of streams or ponds is necessary, all life stages of covered amphibians could potentially be affected. Effects could include desiccation of egg masses, stranding of aquatic life stages of covered amphibians in the dewatered area, and physical impacts to individuals resulting from pumping operations.

Proposed activities occurring in upland habitats adjacent to aquatic breeding habitat would have the potential to affect adult and juvenile amphibians. Impacts could include vehicle strikes, crushing of individuals in subterranean burrows, and loss of access to sheltering sites. Grading of large areas, such as staging areas, could expose amphibians to predation when traversing these areas. Construction-related noise, vibration, and human presence could also affect covered amphibians by altering behavior patterns. Unintentional discharge of chemicals may be toxic for amphibian species due to their permeable skin.

During implementation of proposed conservation measures (see Chapter 6), covered amphibian species could be affected by capture/relocation or exclusion from certain areas. Where capture/relocation is employed, individuals could be injured during handling or suffer stress during their time in captivity. Once released, these animals could be subjected to adverse ecological stresses such as competition with other animals at the relocation site. Where exclusion devices (e.g., silt fence) are employed, individuals may become disoriented and exposed to predation when they encounter the barrier and are unable to continue forward.

Indirect Impacts

Indirect impacts to covered amphibian species could occur as a result of the introduction of invasive plant and/or animal species and spread of infectious diseases. Equipment being moved from one water body to another, or entering project areas without cleaning or decontamination, could act as a vector for these elements. Colonization of non-native species alters the composition of the land and its resources, crowding out native species. This alteration may result in inadequate suitable habitat and prey.[443] Impacts regarding noise include loss of hearing, stress, changes in behavior, interference with communication, and impacts on prey species.[444] Over time, these indirect impacts have the potential to negatively impact amphibian populations and potentially reduce reproduction and regeneration.

[443] Trombulak, S., and C. Frissel. February 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14 (1): 18-30.

[444] Trombulak, S., and C. Frissel. February 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14 (1): 18-30.

5.1.7 Reptiles

There are two reptile Covered Species in the CRCP Plan Area: SRB and SWPT.

Direct Impacts

Direct impacts to covered reptile species could result from Covered Activities within occupied habitat. Impacts could include vehicle strikes and crushing of individuals in subterranean burrows. Terrestrial covered reptiles are fairly mobile, and it is likely that adults would avoid areas with high levels of activity, noise/vibration, and human presence during construction. Grading of large areas, such as staging areas, could expose covered reptiles to predation when traversing these areas.

For aquatic or semi-aquatic reptiles, impacts could also result from changes in water quality due to pollutant release or increased turbidity. Equipment leaks, discharges of hydrostatic test water, and storm water runoff from spoils piles could potentially represent pollutant sources. Individuals using underground shelters could be crushed by construction equipment, and underground nests could be destroyed. Presence of humans and construction equipment, noise, and vibration could temporary disrupt normal behavior patterns.

Indirect Impacts

Indirect impacts to covered reptile species could occur as a result of the introduction of invasive weeds. Over time, non-native plants can change the habitat composition of affected areas, which could lead to decreases in long-term habitat suitability for the covered reptile species.

5.1.8 Birds

There are six bird Covered Species in the CRCP Plan Area: BSS, burrowing owl, CAGN, LBV, SWF, and WYBC.

Direct Impacts

Direct impacts to covered bird species could result from Covered Activities within or near occupied habitat. Direct impacts to covered bird species could occur as a result of vegetation management activities and various ground-disturbing activities (e.g., grading and excavations) performed within or adjacent to occupied nesting habitat. Impacts could include vehicle strikes, crushing of individuals, and destruction of eggs and nests during shrub/tree removal. Direct impacts could also occur as a result of nighttime lighting, activity-related fires, or locating staging/stockpile areas and access routes within or adjacent to areas occupied by covered bird species. Presence of humans and construction equipment, noise, and vibration could temporarily disrupt communication, nesting (incubation and feeding), and other types of community dynamics and behavior patterns. Disruptions during nesting season may lead to changes in nesting behavior and/or nest abandonment and an overall reduction in species fecundity. Covered bird species that are residents of the CRCP Plan Area year-round are more likely to experience direct impacts as impacts could occur when individuals are present within affected habitat outside of the breeding period.

Indirect Impact

Indirect impacts to covered birds could occur as a result of the introduction of invasive weeds that out-compete native vegetation, thus altering suitable habitat and composition of the prey and forage base. Presence of humans may introduce additional mesopredator species for covered birds and their nests, such as corvids and coyotes. These nest predators may be attracted to construction sites due to the presence of new sources of food (food scraps and trash) and perches, and may prey on eggs and/or nestlings of covered species.

5.1.9 Mammals

There are three mammal Covered Species within the CRCP Plan Area: SBKR, SJKF, and SKR.

Direct Impacts

Direct impacts to covered mammal species could result from Covered Activities within or near occupied habitat. Impacts could include vehicle strikes and crushing and entrapment of individuals in subterranean burrows and dens. Covered mammal species use burrows or dens at all stages of their lifecycles. Additionally, covered mammals are nocturnal species and could be crushed or entombed in dens and burrows during daylight activities. Ground-disturbing activities (e.g., grading and excavations), vegetation management activities, in-stream fills or diversions, hydrostatic test discharges, herbicide drift, accidental spills or leaks, polluted runoff from an activity site, or spoil material washing into a stream could also impact covered mammal species. Kangaroo rat species footdrum to communicate courtship, ownership of territory, and defense against predators; thus, vibrations directly impact normal behavior patterns of these Covered Species.[445]

Indirect Impacts

Indirect impacts to covered mammals could occur as a result of the introduction of invasive weeds that could out-compete native vegetation and decrease foraging habitat required by each species. Colonization by non-native species alters the composition of the land, which may result in inadequate suitable habitat or an overall decrease in species mobility due to increased ground cover of non-native species. Habitat fragmentation as a result of Covered Activities could potentially reduce population size for Covered Species. Species that may be flushed out of burrows due to ground-disturbing activities are more susceptible to predation. Flushing paired with the additional predators introduced by human activities may result in a more rapid loss of individuals.

5.1.10 Plants

There are 22 plant Covered Species within the CRCP Plan Area: BMV, California seablite, CCBT, conejo dudleya, GWC, Gaviota tarplant, IKM, LYS, Lyon's pentachaeta, marcescent dudleya, Morro manzanita, Nevin's barberry, NML, Pismo clarkia, SFVS, SARW, SMMD, SBB, SHS, VMF, VMMV, and Verity's dudleya.

[445] Randall. August 2013. Vibrational Communication: Spiders to Kangaroo Rats. Biocommunication of Animals: 103-133.

Direct Impacts

Direct impacts to covered plant species could occur as a result of ground-disturbing activities, vegetation management activities, accidental spills or leaks, herbicide drift, and activity-related fires. Direct impacts also could occur by locating staging/stockpile areas and access routes within areas that may be occupied by the species. In addition, those species that occur within aquatic habitats could be susceptible to in-stream fills, polluted runoff from an activity site, or spoil material washing into a stream.

Indirect Impacts

Indirect impacts to covered plant species could occur as a result of the introduction of invasive weeds and soil loss due to erosion. These indirect impacts have the potential to damage individuals, reduce plant reproduction and regeneration, decrease habitat quality, and alter plant population dynamics.

5.2 Determination of Take of Covered Species

The exact location of impacts to Covered Species cannot be known at the time of the SoCalGas application for an ITP, as annual O&M activities are prioritized based on the results of biannual line inspections, and in response to unanticipated issues such as detected leaks or compromised pipeline reliability as a result of natural disasters (such as fires or floods) or anthropogenic factors (such as vandalism or changes in technology). In any given year, O&M activities may affect a relatively minor proportion of the total facilities within the CRCP Plan Area. Therefore, potential impacts to Covered Species over the 30-year term of the permit were modeled based on documented impacts (from the SoCalGas' GEARS database) to Covered Species within the CRCP Plan Area, empirical data from BOs issued by the USFWS in the CRCP Plan Area, empirical data for the PSEP undertaken in San Joaquin Valley, the minimum required facilities area, the potential need to build access roads to facilitate access to facilities located in remote areas, and other small projects that might be required in the CRCP Plan Area (Appendix D, *Effects Analysis Methods*).

5.2.1 Specialized Modeling/Guidelines

Evaluation of the CRLF required a specific approach to create a more precise habitat model. This species is broadly distributed within the CRCP Plan Area, and the model considered locations of suitable aquatic breeding habitat, as well as upland dispersal habitat, for this species. The habitat model was guided by information provided by the USFWS from a forthcoming Conservation Strategy for the CRLF, which was not publicly released at the time the habitat modeling was conducted.[446] The following steps were undertaken to develop a habitat model consistent with the USFWS input:

(1) The USGS National Hydrography Dataset (NHD) was queried to determine the locations of potential aquatic habitat within the CRCP Plan Area.

(2) CNDDB records for the CRLF were overlaid onto the NHD information to identify drainages where CRLF have been documented in the past.

[446] Yang, Dou, U.S. Fish and Wildlife Service. 25 October 2017. Personal communication to SoCalGas, Sapphos Environmental, Inc., and Rincon Consultants.

(3) Specific flowlines from the NHD were removed from the dataset based on comparison with CNDDB occurrences and review of aerial photos, which suggested that hydrology in many mapped flowlines was ephemeral or otherwise insubstantial, and would not be sufficient to support breeding CRLF.

(4) The removed flowlines were evaluated by USFWS, who requested that certain streams remain in the dataset based on non-public information regarding CRLF occurrences in those streams.

(5) Buffers of 328 feet and 9,186 feet were applied to the remaining NHD flowlines to represent CRLF aquatic and dispersal habitat, respectively, in and around these streams in accordance with the USFWS' forthcoming Conservation Strategy. The designations are mutually exclusive; areas within 328 feet (aquatic habitat) were not also counted as dispersal habitat.

Southern California steelhead trout is subject to the jurisdiction of the NOAA NMFS; and take authorization is being accessed through a separate entity: a programmatic agreement with the USACE.

5.2.2 Evaluated Habitat Areas

Habitat considered and evaluated for each Covered Species comprised open space areas including agricultural lands, grazing lands, natural lands, and water. Urban areas, defined as roads and developed areas (Appendix D), were omitted from the analysis as these areas do not contain habitat for the Covered Species. Impacts were analyzed separately for facilities areas and non-facilities area. The "facilities area" refers to the range where SoCalGas O&M activities will potentially occur. The "non-facilities area" refers to areas outside of the facilities area but inside the CRCP Plan Area boundaries. SoCalGas estimates 95 percent of the work will occur within the facilities area, with the remaining 5 percent occurring outside.

Within the facilities area, approximately 4,101.5 acres were defined as open space, which includes agriculture, grazing land, and ecological habitat features. Suitable habitat was evaluated within the facilities area for each of the Covered Species. Impacts to habitat were based on an estimated 621 acres of temporary disturbances and 18 acres of permanent disturbance predicted to occur within the facilities area over the life of the permit. An impact area override was applied in areas where less than 0.115 acre of combined permanent and temporary impacts were predicted to occur (Appendix D).

Within the non-facilities area, approximately 5,372,004.7 acres were defined as open space. Suitable habitat was then evaluated within the non-facilities area for each of the Covered Species. The minimum impact area override of 0.115 acre was applied to temporary impacts within the Non-Facilities Area for all Covered Species as a conservative base value. Impacts to habitat were based on an estimated 30 acres of permanent disturbance predicted to occur within the facilities area for the life of the permit. An impact area override was applied in areas where less than 0.115 acres of permanent impacts were predicted to occur.

5.3 Impacts to Covered Species

Impacts to 21 of the Covered Species have a low probability to occur due to their limited distribution in the CRCP Plan Area. Accordingly, the suitability species distribution model predicted less than 0.115 acre of permanent disturbance impacts to the following Covered Species: DSFF, MSS, SAS, BSS, WYBC, SBKR, SKR, California seablite, CCBT, conejo dudleya, GWC, IKM, marcescent dudleya, Morro manzanita, Nevin's barberry, NML, SFVS, SARW, SMMD, SHS, and Verity's dudleya. Therefore, the minimum impact area of 0.115 acre of permanent disturbance impacts was assumed for the purpose of the ITP application (Appendix D).

Impacts to the remaining 20 Covered Species have a moderate to high probability to occur over the 30-year term of the requested permit. A detailed evaluation of potential direct and indirect impacts was undertaken using the species distribution suitability model and the formula outlined in the CRCP effects analysis (Appendix D).

Please refer to Table D-17 of Appendix D in order to review the below discussion in tabular form.

5.3.1 Invertebrates

DSFF

This species is only known to occur in Riverside and San Bernardino counties, specifically within the Colton Dune system. As of 2005, USFWS estimates that approximately 2,826 acres of potential DSFF habitat remain, [447] with approximately 900 acres known to be occupied across 12 sites within three recovery units.[448]

Facilities Area: Approximately 6.704 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 1.015 acre. Covered Activities are predicted to permanently impact 0.134 acre.

Non-facilities Area: Approximately 2,503.139 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 0.289 acre. Covered Activities are predicted to permanently impact 0.038 acre; therefore, the impact override minimum of 0.115 acre applies. As a result of this species' refined habitat area, the predicted temporary and permanent impacts to DSFF habitat within the facilities and non-facilities areas (1.553 acres) could be considered a significant impact to this species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will provide for the conservation and management of DSFF and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

ESBB

The current range of ESBB extends from Santa Barbara County to southern Los Angeles County, at eight sites within three distinct locations: two sites at the Los Angeles International Airport dunes

[447] U.S. Fish and Wildlife Service. 2008. Delhi Sands Flower Loving Fly (Rhaphiomidas terminatus abdominalis) 5-Year Review - Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc1898.pdf. Accessed 27 July 2017.

[448] U.S. Fish and Wildlife Service. 1997. Delhi Sands Flower-Loving Fly (Rhaphiomidas terminatus abdominalis) Recovery Plan.

location, two sites at the Chevron Preserve, and four sites near or north of Malaga Cove. These areas consist of approximately 220 acres of occupied habitat.

Facilities Area: No suitable habitat is predicted within the facilities area. Covered Activities are not predicted to result in temporary impacts; therefore, the impact override minimum of 0.115 acre applies. Covered Activities are not predicted to result in permanent impacts; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 20,790.464 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 2.403 acres. Covered Activities are predicted to permanently impact 0.317 acre.

The predicted temporary and permanent impacts within the facilities and non-facilities areas is 2.950 acres of potential impacts to ESBB habitat. The SoCalGas Conservation Program (Chapter 6) includes AMMs that will provide for the conservation and management of ESBB and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable. With recent population trends increasing due to successful habitat restoration the predicted temporary and permanent impacts to ESBB habitat within the facilities and non-facilities areas is likely to be a less than significant impact to the species.

MSS

This species is found only in western San Luis Obispo County. The distribution range of MSS is entirely within the CRCP Plan Area; therefore, SoCalGas O&M activities have the potential to encounter this species where facilities overlap habitat.

Facilities Area: Approximately 1.203 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 0.182 acre. Covered Activities are predicted to permanently impact 0.024 acre; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 1,238.952 acres of suitable habitat are predicted outside the facilities area. Covered activities are predicted to temporarily impact 0.143 acre. Covered Activities are predicted to permanently impact 0.019 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts within the facilities and non-facilities areas, with the impact override minimum, is 0.555 acre. This is likely to be a less than significant impact to the species. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will provide for the conservation and management of MSS and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

5.3.2 Fish

SAS

The species range of the SAS includes the Los Angeles River, San Gabriel River, Santa Clara River, and Santa Ana River basins.[449] Due to the SAS distributions within the CRCP Plan Area, SoCalGas O&M activities have the potential to encounter this species where facilities overlap occupied habitat.

Facilities Area: No suitable habitat is predicted within the facilities area. Covered Activities are not predicted to result in temporary impacts. Therefore, the impact override minimum of 0.115 acre applies. Covered Activities are not predicted to result in permanent impacts. Therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 4,419.845 acres of suitable habitat are predicted outside the facilities area. Covered activities are predicted to temporarily impact 0.511 acre. Covered Activities are predicted to permanently impact 0.067 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts within the facilities and non-facilities areas is 0.856 acre, which could be considered a less than significant impact to this species. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of SAS and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

5.3.3 Amphibians

Arroyo Toad

Based on a recent report on the species,[450] extant arroyo toad populations occur at several locations within the CRCP Plan Area. These areas include the upper reaches of the Sisquoc River and Santa Ynez River watersheds in Santa Barbara County; the Sespe Creek and Piru Creek watersheds in Ventura County; and the upper reaches of the Santa Clara River, Los Angeles River, and Santa Ana River watersheds in Los Angeles County. However, these populations are generally in headwater areas that are remote from development, and SoCalGas facilities are not situated near most of these areas.

Facilities area: Approximately 25.624 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 3.880 acres. Covered Activities are predicted to permanently impact 0.512 acre.

Non-facilities area: Approximately 48,563.727 acres of suitable habitat are predicted outside the facilities area. Covered activities are predicted to temporarily impact 5.614 acre. Covered Activities are predicted to permanently impact 0.741 acre.

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[449] U.S. Fish and Wildlife Service. 2017. Recovery Plan for the Santa Ana Sucker.

[450] U.S. Fish and Wildlife Service. 2014. Arroyo Toad (Anaxyrus californicus) Species Report. Available at: https://www.fws.gov/ventura/docs/species/at/Arroyo%20Toad%20Final%20Species%20Report.pdf.

The predicted temporary and permanent impacts within the facilities and non-facilities areas is 10.747 acres. This species has very specific habitat requirements, and the amount of predicted impacts could be considered a significant impact to this species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of arroyo toad and will ensure that the impacts from Covered Activities are reduced to a level of less than significant.

CRLF[451]

Within the CRCP Plan Area, most remaining populations of CRLF occur in small streams along the coastline. Recovery efforts are under way, and CRLF have been reintroduced into several coastal streams within the CRCP Plan Area, particularly in the Santa Monica Mountains within western Los Angeles County. Therefore, SoCalGas O&M activities have the potential to encounter this species where facilities overlap occupied habitat.

Facilities Area: Approximately 534.4 acres of suitable *aquatic/upland (breeding)* habitat and 2,775.1 acres of suitable *dispersal* habitat, as defined in the forthcoming USFWS Conservation Strategy, are predicted within the facilities area. Covered Activities are predicted to temporarily impact 40.459 acres and permanently impact 5.342 acres of suitable habitat of *aquatic/upland (breeding)* habitat during the wet season and same acreage during the dry season, resulting in a total of 80.917 acres of temporary impacts and 10.685 acres of permanent impacts to aquatic/upland habitat over the life of the permit. Covered Activities are predicted to temporarily impact 210.088 acres and permanently impact 16.239 acres of suitable habitat of *dispersal* habitat during the wet season and the same acreage during the dry season, resulting in 420.176 acres of temporary impacts and 32.477 acres of permanent impacts to dispersal habitat.

Non-facilities Area: Approximately 625,320.0 acres of suitable *aquatic/upland (breeding)* habitat and 4,319,529.0 acres of suitable *dispersal* habitat are predicted outside the facilities area. Covered activities are predicted to temporarily impact 36.143 acres and permanently impact 4.773 acres of suitable habitat of *aquatic (breeding)* habitat during the wet season and same acreage the dry season, resulting in 72.287 acres of temporary impacts and 9.545acres of permanent impacts to aquatic/upland habitat over the life of the permit. Covered activities are predicted to temporarily impact 249.667 acres and permanently impact 19.298 acres of suitable habitat of *dispersal* habitat during both the wet season and the dry season, resulting in 499.335 acres of temporary impacts and 38.596 acres of permanent impacts to dispersal habitat.

Dispersal sites typically provide forage and cover opportunities and include boulders or rocks; organic debris such as downed trees or logs; industrial debris; and agricultural features such as drains, watering troughs, spring boxes, and abandoned sheds.[452] The predicted temporary and permanent impacts to dispersal habitat within the facilities and non-facilities areas is 990.584 acres which could be potentially considered a significant impact to this species.

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[451] Due to the nature of the species, the dry season (May- October) and wet season (November- April) have been taken into account to estimate impacts for CRLF aquatic (breeding) and dispersal habitat. Although a historic impact override was determined based on past SoCalGas projects, it was not applied, due to the comprehensive impact analyses applied and guided by USFWS expert opinion.

[452] U.S. Fish and Wildlife Service. 2000. Biological Opinion on the Effects of Ongoing Forest Activities That May Affect Listed Riparian Species on the Cleveland National Forest, the Los Padres National Forest, the San Bernardino National Forest, and Angeles National Forest in Southern California (1-6-99-F-21).

Habitat for this species includes streams, creeks, ponds, marshes, sag ponds, stock ponds, deep pools and backwaters within streams and creeks, dune ponds, lagoons, and estuaries. Breeding adults are often associated with habitat characterized by shrubby riparian vegetation and with deep (>27 inches) still or slow-moving water.[453] During periods of wet weather, starting with the first rains of fall, some individuals make overland excursions through upland habitats from dispersal sites. The predicted temporary and permanent impacts to aquatic or upland habitat (breeding) within the facilities and non-facilities areas is 173.433 acres which could be potentially considered a significant impact to this species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of CRLF and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

CTS

The USFWS recognizes three distinct population segments (DPSs) of CTSL: Sonoma County, Central California, and Santa Barbara County. Only the Santa Barbara County population has the potential to occur within the CRCP Plan Area.

Facilities Area: Approximately 180.301 acres of suitable habitat (aquatic and dispersal habitat combined) are predicted within the facilities area. Covered Activities are predicted to temporarily impact 27.299 acres. Covered Activities are predicted to permanently impact 3.605 acres.

Non-facilities Area: Approximately 144,568.397 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 16.712 acres. Covered Activities are predicted to permanently impact 2.207 acres.

CTS is a lowland species restricted to grasslands and foothill regions where its breeding habitat (persistent rain-filled pools) occurs.[454] An important habitat requirement for this species is the presence of dry-season refuge sites within a reasonable distance of breeding sites (up to one mile).[455] The predicted temporary and permanent impacts to CTS habitat within the facilities and non-facilities areas is 49.829 acres, aquatic and dispersal habitat combined, which could be potentially considered a significant impact to this species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of CTS and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

[453] Hayes, M.P., and M.R. Jennings. 1988. Habitat Correlates of Distribution of the California Red-Legged Frog (Rana aurora draytonii) and the Foothill Yellow-Legged Frog (Rana boylii): Implications for Management. In Management of Amphibians, Reptiles and Small Mammals in North America, eds. R.C. Szaro, K.E. Severson, and D.R. Patton, 144–158. U.S. Department of Agriculture Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-166.

[454] U.S. Department of Agriculture Forest Service. 2006. Species Accounts: California Tiger Salamander. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm. Accessed 27 July 2017.

[455] Austin, C.C., and H. B. Shaffer 1992. Short, Medium, and Long-Term Repeatability of Locomotor Performance in the Tiger Salamander, Ambystoma californiense. Functional Ecology 6 (2): 145–153.

MYLF

The southern DPS of MYLF occurs in the San Bernardino, San Gabriel, and San Jacinto Mountains of southern California at elevations of 1,200 to 7,500 feet.[456] Currently, extant populations are known from only 10 locations, all of which are at least partially on National Forest System lands. Because the species occurs in remote locations at high elevations, most known occurrences of the southern DPS of MYLF are not in close proximity to SoCalGas facilities. However, this species has the potential to be encountered during O&M activities in the vicinity of Big Bear City in the San Bernardino Mountains[457] where facilities overlap with occupied habitat.

Facilities Area: Approximately 2.091 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 0.317 acre. Covered Activities are predicted to permanently impact 0.042 acre; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 31,659.069 acres of suitable habitat are predicted outside the facilities area. Covered activities are predicted to temporarily impact 3.660 acres. Covered Activities are predicted to permanently impact 0.483 acre.

The predicted temporary and permanent impacts to MYLF habitat within the facilities and non-facilities areas is 4.575 acres. Due to the limited range of the species, this amount of impacts could be potentially considered a significant impact to this species.

However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of MYLF and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

5.3.4 Reptiles

SRB

Populations of SRB are known to occur in the Tehachapi Mountains, Kern County; the Mt. Pinos area (including Mt. Abel and Alamo Mountain), straddling the Kern-Ventura County line; the San Bernardino Mountains in San Bernardino County; and the San Jacinto Mountains in Riverside County.[458] SRB is found in the San Bernardino and San Jacinto Mountains at elevations of 5,050 to 8,070 feet,[459] but it is absent from the San Gabriel Mountains. The Ventura County and San Bernardino County populations are potentially within the CRCP Plan Area on federal National Forest System lands; therefore, SoCalGas O&M activities have the potential to encounter this species where facilities overlap occupied habitat.

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[456] Stebbins, R.C. 1985. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin.

[457] U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Southern California Distinct Vertebrate Population Segment of the Mountain Yellow-Legged Frog (Rana muscosa). Final Rule. Federal Register 67: 44382–92.

[458] Hoyer, R.F., and G.R. Stewart. 2000. Biology of the Rubber Boa (*Charina bottae*), with Emphasis on C. b. umbratica. Part I: Capture, Size, Sexual Dimorphism, and Reproduction. Part II: Diet, Antagonists, and Predators. Journal of Herpetology 34 (3): 348–60.

[459] Stewart, G.R. 1988. The Rubber Boa (*Charina bottae*) in California, with Particular Reference to the Subspecies, C. b. umbratica. In Proceedings of the Conference on California Herpetology. Southwestern Herpetologists' Society Special Publication No. 4.

Facilities Area: Approximately 12.364 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 1.872 acres. Covered Activities are predicted to permanently impact 0.247 acre.

Non-facilities Area: Approximately 79,874.675 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 9.233 acres. Covered Activities are predicted to permanently impact 1.219 acres.

The predicted temporary and permanent impacts to SRB habitat within the facilities and non-facilities areas is 12.571 acres. This amount of impacts could be potentially considered a significant impact to this species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of SRB and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

SWPT

Within the CRCP Plan Area, SWPT has been documented in Los Angeles, San Luis Obispo, Santa Barbara, and Ventura Counties. The species occurs throughout the Los Padres National Forest, with populations concentrated in Piru Creek, Sespe Creek, the Indian Creek/Mono Creek area, the Sisquoc River/Manzana Creek area, Alamo Creek, the Nacimiento River, and Arroyo Seco Creek. The species also occurs in most of the small coastal drainages of Santa Barbara and San Luis Obispo Counties. Although the number of occurrences has been reduced from historic levels, SWPT likely persists in most of the rivers and streams within the CRCP Plan Area that are in a relatively natural condition; therefore, SoCalGas O&M activities have the potential to encounter this species where facilities overlap habitat.

Facilities Area: Approximately 169.461 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 25.658 acres. Covered Activities are predicted to permanently impact 3.388 acres.[460]

Non-facilities Area: Approximately 193,205.706 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 22.334 acres. Covered Activities are predicted to permanently impact 2.949 acres.[461]

The predicted temporary and permanent impacts to SWPT habitat within the facilities and non-facilities areas is 54.329 acres. This amount of impacts could be potentially considered a significant impact to this species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of SWPT and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

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[460] Historic data for temporary impacts to SWPT are 1.520 acres within the facilities area and 0.080 acre for the non-facilities area; there are no historic records for permanent impacts for this species. The higher numbers resulting from the suitability model serve as the basis of the impact analysis.

[461] Historic data for temporary impacts to SWPT are 1.520 acres within the facilities area and 0.080 acre for the non-facilities area; there are no historic records for permanent impacts for this species. The higher numbers resulting from the suitabilitiy model serve as the basis of the impact analysis.

5.3.5 Birds

BSS

The CRCP Plan Area overlaps the current known distribution of BSS at eight salt marsh sites in Santa Barbara, Ventura, and Los Angeles Counties, including Devereux Slough, Goleta Slough, Carpinteria Marsh, McGrath Beach State Park, Ormond Beach Wetlands, Mugu Lagoon, Ballona Wetlands, and Los Cerritos Marsh.[462]

Facilities Area: Approximately 1.959 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 0.297 acre. Covered Activities are predicted to permanently impact 0.039 acre; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 1,116.378 acres of suitable habitat are predicted outside the facilities area. Covered activities are predicted to temporarily impact 0.129 acre. Covered Activities are predicted to permanently impact 0.017 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts to BSS habitat within the facilities and non-facilities areas is 0.656 acres. With the distribution of this species this could be considered a less than significant impact to the species. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of BSS and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

Burrowing Owl

Within the CRCP Plan Area, the current burrowing owl breeding range is restricted to San Bernardino County and the easternmost portion of Los Angeles County.[463]

Facilities Area: Approximately 934.205 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 141.446 acres. Covered Activities are predicted to permanently impact 18.677 acres.

Non-facilities Area: Approximately 529,096.055 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 61.163 acres. Covered Activities are predicted to permanently impact 8.076 acres.

Burrowing owls usually inhabit desert and grassland habitat and, in many cases, urban and agricultural landscapes. Occupied habitats are characterized by flat, open areas with sparse vegetation that is typical of heavily grazed grasslands, low-stature grasslands, sparse sage scrub, or desert vegetation that also includes available burrows. This species requires underground burrows

[462] Zembal, R., S.M. Hoffman, and R.T. Patton. 2015. A Survey of the Belding's Savannah Sparrow (Passerculus sandwichensis beldingi) in California, 2015. Nongame Wildlife Program Report, 2015-02. California Department of Fish and Wildlife, Wildlife Branch.

[463] Gervais, J.A., D.K. Rosenberg, and L.A. Comrack. 2008. Burrowing Owl. In California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California, ed. W. D. Shuford and T. Gardali. Studies of Western Birds 1. Western Field Ornithologists and California Department of Fish and Game.

or artificial structures for shelter and nesting. Burrows are used year-round and are an essential component to the life history of burrowing owls. The predicted temporary and permanent impacts to burrowing owl habitat within the facilities and non-facilities areas is 229.362 acres, which could be considered a significant impact to the species. However, permanent impacts account for only 26.753 acres. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of burrowing owl and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

CAGN

In the CRCP Plan Area, CAGN is distributed within portions of San Bernardino, Los Angeles, and Ventura Counties. There are 36 total HCPs for CAGN according to the USFWS ECOS database.[464] Due to the subspecies' spotty distribution, there are some gaps of coverage within the CRCP Plan Area, which is why CAGN is included in this MSHCP.

Facilities Area: Approximately 892.216 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 135.088 acres. Covered Activities are predicted to permanently impact 17.838 acres.

Non-facilities Area: Approximately 379,605.080 acres of suitable habitat are predicted outside the facilities area. Covered activities are predicted to temporarily impact 43.882 acres. Covered Activities are predicted to permanently impact 5.794 acres.

The predicted temporary and permanent impacts to CAGN habitat within the facilities and non-facilities areas is 202.602 acres, which could be considered a significant impact to the species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of CAGN and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

LBV

LBV may occur in the CRCP Plan Area where suitable habitat is present at the minimum area requirements for a breeding territory (one-half acre).[465] Within San Bernardino County, the majority of territories occur along the Santa Ana River and its tributaries (including flood control facilities), and the Prado Reservoir in San Bernardino County. In Los Angeles and Ventura Counties, the largest population is along the Santa Clara River and its tributaries (including flood control facilities). The largest population in Santa Barbara County occurs along the Santa Ynez River and its tributaries. SoCalGas O&M activities have the potential to encounter this subspecies where facilities overlap occupied habitat.

[464] U.S. Fish and Wildlife Service. 2016. Species Profile for Coastal California gnatcatcher (*Polioptila californica californica*). Available at: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B08X#recovery. Accessed 27 July 2017.

[465] Kus, B. E. 1991. Habitat Use and Breeding Status of the Least Bell's Vireo at the Tijuana River, California. International Boundary and Water Commission.

Facilities Area: Approximately 30.179 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 4.569 acres. Covered Activities are predicted to permanently impact 0.603 acre.[466]

Non-facilities Area: Approximately 59,209.147 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 6.845 acres. Covered Activities are predicted to permanently impact 0.904 acre.[467]

The predicted temporary and permanent impacts to LBV habitat within the facilities and non-facilities areas is 12.921 acres, which could be potentially significant to the species. Through significant habitat protection, restoration programs and invasive cowbird species control, LBV populations have increased between 1986 and 2005.[468,469] This MSHCP offers opportunities to establish protection benefits for this species that would add to the continued progress of LBV. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of LBV and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

SWF

Current occurrences of SWF within the CRCP Plan Area are rare due to continued population declines. Some creeks in the San Bernardino and San Gabriel Mountains may still support this species, as well as the Santa Ynez River in Santa Barbara County and the Santa Clara River in Ventura County.[470]

Facilities Area: Approximately 14.706 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 2.227 acres. Covered Activities are predicted to permanently impact 0.294 acre.

Non-facilities Area: Approximately 25,183.437 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 2.911 acres. Covered Activities are predicted to permanently impact 0.384 acre.

The predicted temporary and permanent impacts to SWF habitat within the facilities and non-facilities areas is 5.816 acres, which could be considered a significant impact to the species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and

[466] Historic data for temporary impacts to LBV are 1.520 acres within the facilities area and 0.080 acre for the non-facilities area; there are no historic records for permanent impacts for this species. The higher numbers resulting from the suitability model serve as the basis of the impact analysis.

[467] Historic data for temporary impacts to LBV are 1.520 acres within the facilities area and 0.080 acre for the non-facilities area; there are no historic records for permanent impacts for this species. The higher numbers resulting from the predictive model serve as the basis of the impact analysis.

[468] U.S. Fish and Wildlife Service. 1998. Draft Recovery Plan for the Least Bell's Vireo.

[469] Kus, B.E. and M.J. Whitfield. 2005. Parasitism, Productivity, and Population Growth: Response of Least Bell's Vireos (Vireo bellii extimus) and Southwestern Willow Flycatchers (Empidonax traillii extimus) to Cowbird (Molothrus spp.) Control.

[470] U.S. Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Southwestern Willow Flycatcher. Final Rule. Federal Register 78: 50542–629.

management of SWF and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

WYBC

No known breeding populations are currently known to occur within the CRCP Plan Area. Breeding pairs of WYBC historically occurred at Prado Dam. The current WYBC range within the CRCP Plan Area falls north of Prado Dam in San Bernardino County approximately two miles from SoCalGas facilities.

Facilities Area: No suitable habitat is predicted within the facilities area. Covered Activities are not predicted to result in temporary impacts; therefore, the impact override minimum of 0.115 acre applies. Covered Activities are not predicted to result in permanent impacts; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 322.911 acres of suitable habitat are predicted outside the facilities area. Covered activities are predicted to temporarily impact 0.037 acre; therefore, the impact override minimum of 0.115 acre applies. Covered Activities are predicted to permanently impact 0.005 acre; therefore, the impact override minimum of 0.115 acre applies.

Considering the impact overrides, the predicted temporary and permanent impacts to WYBC habitat within the facilities and non-facilities areas is 0.382 acre, which could be considered a less than significant impact to the species. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will provide for the conservation and management of WYBC and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

5.3.6 Mammals

SBKR

Extant populations are restricted to areas along the Santa Ana River, Mill Creek, Plunge Creek, City Creek, Lytle Creek, Cajon Wash, Cable Creek, San Jacinto River, and Bautista Creek.[471] SBKR have the potential to occur along the easternmost boundaries of the CRCP Plan Area in San Bernardino County. Within the CRCP Plan Area, SBKR habitat overlaps SoCalGas facilities near the Lytle Creek area; therefore, SoCalGas O&M activities have the potential to encounter this species.

Facilities Area: Approximately 68.158 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 10.320 acres. Covered Activities are predicted to permanently impact 1.363 acres.

Non-facilities Area: Approximately 20,606.405 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 2.382 acres. Covered Activities are predicted to permanently impact 0.315 acre.

The predicted temporary and permanent impacts to SBKR habitat within the facilities and non-facilities areas is 14.380 acres, which could be considered a significant impact to the species.

[471] U.S. Fish and Wildlife Service. 2002. Service Proposes Critical Habitat for Endangered San Bernardino Kangaroo Rat.

However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of SBKR and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

SJKF

Within the CRCP Plan Area, SJKF occurrences have been recorded within 20 miles of the City of Paso Robles, with a heavy concentration two miles west of San Miguel. SoCalGas currently operates and maintains facilities within the range of the SJKF in the CRCP Plan Area, including the vicinities of San Miguel, Paso Robles, and the upper Cuyama River Valley.

Facilities Area: Approximately 22.118 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 3.349 acres. Covered Activities are predicted to permanently impact 0.442 acre.

Non-facilities Area: Approximately 102,900.673 acres of suitable habitat are predicted outside the facilities area. Covered activities are predicted to temporarily impact 11.895 acres. Covered Activities are predicted to permanently impact 1.571 acres.

The predicted temporary and permanent impacts to SJKF habitat within the facilities and non-facilities areas is 17.257 acres, which could be considered a significant impact to the species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of SJKF and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

SKR

SKR distribution includes the San Jacinto Valley and adjacent areas of western Riverside, southwestern San Bernardino, and northwestern San Diego Counties.[472] It also known to occur in the Badlands within Riverside and San Bernardino Counties. Within the CRCP Plan Area, SKR has the potential to occur near the vicinity of the San Bernardino–Riverside County boundary; SoCalGas operates and maintains a variety of facilities within this general area.

Facilities Area: Approximately 5.704 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 0.864 acre. Covered Activities are predicted to permanently impact 0.114 acre; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 4,604.507 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 0.532 acre. Covered Activities are predicted to permanently impact 0.070 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts to SKR habitat within the facilities and non-facilities areas is 1.626 acres. Considering the distribution of this species this could be considered a less than significant impact to the species. Furthermore, the SoCalGas Conservation Program (Chapter 6)

[472] U.S. Fish and Wildlife Service. 1997. Draft Recovery Plan for the Stephen's Kangaroo Rat.

includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of SKR and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

5.3.7 Plants

BMV

BMV is endemic to coastal Southern California and occurs only in five distinct geographic areas in Ventura, Los Angeles, and Orange Counties. These include (1) Simi Hills in eastern Ventura and western Los Angeles Counties; (2) eastern Santa Monica Mountains in Los Angeles County; (3) western Santa Monica Mountains near Pacific Palisades, Los Angeles County; (4) San Gabriel Mountains in Monrovia, Los Angeles County; and (5) Santa Ana Mountains in Orange County.[473] All areas except for the Santa Ana Mountains in Orange County fall within the CRCP Plan Area; therefore, SoCalGas O&M activities have the potential to encounter this species where facilities over occupied habitat.

Facilities Area: Approximately 60.864 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 9.215 acres. Covered Activities are predicted to permanently impact 1.217 acre.

Non-facilities Area: Approximately 31,587.431 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 3.651 acres. Covered Activities are predicted to permanently impact 0.482 acre.

The predicted temporary and permanent impacts to BMV habitat within the facilities and non-facilities areas is 14.565 acres, which due to the species being limited to a distinct geographic areas could potentially be significant. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of BMV and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

California Seablite

Potential habitat along the central California coast is extremely limited; however, the entire known distribution of this species falls within the CRCP Plan Area and is in relatively close proximity to SoCalGas facilities.

Facilities Area: Approximately 0.691 acre of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 0.105 acre; therefore, the impact override minimum of 0.115 acre applies. Covered Activities are predicted to permanently impact 0.014 acre; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 421.793 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 0.049 acre; therefore, the

[473] U.S. Fish and Wildlife Service. 2009. Braunton's Milk-Vetch 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc2381.pdf. Accessed 27 July 2017.

impact override minimum of 0.115 acre applies. Covered Activities are predicted to permanently impact 0.006 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts to California seablite habitat within the facilities and non-facilities areas is 0.460 acres. Even with the limited distribution of this species, this could be considered a less than significant impact to the species. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of California seablite and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

CCBT

CCBT is endemic to San Luis Obispo County in open boggy seep areas and drainages with serpentine soils in chaparral, coastal scrub, and valley grasslands at elevations between approximately 110 and 1,260 feet. Only 13 CNDDB occurrences have been documented. No SoCalGas facilities currently operate near known CCBT populations. Although CCBT does not exist near any facilities, potential impacts may occur within CCBT habitat. Therefore, CCBT is included in this MSHCP.

Facilities Area: Approximately 0.321 acre of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 0.049 acre; therefore, the impact override minimum of 0.115 acre applies. Covered Activities are predicted to permanently impact 0.006 acre; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 159.610 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 0.018 acre; therefore, the impact override minimum of 0.115 acre applies. Covered Activities are predicted to permanently impact 0.002 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts to CCBT habitat within the facilities and non-facilities areas is 0.460 acres, which could be considered a less than significant impact to the species. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of CCBT and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

Conejo Dudleya

Conejo dudleya is endemic to California and is currently known from the western end of the Simi Hills to the Santa Monica Mountains in Ventura County. Within this range, there is a large metapopulation that extends along the northern slope of Mountclef Ridge from the vicinity of the Reagan Library in the east to Camarillo Springs Road in the west.[474] Due to the scattered distribution of the subspecies, SoCalGas O&M activities have the potential to encounter it where facilities overlap occupied habitat.

[474] U.S. Fish and Wildlife Service. 2015. Conejo Dudleya 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc4507.pdf. Accessed 27 July 2017.

Facilities Area: Approximately 2.353 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 0.356 acre. Covered Activities are predicted to permanently impact 0.047 acre; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 11,165.779 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 1.291 acres. Covered Activities are predicted to permanently impact 0.170 acre.

The predicted temporary and permanent impacts to conejo dudleya habitat within the facilities and non-facilities areas is 1.932 acres, which could be considered a less than significant impact to the species. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of conejo dudleya and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

GWC

Currently, GWC is known from five small populations: four in San Luis Obispo County and one in Santa Barbara County. The San Luis Obispo County populations do not have pure plants; they have been introgressed with common watercress (*Nasturtium officinale*) and occur at Little Oso Flaco Lake and Oso Flaco Lake and Black Lake Canyon. An additional population was introduced on the Guadalupe-Nipomo Dunes National Wildlife Refuge in San Luis Obispo County.[475] The only remaining pure population is extant at Vandenberg Air Force Base in Santa Barbara County. The nearest known GWC population to SoCalGas facilities occurs in San Luis Obispo County. However, given the restricted habitat requirements for this species and the limited distribution of known populations, there is a low likelihood that it will be encountered during SoCalGas O&M activities.

Facilities Area: No suitable habitat is predicted within the facilities area. Covered Activities are not predicted to result in temporary impacts; therefore, the impact override minimum of 0.115 acre applies. Covered Activities are not predicted to result in permanent impacts; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 144.119 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 0.017 acre; therefore, the impact override minimum of 0.115 acre applies. Covered Activities are predicted to permanently impact 0.002 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts to GWC habitat within the facilities and non-facilities areas is 0.460 acres. This could be considered a less than significant impact to the species. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of GWC and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

[475] U.S. Fish and Wildlife Service. 2011. Gambel's Water Cress 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3949.pdf. Accessed 27 July 2017.

Gaviota Tarplant

Extant populations have been discovered west of Gaviota along the coast and in the Santa Ynez Mountains to Point Arguello. Seven primary populations are recognized from a highly localized distribution within this area: Lion's Head (near Point Sal), Point Arguello, Tranquillion Mountain/Sudden Peak, Point Conception, Hollister Ranch, Santa Ynez Mountains, and Gaviota.[476] All known populations are known to occur within the CRCP Plan Area and are within relatively close proximity to SoCalGas facilities; therefore, Gaviota tarplant may potentially be encountered during SoCalGas O&M activities.

Facilities Area: Approximately 29.677 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 4.493 acres. Covered Activities are predicted to permanently impact 0.593 acre.

Non-facilities Area: Approximately 57,312.670 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 6.625 acres. Covered Activities are predicted to permanently impact 0.875 acre.

The predicted temporary and permanent impacts to Gaviota tarplant habitat within the facilities and non-facilities areas is 12.586 acres. Due to the limited range of the species and proximity to facilities, this could be considered a significant impact to this species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of Gaviota tarplant and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

IKM

This species is known from six occurrences in the Irish Hills and on Indian Knob in San Luis Obispo County. Due to its restricted habitat requirement and the distribution of the known populations, which do not occur within close proximity to existing facilities, there is a low likelihood that it will be encountered during O&M activities.

Facilities Area: No suitable habitat is predicted within the facilities area. Covered Activities are not predicted to result in temporary impacts; therefore, the impact override minimum of 0.115 acre applies. Covered activities are not predicted to result in permanent impacts; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 70.670 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 0.008 acre; therefore, the impact override minimum of 0.115 acre applies. Covered Activities are predicted to permanently impact 0.001 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts to IKM habitat within the facilities and non-facilities areas is 0.460 acres, which could be considered a less than significant impact to the species. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be

[476] U.S. Fish and Wildlife Service. 2011. Gaviota Tarplant 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3884.pdf. Accessed 27 July 2017.

implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of IKM and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

LYS

LYS is endemic to California and is currently known from four locations in southwestern Santa Barbara County on Vandenberg Air Force Base, the west crest of the Santa Ynez Mountains on Hollister Ranch, and Graciosa Ridge in the Solomon Hills southeast of Orcutt. The entire LYS distribution range is within the CRCP Plan Area and within relatively close proximity to SoCalGas facilities; therefore, LYS may potentially be encountered during SoCalGas O&M activities.

Facilities Area: Approximately 39.344 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 5.957 acres. Covered Activities are predicted to permanently impact 0.787 acre.

Non-facilities Area: Approximately 90,364.106 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 10.446 acres. Covered Activities are predicted to permanently impact 1.379 acres.

The predicted temporary and permanent impacts to LYS habitat within the facilities and non-facilities areas is 18.569 acres and due to the likeliness to be encountered could be considered a significant impact to this species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of LYS and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

Lyon's Pentachaeta

This species' current distribution includes only the Santa Monica Mountains in eastern Ventura and western Los Angeles Counties and the western Simi Hills in Ventura County. Populations found within the western Simi Hills in Ventura County overlap SoCalGas facilities. All known populations are known to occur within the CRCP Plan Area and are within relatively close proximity to SoCalGas facilities; therefore, Lyon's pentachaeta may potentially be encountered during SoCalGas O&M activities.

Facilities Area: Approximately 15.200 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 2.301 acres. Covered Activities are predicted to permanently impact 0.304 acre; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 24,964.674 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 2.886 acres. Covered Activities are predicted to permanently impact 0.381 acres.

The predicted temporary and permanent impacts to Lyon's pentachaeta habitat within the facilities and non-facilities areas is 5.872 acres. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will

provide for the conservation and management of Lyon's pentachaeta and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

Marcescent Dudleya

There have been 10 reported occurrences of marcescent dudleya from an area of about 14 square miles in the Santa Monica Mountains within Ventura County.[477]

Facilities Area: No suitable habitat is predicted within the facilities area. Covered Activities are not predicted to result in temporary impacts; therefore, the impact override minimum of 0.115 acre applies. Covered activities are not predicted to result in permanent impacts; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 65.315 acres of suitable habitat are predicted outside the facilities area. Covered activities are predicted to temporarily impact 0.008 acre; therefore, the impact override minimum of 0.115 acre applies. Covered Activities are predicted to permanently impact 0.001 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts to marcescent dudleya habitat within the facilities and non-facilities areas is 0.460 acres, which could be considered a less than significant impact to the species. Furthermore, given the restricted habitat requirements and the distribution of known populations, there is a low likelihood that this species will be encountered during covered activities. In addition, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of marcescent dudleya and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

Morro Manzanita

Morro manzanita is a San Luis Obispo County–endemic plant species. It is known from fewer than 10 occurrences in the Morro Bay area, from the northeast side of Morro Bay to the southern end of Montaña de Oro State Park. The entire distribution range is located within the CRCP Plan Area, and SoCalGas facilities occur within relatively close proximity to known occurrences.

Facilities Area: Approximately 1.576 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 0.239 acre. Covered Activities are predicted to permanently impact 0.032 acre; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 5,790.718 acres of suitable habitat are predicted outside the facilities area. Covered activities are predicted to temporarily impact 0.598 acre. Covered Activities are predicted to permanently impact 0.079 acre; therefore, the impact override minimum of 0.115 acre applies.

Although this species is known to occur in proximity to SoCalGas facilities the predicted temporary and permanent impacts to Morro Manzanita habitat within the facilities and non-facilities areas is 1.067 acres, which is likely a less than significant impact to the species. Furthermore, the SoCalGas

[477] NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of Morro Manzanita and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

Nevin's Barberry

There are four occurrence areas that overlap the CRCP Plan Area: (1) Lopez Canyon in western Los Angeles County on the Angeles National Forest, (2) Cobal Canyon in eastern Los Angeles County near Claremont, (3) Scott and San Timoteo Canyons in southern San Bernardino County near Redlands/Loma Linda and (4) those found at CSUCI. Several locations are known to occur near SoCalGas facilities, although these facilities occur within urban developments. Therefore, there is a low likelihood that this species will be encountered during SoCalGas O&M activities.

Facilities Area: Approximately 1.374 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 0.208 acre. Covered Activities are predicted to permanently impact 0.027 acre; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 7,161.612 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 0.828 acre. Covered Activities are predicted to permanently impact 0.109 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts to Nevin's barberry habitat within the facilities and non-facilities areas is 1.266 acres, which could be considered a less than significant impact to the species. Furthermore, given the restricted habitat requirements and the distribution of known populations, there is a low likelihood that this species will be encountered during covered activities. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of Nevin's Barberry and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

NML

NML grows in the stabilized back dune habitat of the Guadalupe Dunes in the southwestern corner of San Luis Obispo County. The species occurs as one extended population made up of seven occurrences with fewer than 700 plants. The small patches are spread over 1.5 miles west of Highway 1 and between Black Lake Canyon to the north and Oso Flaco Lake to the south. No known populations are known to overlap SoCalGas facilities; however, existing pipelines are known to be within one mile of suitable habitat for this species. Therefore, NML may potentially be encountered during O&M activities.

Facilities Area: No suitable habitat is predicted within the facilities area. Covered Activities are not predicted to result in temporary impacts; therefore, the impact override minimum of 0.115 acre applies. Covered activities are not predicted to result in permanent impacts; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 3,825.266 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 0.442 acre. Covered Activities

are predicted to permanently impact 0.058 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts to NML habitat within the facilities and non-facilities areas is 0.787 acres. Although this is a relatively small area due to the specific habitat requirements and small population size, this could be considered a significant impact to the species due to its limited distribution. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of NML and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

Pismo Clarkia

Currently, this subspecies is known from 14 occurrences in the Pismo Beach area with a narrow range that is approximately 14 miles long by 6 miles wide. All known populations are known to occur within the CRCP Plan Area and are within relatively close proximity to SoCalGas facilities; therefore, Pismo clarkia may potentially be encountered during SoCalGas O&M activities.

Facilities Area: Approximately 45.162 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 6.838 acres. Covered Activities are predicted to permanently impact 0.903 acre.

Non-facilities Area: Approximately 79,287.326 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 9.166 acres. Covered Activities are predicted to permanently impact 1.210 acres.

The predicted temporary and permanent impacts to Pismo Clarkia habitat within the facilities and non-facilities areas is 18.117 acres. Due to this species' narrow range, 18.117 acres, which is 4.63 percent of the known habitat, could be considered a significant impact to the species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of Pismo Clarkia and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

SFVS

SFVS is endemic to California and is currently narrowly distributed across Los Angeles and Ventura Counties. Known populations exist in Laskey Mesa (Ventura County) and near Santa Clarita (Los Angeles County). SoCalGas facilities currently overlap the known distribution of this species within the CRCP Plan Area in Ventura and Los Angeles Counties; therefore, SFVS may potentially be encountered during SoCalGas O&M activities.

Facilities Area: Approximately 6.904 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 1.045 acres. Covered Activities are predicted to permanently impact 0.138 acre.

Non-facilities Area: Approximately 2,613.802 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 0.302 acre. Covered Activities

are predicted to permanently impact 0.040 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts to SFVS habitat within the facilities and non-facilities areas is 1.600 acres. Although narrowly distributed, this is not likely to be a significant impact to the species because the impacts will affect less than 1 percent of SFVS known suitable habitat. Furthermore, the actions discussed in the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of SFVS and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

SARW

This species is endemic to the Santa Ana River drainage of southern California and occurs within the floodplains of Mill Creek, City Creek, Plunge Creek, the Santa Ana River, Cajon Wash, and Lytle Creek within San Bernardino County. All known occurrences overlap the CRCP Plan Area and have the potential to overlap SoCalGas facilities in the vicinity of the census-designated place of Muscoy in San Bernardino County; therefore, SARW may potentially be encountered during SoCalGas O&M activities.

Facilities Area: Approximately 7.443 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 1.127 acres. Covered Activities are predicted to permanently impact 0.149 acre.

Non-facilities Area: Approximately 8,972.472 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 1.037 acres. Covered Activities are predicted to permanently impact 0.137 acre.

The predicted temporary and permanent impacts to SARW habitat within the facilities and non-facilities areas is 2.450 acres. The SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of SARW and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

SMMD

Occurrence areas for this species overlap the general CRCP Plan Area in three locations: (1) Lopez Canyon in western Los Angeles County on the Angeles National Forest, (2) Cobal Canyon in eastern Los Angeles County near Claremont, (3) Scott and San Timoteo Canyons in southern San Bernardino County near Redlands/Loma Linda. Populations are known to occur within the CRCP Plan Area and are within relatively close proximity to SoCalGas facilities; therefore, SMMD may potentially be encountered during SoCalGas O&M activities.

Facilities Area: No suitable habitat is predicted within the facilities area. Covered Activities are not predicted to result in temporary impacts; therefore, the impact override minimum of 0.115 acre applies. Covered activities are not predicted to result in permanent impacts; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 3,889.665 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 0.450 acre. Covered Activities are predicted to permanently impact 0.059 acre; therefore, the impact override minimum of 0.115 acre applies.

The predicted temporary and permanent impacts to SMMD habitat within the facilities and non-facilities areas is 0.795 acres which could be considered a less than significant impact to the species. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of SMMD and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

SBB

The current known distribution and populations are restricted to the coastal regions of Monterey and Santa Barbara Counties.[478] The populations that are in the vicinity of Lompoc and Vandenberg Air Force Base, Santa Barbara County, occur within the CRCP Plan Area; therefore, SBB may potentially be encountered during SoCalGas O&M activities.

Facilities Area: Approximately 6.392 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 0.968 acre. Covered Activities are predicted to permanently impact 0.128 acre.[479]

Non-facilities Area: Approximately 10,145.228 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 1.173 acres. Covered Activities are predicted to permanently impact 0.155 acre.[480]

The predicted temporary and permanent impacts to SBB habitat within the facilities and non-facilities areas is 3.066 acres, which could be considered a significant impact to the species. However, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of SBB and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

SHS

This species' current known distribution extends from the San Gabriel Mountains in Los Angeles County, east to the San Bernardino Mountains, and south to the northern edge of the Peninsular Ranges.[481] Within the CRCP Plan Area, locations around Lytle Creek (San Bernardino County) and

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[478] Smith, J.P., and K. Berg. 1988. California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California. 4th ed. California Native Plant Society.

[479] SoCalGas periodically (every three to five years) undertakes 34.485 acres for vegetation maintenance within the Burton Mesa Ecological Reserve. There are no temporary or permanent impacts to suitable habitat as a result of these activities.

[480] SoCalGas periodically (every three to five years) undertakes 34.485 acres for vegetation maintenance within the Burton Mesa Ecological Reserve. There are no temporary or permanent impacts to suitable habitat as a result of these activities.

[481] U.S. Fish and Wildlife Service. 1987. Endangered Status for Eriastrum divesifolium ssp. sanctorum (Santa Ana River Woolly Star) and Centrostegia leptoceras (Slender-Horned Spineflower). Final Rule. Federal Register 52 (187): 36265–70.

La Cañada Flintridge (Los Angeles County) overlap current SoCalGas facilities; therefore, SHS may potentially be encountered during SoCalGas O&M activities.

Facilities Area: Approximately 1.219 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 0.185 acre. Covered Activities are predicted to permanently impact 0.024 acre; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 8,324.709 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 0.962 acre. Covered Activities are predicted to permanently impact 0.127 acre.

The predicted temporary and permanent impacts to SHS habitat within the facilities and non-facilities areas is 1.389 acres. Threats to this species include urban development and introduction of non-native species. This MSHCP provides opportunities to establish protection benefits for this species from these threats and reduce any substantial adverse effects to Covered Species from SoCalGas Covered Activities to below the level of significance. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of SHS and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

VMF

The current and historic distribution is limited to fragmented areas in Santa Barbara County within the Burton Mesa. Current known distribution ranges in Santa Barbara County occur within the CRCP Plan Area.

Facilities Area: Approximately 21.640 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 3.277 acres. Covered Activities are predicted to permanently impact 0.433 acre.[482]

Non-facilities Area: Approximately 9,567.465 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 1.106 acres. Covered Activities are predicted to permanently impact 0.146 acre.[483]

The predicted temporary and permanent impacts to VMF habitat within the facilities and non-facilities areas is 4.962 acres. Threats to this species include development, vehicles, and competition from non-native plants. This MSHCP provides opportunities to establish protection benefits for this species from these threats and reduce any substantial adverse effects to Covered Species from SoCalGas Covered Activities to below the level of significance. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMM's will provide for the conservation and management of SHS and will

[482] SoCalGas periodically (every three to five years) undertakes 34.485 acres for vegetation maintenance within the Burton Mesa Ecological Reserve. There are no temporary or permanent impacts to suitable habitat as a result of these activities.

[483] SoCalGas periodically (every three to five years) undertakes 34.485 acres for vegetation maintenance within the Burton Mesa Ecological Reserve. There are no temporary or permanent impacts to suitable habitat as a result of these activities.

ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

VMMV

Historically, the VMMV is known from coastal sites in Ventura, Los Angeles, and Orange Counties.[484] The current known distribution is limited to one native population in Oxnard, Ventura County, known as North Shore on the Mandalay Property.

Facilities Area: Approximately 136.787 acres of suitable habitat are predicted within the facilities area. Covered Activities are predicted to temporarily impact 20.711 acres. Covered Activities are predicted to permanently impact 2.735 acres.

Non-facilities Area: Approximately 26,632.184 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 3.079 acres. Covered Activities are predicted to permanently impact 0.407 acre.

The predicted temporary and permanent impacts to VMMV habitat within the facilities and non-facilities areas is 26.932 acres. Due to the limited distribution of native populations, this is potentially a significant impact to the species. However, the MSHCP provides opportunities to establish protection benefits for this species. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMM's will provide for the conservation and management of VMMV and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

Verity's Dudleya

The entire distribution of the species is scattered over a four-mile stretch of land along the northern slope of Conejo Mountain and on north-facing volcanic outcrops in the vicinity of the California State University, Channel Islands campus.[485] Due to its restricted habitat requirements and the distribution of known populations, there is a low likelihood that this species will be encountered during SoCalGas O&M activities.

Facilities Area: No suitable habitat is predicted within the facilities area. Covered Activities are not predicted to result in temporary impacts; therefore, the impact override minimum of 0.115 acre applies. Covered Activities are not predicted to result in permanent impacts; therefore, the impact override minimum of 0.115 acre applies.

Non-facilities Area: Approximately 2,533.787 acres of suitable habitat are predicted outside the facilities area. Covered Activities are predicted to temporarily impact 0.293 acre. Covered Activities are predicted to permanently impact 0.039 acre; therefore, the impact override minimum of 0.115 acre applies.

[484] US. Fish and Wildlife Service. 2010. Ventura Marsh Milk-Vetch 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3554.pdf. Accessed 27 July 2017.

[485] U.S. Fish and Wildlife Service. 2009. Verity's Dudleya 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc2554.pdf. Accessed 27 July 2017.

The predicted temporary and permanent impacts to Verity's dudleya habitat within the facilities and non-facilities areas is 0.638 acre. Even with the limited distribution of the species, this is not likely to be a significant impact due to the lack of suitable habitat within the facilities area. Furthermore, the SoCalGas Conservation Program (Chapter 6) includes AMMs that will be implemented during the course of Covered Activities. These AMMs will provide for the conservation and management of Verity's dudleya and will ensure that the impacts from Covered Activities are minimized and mitigated to the maximum extent practicable.

5.4 Anticipated Impacts to Critical Habitat

There is designated critical habitat for 13 of the 41 Covered Species within the facilities area: MSS, SAS, arroyo toad, CRLF, MYLF, CCG, LBV, SBKR, BMV, Gaviota tarplant, LYS, Lyon's pentachaeta, and VMMV. Impacts to critical habitat have been accounted for within the impact analysis conducted for each species. Considering the effectiveness of SoCalGas' measures to avoid and minimize take and the compensatory mitigation proposed to be implemented, anticipated impacts of take are not likely to jeopardize the continued existence of any of the Covered Species within the CRCP Plan Area; nor are they expected to appreciably diminish the value of any designated critical habitat for the survival and recovery of these species. However, this will be further evaluated in the BO prepared for Covered Activities. This section reviews the impacts that have the potential to occur within critical habitat alone, for later analysis of the extent of the significance of these impacts in their relation to the survival and or recovery of Covered Species.

MSS

Facilities Area: Approximately 2.485 acres of designated critical habitat occur within the facilities area. Approximately 0.376 acre of temporary disturbance within designated critical habitat is predicted to occur within the facilities area. Approximately 0.050 acre of permanent disturbance is predicted to occur within the facilities area.

Non-facilities Area: Approximately 1,823.144 acres of designated critical habitat occur outside the facilities area. Approximately 0.211 acre of temporary disturbance is predicted to occur outside the facilities area. Approximately 0.028 acre of permanent disturbance is predicted to occur outside the facilities area.

SAS

Facilities Area: No designated critical habitat occurs within the facilities area.

Non-facilities Area: Approximately 2,956.933 acres of designated critical habitat occur outside the facilities area. Approximately 0.342 acre of temporary disturbance is predicted to occur outside the facilities area. Approximately 0.045 acre of permanent disturbance is predicted to occur outside the facilities area.

Arroyo Toad

Facilities Area: Approximately 16.862 acres of designated critical habitat occur within the facilities area. Approximately 2.553 acres of temporary disturbance within designated critical habitat are predicted to occur within the facilities area. Approximately 0.337 acre of permanent disturbance is predicted to occur within the facilities area.

Non-facilities Area: Approximately 18,213.613 acres of designated critical habitat occur outside the facilities area. Approximately 2.105 acre of temporary disturbance is predicted to occur outside the facilities area. Approximately 0.278 acre of permanent disturbance is predicted to occur outside the facilities area.

CRLF

Facilities Area: Approximately 287.046 acres of designated critical habitat occur within the facilities area. Approximately 43.461 acres of temporary disturbance within designated critical habitat are predicted to occur within the facilities area. Approximately 5.739 acres of permanent disturbance are predicted to occur within the facilities area.

Non-facilities Area: Approximately 506,577.020 acres of designated critical habitat occur outside the facilities area. Approximately 58.560 acre of temporary disturbance is predicted to occur outside the facilities area. Approximately 7.733 acres of permanent disturbance are predicted to occur outside the facilities area.

MYLF

Facilities Area: No designated critical habitat occurs within the facilities area.

Non-facilities Area: Approximately 6,691.701 acres of designated critical habitat occur outside the facilities area. Approximately 0.774 acre of temporary disturbance is predicted to occur outside the facilities area. Approximately 0.102 acre of permanent disturbance is predicted to occur outside the facilities area.

CAGN

Facilities Area: Approximately 257.447 acres of designated critical habitat occur within the facilities area. Approximately 38.980 acres of temporary disturbance within designated critical habitat are predicted to occur within the facilities area. Approximately 5.147 acres of permanent disturbance are predicted to occur within the facilities area.

Non-facilities Area: Approximately 61,974.234 acres of designated critical habitat occur outside the facilities area. Approximately 7.164 acre of temporary disturbance is predicted to occur outside the facilities area. Approximately 0.946 acre of permanent disturbance is predicted to occur outside the facilities area.

LBV

Facilities Area: Approximately 12.590 acres of designated critical habitat occur within the facilities area. Approximately 1.906 acres of temporary disturbance within designated critical habitat are predicted to occur within the facilities area. Approximately 0.252 acre of permanent disturbance is predicted to occur within the facilities area.

Non-facilities Area: Approximately 14,375.784 acres of designated critical habitat occur outside the facilities area. Approximately 1.662 acre of temporary disturbance is predicted to occur outside the

facilities area. Approximately 0.219 acre of permanent disturbance is predicted to occur outside the facilities area.

SBKR[486]

Facilities Area: Approximately 68.158 acres of designated critical habitat occur within the facilities area. Approximately 10.320 acres of temporary disturbance within designated critical habitat are predicted to occur within the facilities area. Approximately 1.363 acre of permanent disturbance is predicted to occur within the facilities area.

Non-facilities Area: Approximately 20,606.405 acres of designated critical habitat occur outside the facilities area. Approximately 2.382 acre of temporary disturbance is predicted to occur outside the facilities area. Approximately 0.315 acre of permanent disturbance is predicted to occur outside the facilities area.

BMV

Facilities Area: No designated critical habitat occurs within the facilities area.

Non-facilities Area: Approximately 1,817.861 acres of designated critical habitat occur outside the facilities area. Approximately 0.210 acre of temporary disturbance is predicted to occur outside the facilities area. Approximately 0.028 acre of permanent disturbance is predicted to occur outside the facilities area.

Gaviota Tarplant

Facilities Area: Approximately 16.788 acres of designated critical habitat occur within the facilities area. Approximately 2.542 acres of temporary disturbance within designated critical habitat are predicted to occur within the facilities area. Approximately 0.336 acre of permanent disturbance is predicted to occur within the facilities area.

Non-facilities Area: Approximately 9,406.730 acres of designated critical habitat occur outside the facilities area. Approximately 1.087 acre of temporary disturbance is predicted to occur outside the facilities area. Approximately 0.144 acre of permanent disturbance is predicted to occur outside the facilities area.

[486] Critical habitat for SBKR was based on historical data because no current data is available.

LYS

Facilities Area: No designated critical habitat occurs within the facilities area.

Non-facilities Area: Approximately 5,641.790 acres of designated critical habitat exists outside the facilities area. Approximately 0.652 acre of temporary disturbance is predicted to occur outside the facilities area. Approximately 0.086 acre of permanent disturbance is predicted to occur outside the facilities area.

Lyon's Pentachaeta

Facilities Area: Approximately 5.960 acres of designated critical habitat occur within the facilities area. Approximately 0.902 acre of temporary disturbance within designated critical habitat is predicted to occur within the facilities area. Approximately 0.119 acre of permanent disturbance is predicted to occur within the facilities area.

Non-facilities Area: Approximately 2,545.533 acres of designated critical habitat occur outside the facilities area. Approximately 0.294 acre of temporary disturbance is predicted to occur outside the facilities area. Approximately 0.039 acre of permanent disturbance is predicted to occur outside the facilities area.

VMMV

Facilities Area: Approximately 1.112 acres of designated critical habitat occur within the facilities area. Approximately 0.168 acre of temporary disturbance within designated critical habitat is predicted to occur within the facilities area. Approximately 0.022 acre of permanent disturbance is predicted to occur within the facilities area.

Non-facilities Area: Approximately 112.222 acres of designated critical habitat occur outside the facilities area. Approximately 0.013 acre of temporary disturbance is predicted to occur outside the facilities area. Approximately 0.002 acre of permanent disturbance is predicted to occur outside the facilities area.

5.5 Anticipated Impacts of the Taking

The SoCalGas Conservation Program, discussed in Chapter 6, describes AMMs that will be implemented during the course of Covered Activities. These AMMs are expected to provide continued protections against the likelihood of the take of the Covered Species.

Impacts to Covered Species are anticipated to be less than significant based on the conducted analysis following implementation of mitigation measures. Since Covered Activities are largely connected with existing SoCalGas facilities, there are relatively low levels of permanent direct effects. Most activities will occur on existing facilities, resulting in temporary direct effects. Due to the relatively short duration and small size of the area for Covered Activities, it is anticipated that the indirect effects would largely be coterminous with the area of temporary impacts, which can be fully resolved *in situ*.

SoCalGas SOPs for Covered Activities in tandem with applicable AMMs for Covered Species would be implemented to limit direct and indirect effects to permanent and temporary impact areas; thus,

there would be no increase in adverse effects beyond the limits of the temporary impact area. The Covered Activities would result in no adverse effects or less than substantial adverse effects.

All 41 of the Covered Species (15 species protected under FESA, 3 species protected under CESA, 21 species protected under both FESA and CESA, and 2 species identified by USFWS as a Bird of Conservation Concern or identified by CDFW as a Species of Special Concern) have the potential to fall under direct impacts and indirect impacts of the Covered Activities. Direct permanent effects anticipated in suitable habitat for the Covered Species include 180.363 acres, and direct temporary effects anticipated include 806.785 acres, which amounts to 987.148 acres within the CRCP Plan Area.

Of the Covered Species, 14 have designated critical habitat, which occurs on less than 10 percent of the CRCP Plan Area. Anticipated disturbance of critical habitat as a result of the Covered Activities includes 176.701 acres from temporary disturbances and 23.335 acres from permanent disturbances. These numbers are included in the total estimated anticipated effects of Covered Species.

There are approximately 5 million acres in the CRCP Plan Area not including barren, agriculture, and urban-designated land types. Beyond the suitable habitat calculated for Covered Species, it is anticipated that 13.340 acres shall undergo permanent direct effects and 26.690 acres shall undergo permanent indirect effects.

The implementation of the conservation strategy shall compensate direct effects at 3:1 and indirect effects at 1:1. A conservative estimate threshold has been set to identify the maximum amount of habitat loss expected from the Covered Activities. Natural habitat will be restored and added as a result of the 3:1 direct effects conservation strategy. Annual reporting required under this Plan shall track activities that result in more than 0.1 acre of direct effects as a result of Covered Activities.

Covered Activities were designed to avoid or minimize take of Covered Species. The implementation of Covered Activities may result in incidental take of Covered Species and their habitats; therefore, the ITP shall cover these potential circumstances. To meet regulatory requirements and mitigate effects competently, take must be discussed and, if possible, quantified (see Appendix I).

Covered Activities are required to be fully mitigated, accomplishing no net loss of habitat functions or values within the CRCP Plan Area. Under full compensation, there is no net contribution to cumulative impacts as a result of maintaining the existing gas transmission and distribution system within the SoCalGas service area. Temporary effect areas will be restored to pre-project conditions or enhanced with native habitat if previously degraded. Therefore, temporary effects will result in a net benefit to the conservation of habitat and Covered Species.

Chapter 6.0
CONSERVATION PROGRAM

This MSHCP shall cover SoCalGas' O&M activities listed in Chapter 2.0, *Project Description*, within the CRCP Plan Area. SoCalGas performs these activities to maintain adequate, safe, and reliable gas service. SoCalGas is dedicated to implementing its Covered Activities in a manner that supports the long-term survival and recovery of the 41 Covered Species. SoCalGas' conservation strategy shall involve carrying out one or more of the following sequential measures as they relate to the Covered Species and/or their habitat:

- Avoidance—Avoid covered species/habitat by locating work and staging areas within preexisting disturbed areas or by establishing no entry buffers from riparian or aquatic features to restrict equipment refueling and maintenance.

- Minimization—Minimize potential impacts by avoiding breeding seasons, establishing buffer zones, or utilizing weed-free seed and erosion control materials.

- Rectify the impact—Restoring, stabilizing, and revegetating temporarily disturbed areas to rectify potential impacts from Covered Activities.

- Compensate the impact—Offset unavoidable impacts through the funding of captive breeding and reintroduction programs or the acquisition, restoration, or enhancement of suitable replacement habitat. Compensatory mitigation should be established as near to the impacts as possible, in order to restore habitat values to the affected population groups.

In order to successfully implement the conservation program outlined in this section, SoCalGas shall establish the following positions, subject to the approval of USFWS:

- MSHCP Administrator—The SoCalGas representative that is responsible for overseeing and ensuring compliance for all Covered Activities within the CRCP Plan Area.

- Project Biologist—A biologist appointed by the MSHCP Administrator, subject to the approval of USFWS, to oversee and ensure compliance for a specific Covered Activity. A Project Biologist is responsible for supervising and training biological monitors; ensuring the implementation of SoCalGas SOPs and all general, habitat, and species-specific AMMs outlined in this chapter that are applicable to the Covered Activity; and fulfilling all reporting requirements for the Covered Activity. A Project Biologist has sufficient educational background, training, and experience working with a specific Covered Species that is approved by USFWS to survey, monitor, handle, and/or relocate the species out of harm's way as needed. The requirements to be approved as a Project Biologist vary per the Covered Species, as well as the activities a Project Biologist may conduct (Appendix F).

- Biological monitor—A biologist trained to identify all Covered Species with the potential to occur in the vicinity of a Covered Activity and to follow all general, habitat, and species-specific AMMs outlined in this chapter, as well as SoCalGas

SOPs. Species-specific AMMs may require an approved Project Biologist, in which they cannot be carried out by a biological monitor alone. Biological monitors shall implement all applicable AMMs and SOPs for the Covered Activity and report to the Project Biologist.

In no instance will the take allowed pursuant to this MSHCP adversely affect the ability of any of the covered species to survive or recover in the wild. SoCalGas shall request USFWS approval of the Project Biologists for species-specific AMMs. The Project Biologists may then designate any further biological monitors to conduct activities in assisting the Project Biologist pursuant to this MSHCP. Such requests shall be in writing, and the Ventura Fish and Wildlife Office must receive the request at least 15 days prior to any such activities, with the exception of emergency activities which may require expedited notification.

6.1 Biological Goals and Objectives

The CRCP biological goals and objectives are consistent with the guidance provided in the 2016 Habitat Conservation Planning and Incidental Take Permit Processing Handbook.[487,488] SoCalGas biological goals are broad guiding principles for developing the MSHCP's operating conservation program that can be construed into manageable subsections of biological objectives. The biological objectives are the measurable targets for achieving the biological goals.

The biological goals under SoCalGas' MSHCP are broad principles for the operation of the conservation program; they serve as the foundation for SoCalGas' conservation strategy. Biological objectives are derived from goals and provide a basis for determining strategies, monitoring effectiveness, and evaluating the success of the action. SoCalGas' MSHCP includes a combination of habitat-based and species-specific objectives that apply to each of the 41 Covered Species and their habitats. The following biological goals and objectives have been established for the MSHCP.

Regional-Level Goals and Objectives

Goal 1: Improve overall effectiveness of ecosystem management, reducing impacts on Covered Species and sensitive communities in the counties of San Luis Obispo, Santa Barbara, Ventura, and the non-desert provinces of Los Angeles and San Bernardino for the continuing benefit of the State of California.

> **Objective 1:** Conduct SoCalGas O&M activities on existing facilities to maintain uniform, adequate, safe, and reliable gas service undertaken in a timely and orderly manner that optimizes avoidance and minimization and provides meaningful compensatory mitigation for unavoidable impact that facilitates the survival and recovery in the wild of Covered Species and Sensitive Communities
>
> **Objective 2:** Increase efficiency of implementation of federally mandated SoCalGas O&M activities from the reduction of the regulatory review timely impact.

[487] Federal Register. 1 June 2000. 65 (106): 35242.

[488] U.S. Fish and Wildlife Service. December 2016. Habitat Conservation Planning and Incidental Take Permit Processing Handbook.

Natural Community-Level Goals and Objectives

Goal: Protect, manage, restore, and enhance natural communities and sensitive communities, if feasible, so that there shall be no net loss of habitat functions or values within the CRCP Plan Area.[489]

> **Objective 1:** Protect, manage, and restore freshwater natural communities of estuarine, lacustrine, marsh, riverine, wet meadow, fresh emergent wetland, and of saline emergent wetland to support the Covered Species associated with these communities and promote biodiversity of indigenous plants, wildlife, and native plant communities. This objective shall be met through effective planning, implementation, and restoration practices outlined in General, Habitat, and Species-specific measures located in Section 6.1 and 6.2.9 of this chapter.
>
> **Objective 2:** Restore terrestrial natural communities of grassland, shrubland, desert shrub, forest, woodland, and desert woodland to support the Covered Species of these communities and promote native biodiversity. This objective shall be met through effective planning, implementation, and restoration practices outlined in General, Habitat, and Species-specific measures located in Section 6.1 and 6.2.9 of this chapter.
>
> **Objective 3:** Protect, manage, and restore state-designated sensitive plant communities including riparian, aquatic, and wetland habitats afforded protection pursuant to Sections 401 and 404 of the Federal Clean Water Act and Section 1600 of the State Fish and Game Code. No net loss of riparian, aquatic, and wetland habitats will be attained by ensuring that the appropriate authorizations under existing permits are issued, or that individual permits and agreements are obtained pursuant to Sections 401 and 404 of the Federal Clean Water Act and Section 1600 of the State Fish and Game Code, where required. Mitigation in support of permits under Section 404 of the Clean Water Act will conform to Compensatory Mitigation for Losses of Aquatic Resources.[490] Mitigation in support of Agreements pursuant to Section 1600 of the State Fish and Game Code shall conform to Compensatory Mitigation for Losses of Aquatic Resources as well, because Section 404 compliance is necessary and CDFW may not require additional mitigation beyond those guidelines.[491]

Species-Level Goals and Objectives

Species Goal 1: Provide conservation of **DSFF** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

> **Objective 1.1:** If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided, where feasible.

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[489] Excluding approximately 1,750,597 acres of agriculture, barren, or urban communities within the CRCP Plan area.

[490] Section 401 (b)(1) Part 230.91-98

[491] CALFED Bay-Delta Program. November 2001. Guide to Regulatory Compliance for Implementing CALFED Actions Volume 2. Available at: http://www.calwater.ca.gov/content/Library/RegGuide/Volume%202/Voume%202%20PDF%20f/vol2chp2FINAL%20S1600_1101.pdf.

Objective 1.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, a bore replacement shall be utilized to avoid impacts to the species, where feasible.
Objective 1.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build, where feasible.
Objective 1.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.1.
Objective 1.5: Where impacts occur to occupied habitat, compensatory mitigation using the Colton Dunes Conservation Bank, or comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-1, *Annual Mitigation Costs*).

Species Goal 2: Provide conservation of **ESBB** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 2.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 2.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, a bore replacement shall be utilized to avoid impacts to the species.
Objective 2.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 2.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.1.
Objective 2.5: Where impacts occur to occupied habitat, compensatory mitigation using the La Purisma Conservation Bank, or comparable mitigation bank available at the time the impact occurs (Table 8.1.3-2, *Mitigation Banking Fees*).

Species Goal 3: Provide conservation of **MSS** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 3.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 3.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, a bore replacement shall be utilized to avoid impacts to the species.
Objective 3.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 3.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.1.
Objective 3.5: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land (Table 8.1.3), or comparable mitigation bank available at the time the impact occurs will be utilized.

Species Goal 4: Provide conservation of **SAS** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 4.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.

Objective 4.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, a bore replacement shall be utilized to avoid impacts to the species.
Objective 4.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 4.4: Impacts to Santa Ana sucker and its habitat shall be minimized using SoCalGas BMPs, the general mitigation measures found in Section 6.2.1, and contacting USFWS to establish minimization procedures, as the species has no specific measures at this time.
Objective 4.5: Where impacts occur to occupied habitat, compensatory mitigation using the Resource Conservation Mitigation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 5: Provide conservation of **arroyo toad** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 5.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 5.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, a bore replacement shall be utilized to avoid impacts to the species.
Objective 5.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 5.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.2.
Objective 5.5: Where impacts occur to occupied habitat, compensatory mitigation using the Santa Paula Creek Mitigation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 6: Provide conservation of **CRLF** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 6.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 6.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, a bore replacement shall be utilized to avoid impacts to the species.
Objective 6.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 6.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.1.
Objective 6.5: Where impacts occur to occupied habitat, compensatory mitigation using the Santa Paula Creek Mitigation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 7: Provide conservation of **CTS** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 7.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 7.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, a bore replacement shall be utilized to avoid impacts to the species.

Objective 7.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 7.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.2.
Objective 7.5: Where impacts occur to occupied habitat, compensatory mitigation using the La Purisma Mitigation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 8: Provide conservation of **MYLF** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 8.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 8.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, bore replacement shall be utilized to avoid impacts to the species.
Objective 8.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 8.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.2.
Objective 8.5: Where impacts occur to occupied habitat, compensatory mitigation using the Santa Paula Creek Mitigation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 9: Provide conservation of **SRB** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 9.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 9.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, bore replacement shall be utilized to avoid impacts to the species.
Objective 9.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 9.4: Impacts shall be minimized using SoCalGas BMPs, the general mitigation measures found in Section 6.2.1, and contacting CDFW to establish minimization procedures, as the species has no specific measures at this time.
Objective 9.5: Where impacts occur to occupied habitat, compensatory mitigation using the Soquel Canyon Mitigation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 10: Provide conservation of **SWPT** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 10.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 10.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, bore replacement shall be utilized to avoid impacts to the species.
Objective 10.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.

Objective 10.4: Impacts shall be minimized using SoCalGas BMPs, the general mitigation measures found in Section 6.2.1, and contacting USFWS to establish minimization procedures, as the species has no specific measures at this time.
Objective 10.5: Where impacts occur to occupied habitat, compensatory mitigation using the Santa Paula Creek Mitigation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 11: Provide conservation of **BSS** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 11.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 11.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, bore replacement shall be utilized to avoid impacts to the species.
Objective 11.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 11.4: Impacts shall be minimized using SoCalGas BMPs, the general mitigation measures found in Section 6.2.1, and contacting CDFW to establish minimization procedures, as the species has no specific measures at this time.
Objective 11.5: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land (Table 8.1.3), or comparable mitigation bank available at the time the impact occurs will be utilized.

Species Goal 12: Provide conservation of **burrowing owl** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 12.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 12.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, bore replacement shall be utilized to avoid impacts to the species.
Objective 12.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 12.4: Impacts shall be minimized using SoCalGas BMPs, the general mitigation measures found in Section 6.2.1, and contacting USFWS to establish minimization procedures, as the species has no specific measures at this time.
Objective 12.5: Where impacts occur to occupied habitat, compensatory mitigation using the Palo Prieto Conservation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 13: Provide conservation of **CAGN** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 13.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 13.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, bore replacement shall be utilized to avoid impacts to the species.
Objective 13.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.

Objective 13.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.3.
Objective 13.5: Where impacts occur to occupied habitat, compensatory mitigation using the Santa Paula Creek Mitigation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 14: Provide conservation of **LBV** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 14.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 14.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, bore replacement shall be utilized to avoid impacts to the species.
Objective 14.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 14.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.3.
Objective 14.5: Where impacts occur to occupied habitat, compensatory mitigation using the Santa Paula Creek Mitigation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 15: Provide conservation of **SWF** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 15.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 15.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, bore replacement shall be utilized to avoid impacts to the species.
Objective 15.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 15.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.3.
Objective 15.5: Where impacts occur to occupied habitat, compensatory mitigation using the Santa Paula Creek Mitigation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 16: Provide conservation of **WYBC** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 16.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 16.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, bore replacement shall be utilized to avoid impacts to the species.
Objective 16.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.

Objective 16.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.3.
Objective 16.5: Where impacts occur to occupied habitat, compensatory mitigation using the Soquel Canyon Mitigation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 17: Provide conservation of **SBKR** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 17.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 17.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, bore replacement shall be utilized to avoid impacts to the species.
Objective 17.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 17.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.4.
Objective 17.5: Where impacts occur to occupied habitat, compensatory mitigation using the Cajon Creek Conservation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 18: Provide conservation of **SJKF** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 18.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 18.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, bore replacement shall be utilized to avoid impacts to the species.
Objective 18.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.
Objective 18.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.4.
Objective 18.5: Where impacts occur to occupied habitat, compensatory mitigation using the Palo Prieto Conservation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 19: Provide conservation of **SKR** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 19.1: If Covered Activities are occurring to an existing above-ground pipeline, impacts to the species shall be avoided where feasible.
Objective 19.2: If Covered Activities are occurring to an existing below-ground pipeline or new facilities, bore replacement shall be utilized to avoid impacts to the species.
Objective 19.3: For the construction of new facilities, suitable habitat shall be avoided by selecting a location outside of suitable habitat to build.

Objective 19.4: Where avoidance is determined to be infeasible due to engineering, technical, or safety requirements, impacts shall be minimized using SoCalGas BMPs and the mitigation measures outlined in Section 6.2.9.4.
Objective 19.5: Where impacts occur to occupied habitat, compensatory mitigation using Soquel Canyon Mitigation Bank or a comparable mitigation bank available at the time the impact occurs shall be utilized (Table 8.1.3-2).

Species Goal 20: Provide conservation of **BMV** within SoCalGas work areas and minimize and mitigate impacts associates with Covered Activities.

Objective 20.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 20.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 20.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 20.4: Where impacts occur to occupied habitat, compensatory mitigation using the Petersen Ranch Mitigation Bank as described in Chapter 8 (Table 8.1.3-2), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 21: Provide conservation of **California seablite** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 21.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 21.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 21.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 21.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 22: Provide conservation of **CCBT** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 22.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 22.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 22.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 22.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 23: Provide conservation of **Conejo dudleya** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 23.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 23.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 23.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 23.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 24: Provide conservation of **GWC** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 24.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 24.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 24.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 24.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 25: Provide conservation of **Gaviota tarplant** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 25.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 25.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 25.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 25.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 26: Provide conservation of **IKM** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 26.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 26.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 26.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 26.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 27: Provide conservation of **LYS** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 27.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 27.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 27.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 27.4: Where impacts occur to occupied habitat, compensatory mitigation using the La Purisma Conservation Bank as described in Chapter 8 (Table 8.1.3-2), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 28: Provide conservation of **Lyon's pentachaeta** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 28.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 28.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 28.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 28.4: Where impacts occur to occupied habitat, compensatory mitigation using the Petersen Ranch Mitigation Bank as described in Chapter 8 (Table 8.1.3-2), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 29: Provide conservation of **marcescent dudleya** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 29.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 29.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 29.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 29.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 30: Provide conservation of **Morro manzanita** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 30.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 30.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 30.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.

Objective 30.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 31: Provide conservation of **Nevin's barberry** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 31.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 31.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 31.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 31.4: Where impacts occur to occupied habitat, compensatory mitigation using the Petersen Ranch Conservation Bank as described in Chapter 8 (Table 8.1.3-2), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 32: Provide conservation of **NML** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 32.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 32.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 32.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 32.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 33: Provide conservation of **Pismo clarkia** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 33.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 33.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 33.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 33.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 34: Provide conservation of **SFVS** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 34.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 34.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.

Objective 34.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 34.4: Where impacts occur to occupied habitat, compensatory mitigation using the Petersen Ranch Conservation Bank as described in Chapter 8 (Table 8.1.3-2), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 35: Provide conservation of **SARW** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 35.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 35.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 35.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 35.4: Where impacts occur to occupied habitat, compensatory mitigation using the Cajon Creek Conservation Bank as described in Chapter 8 (Table 8.1.3-2), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 36: Provide conservation of **SMMD** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 36.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 36.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 36.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 36.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 37: Provide conservation of **SBB** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 37.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 37.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 37.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 37.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 38: Provide conservation of **SHS** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 38.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.

Objective 38.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 38.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 38.4: Where impacts occur to occupied habitat, compensatory mitigation using the Cajon Creek Conservation Bank as described in Chapter 8 (Table 8.1.3-2), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 39: Provide conservation of **VMF** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 39.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 39.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 39.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 39.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 40: Provide conservation of **VMMV** within SoCalGas work areas and minimize and mitigate impacts associated with Covered Activities.

Objective 40.1: Within SoCalGas Covered Activities, the species shall be avoided where feasible.
Objective 40.2: If avoidance is not feasible, the species' seed shall be collected and restoration shall be implemented on-site.
Objective 40.3: If on-site restoration is not feasible, CDFW will be contacted for salvage and restoration at an alternative site.
Objective 40.4: Where impacts occur to occupied habitat, compensatory mitigation using the acquisition of land as described in Chapter 8 (Table 8.1.3-3), or a comparable mitigation bank available at the time the impact occurs shall be utilized.

Species Goal 41: Provide conservation of **Verity's dudleya** within SoCalGas work areas and minimize and mitigate impacts associates with Covered Activities.

Objective 41.1: Within SoCalGas Covered Activities, shall be developed to avoid extant populations of this species.
Objective 41.2: Where small capital improvements are proposed on adjacent parcels of land with extant populations of Verity's dudleya, the extant populations shall be marked as an off-limits area.

6.2 Measures to Avoid and Minimize Take

Section 10(a)(2)(A) of the ESA requires that an HCP specify the measures that the permittee shall take to minimize and mitigate to the maximum extent practicable the impacts of the take of any Covered Species as a result of activities addressed by the Plan. Plant and wildlife species identified in work areas, per individual SoCalGas project, will be screened through the predicted suitability model

(Appendix D). Prior to implementing any measures outlined in this section, the predictive suitability model designed from the GEARs database will be able to identify if suitable habitat for Covered Species is present per project. The GEARs database is used conjointly with other SoCalGas SOPs to include site visits for all undeveloped areas within or near historic and suitable range of Covered Species to assess physical absence or presence. Under the MSHCP, all Covered Activities taking place within potentially suitable habitat for a Covered Species as identified in the predictive model, or otherwise occurring within an area known to be occupied by a Covered Species, shall be subject to a comprehensive set of AMMs (Appendix D).[492] For each of these activities, a specific set of measures shall be developed based on (1) the output of SoCalGas' Predictive Model; (2) the existing baseline site conditions; and (3) the Covered Activity itself, including the project footprint and construction schedule. Project AMMs shall be stipulated under an Environmental Clearance as part of SoCalGas' internal approval process.

The AMMs are organized into four categories: General Measures, Habitat Measures, Species-Specific Measures, and Compensatory Mitigation. Compensatory mitigation is described in Section 6.3 Measures to Mitigate Unavoidable Take. Protocol-level surveys are only required for select species with limited numbers or populations as agreed to by USFWS and SoCalGas. Additional measures discussed in this section cover water quality BMPs, jurisdictional waters, safety and fire prevention practices, wildlife connectivity, nesting bird policy, covered plant policy, and emergency response.

6.2.1 General Measures

If one or more Covered Species has the potential to occur, SoCalGas will assume the Covered Species are present by reason of the predictive model of suitable habitat and will implement applicable AMMs for each species assumed present. AMMs shall be forwarded to the Project Biologist to ensure that appropriate AMMs are implemented. Project Biologists shall seek USFWS approval if any deviation from the provided measures shall occur. General Measures are designed to be sufficient on their own to avoid or minimize potential impacts to most Covered Species. General Measures shall apply to nearly all SoCalGas O&M activities that take place within natural areas.

G-1 SoCalGas shall implement a training program to ensure that SoCalGas employees, including employees contracted by SoCalGas, have adequate information and understanding regarding the avoidance and minimization measures set out in this MSHCP. The training program shall focus on compliance, project review, measure implementation, and reporting and notification procedures. Field crews shall participate in "tailgate" training prior to the commencement of activities that may impact suitable habitat for Covered Species at the discretion of the Project Biologist and/or biological monitor. Field crews shall work under the direction of a trained individual until the training is provided. Tailgates shall generally include reviews of any sensitive biological resources, roles and responsibilities, communication protocols, and the required AMMs.

G-2 Vehicles shall not exceed a speed limit of 15 miles per hour (mph) on unpaved roads within natural areas.

[492] The predictive modeling data prepared in support of the development of this MSHCP will become part of the SoCalGas GEARs system used to identify potential environmental constraints related to SoCalGas O&M activities. Any project proposed within the CRCP Plan Area will be flagged as being subject to the provisions of the MSHCP, including applicable Standard Operating Procedures, Avoidance and Minimization Measures, and Compensatory Mitigation.

G-3 Work and staging areas (including parking and stockpile areas) and temporary access routes shall be located, sized, and flagged by a biological monitor, as necessary, in order to minimize impacts to natural areas. Previously disturbed areas shall be used to the extent feasible and cross-country or overland travel shall be prohibited unless determined critical for a particular project activity.

G-4 Covered plants shall not be collected, except for identification purposes by a Project Biologist (see Appendix F) or as part of a salvage and recovery program in areas that cannot be avoided undertaken consistent with the provisions of the CNPS *Policy on Mitigation Guidelines Regarding Impacts to Rare, Threatened, and Endangered Plants*.[493] Mitigation measures outlined within the *Policy on Mitigation Guidelines* shall be undertaken to the greatest extent feasible.

G-5 Domestic pets or firearms shall not be brought to a project site. Firearms carried by authorized security personnel are exempt from this measure.

G-6 To minimize the risk of fire, vehicle use and parking shall be restricted to areas of bare ground or sparse vegetation within existing access roads or activity staging areas. Field crews conducting activities with the potential to inadvertently cause a fire (e.g., welding, grinding, metal cutting) shall be equipped with an appropriate level of fire prevention and suppression equipment, such as fire extinguishers, backpack pumps filled with water, shovels, welding tents, shields, and/or fire-resistant mats.

G-7 Steep-walled excavations (e.g., trenches) that would act as pitfall traps shall be inspected for wildlife at the beginning and ending of the work day and immediately before backfilling. Exclusionary fencing, covers, ramps, or similar mechanisms shall be installed to prevent wildlife entrapment. The removal of any entrapped wildlife shall be performed by, or under the direction of, a biological monitor. Handling of listed species may require additional agency approval and/or deployment of a Project Biologist (Appendix F).

G-8 SoCalGas' *Water Quality Construction Best Management Practices Manual*, as amended over time, shall prescribe the measures necessary to eliminate or reduce pollutants in runoff from Covered Activities. Such measures include, but are not limited to, those construction management measures required pursuant to the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit as amended in 2013 and any subsequent revisions to that permit over the term of the ITP) and the *Construction BMP Online Handbook*.[494,495]

G-9 In the event that nighttime lighting is required for a Covered Activity, measures, such as directing and/or shielding the light away from natural areas, shall be implemented to minimize the illumination of natural areas that may be occupied by covered wildlife.

[493] California Native Plant Society. April 1998. Policy on Mitigation Guidelines Regarding Impacts to Rare, Threatened, and Endangered Plants. Available at: http://www.cnps.org/cnps/archive/mitigation.php.

[494] California Water Resources Board. January 23, 2013. 2009-0009-DWQ Construction General Permit. Available at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml.

[495] California Stormwater Quality Association. 2017. Construction BMP Online Handbook. Available at: https://www.casqa.org/resources/bmp-handbooks/construction

G-10 Herbicides shall be used minimally and applied in accordance with the manufacturer's label instructions and SoCalGas' Environmental and Safety Standards. Three herbicides are authorized for use by SoCalGas in the CRCP Plan Area (Appendix E). The use of any herbicide not covered in this MSHCP would be subject to a Plan Amendment. Spraying shall be conducted when wind velocities are such that herbicide drift is minimized (nine mph or less). This list shall be amended from time to time, and is subject to USFWS approval.

G-11 Any accidental spills shall be cleaned up immediately. All waste material shall be disposed of pursuant to appropriate methods and procedures specified for such materials under applicable federal, state, and local statutes and regulations.

G-12 A trash abatement program will be in place during construction activities. Trash and food items shall be contained in animal-proof containers and removed daily to reduce attractiveness to opportunistic predators. Or what trash and food items are packed in to the construction site will be packed out. Additionally, workers will be trained on the issue of microtrash and how to avoid the deposition of microtrash.

G-13 Upon completion of a project, the worksite shall be cleared of all maintenance equipment and excess materials. For long-term projects, onsite materials shall be stored in a manner that discourages use by wildlife (e.g., capping of pipe segments, installation of exclusionary fencing).

G-14 Wildlife shall not be fed.

G-15 Wildlife shall not be captured, collected or removed, except by or under the direction of a biological monitor. Handling of Covered species shall be conducted under the direction of the USFWS-approved Project Biologist.

G-16 The discovery of any dead or injured covered wildlife species or other threatened or endangered wildlife shall be reported to the USFWS and any additional regulatory federal or state agency with regulatory oversight or authority: USACE, NMFS, USFS, and/or CDFW within 24 hours.

G-17 Disturbed areas shall be restored and stabilized to reflect preexisting contours and gradients to the extent feasible. Erosion and sediment controls (e.g., silt fences, fiber rolls, sandbags) shall be installed, where necessary, with an emphasis placed on utilizing weed-free materials. Fill soils shall be utilized from sources known to be free of non-native species of plants.

G-18 In an effort to minimize the introduction and spread of invasive weeds, any temporary ground disturbance shall be revegetated with native plant species representative of the preexisting plant community in accordance with the provisions of the CNPS *Policy on Mitigation Guidelines Regarding Impacts to Rare, Threatened, and Endangered Plants*.[496] Activities that are performed on a regular basis at a given location ("regularly re-occurring activities") are not subject to this measure.

G-19 Prior to start of Covered Activities, a pre-project survey shall be conducted no less than 14 days and no more than 30 days prior to the project start. The pre-project survey will occur in

[496] California Native Plant Society. April 1998. Policy on Mitigation Guidelines Regarding Impacts to Rare, Threatened, and Endangered Plants. Available at: http://www.cnps.org/cnps/archive/mitigation.php.

suitable habitat predicted from the species distribution modeling for Covered Species and in areas where a range of Covered Species has been identified by a Project Biologist, depending on the Covered Species potentially present (Appendix F). The survey shall be conducted within the project footprint and a 250-foot buffer from the edges of the worksite, where accessible and within SoCalGas ROW. Inaccessible areas and areas outside the SoCalGas ROW shall be surveyed with binoculars. Buffer zones shall be established around covered plant species and any burrows, dens, or nests deemed occupied by any Covered Species within and adjacent to the project area.

G-20 Covered Activity sites that lie within or near habitat deemed suitable to support Covered Species shall be monitored by the Project Biologist and/or biological monitors during project implementation.

G-21 All biological monitors shall have the power to immediately halt work if ANY Covered Species is affected in a way not anticipated in this MSHCP. The Project Biologist shall resolve the situation by eliminating the potential to adversely affect the Covered Species, and work may resume only after the Project Biologist determines that impacts to the species have been avoided.

G-22 SoCalGas shall request USFWS approval of any Project Biologists wishing to conduct activities pursuant to this MSHCP (Appendix F). Such requests shall be in writing, and the Ventura Fish and Wildlife Office must receive the request at least 15 days prior to any such activities, with the exception of emergency activities which may require expedited notification. For most Covered Species, pre-construction clearance surveys and construction monitoring may be conducted by a biological monitor that is able to identify the Covered Species potentially present. Observations of Covered Species during these activities would be incidental, and not considered protocol surveys. However, should an individual of a Covered Species be discovered in harm's way, an approved Project Biologist will relocate the individual.

6.2.2 Habitat Measures

Additional measures shall be required for sensitive habitats within the CRCP Plan Area in order to adequately avoid or minimize the potential effects of Covered Activities. Habitat Measures specifically address riparian, aquatic, and nesting bird habitats. These measures shall be applied to Covered Activities conducted in riparian or aquatic habitat areas or in proximity to nesting bird habitat during the breeding season (February 15 to August 31).

Riparian and Aquatic Habitats

H-1 Where appropriate, prior to implementing a Covered Activity within riparian or aquatic habitat, SoCalGas shall coordinate with, and obtain authorizations from, the USACE, the CDFW, and the appropriate RWQCB to ensure that any potential adverse effects to biological resources and water quality shall be avoided or minimized. All mitigation shall be consistent with the *Regional Compensatory Mitigation and Monitoring Guidelines for South Pacific Division*.[497]

[497] U.S. Army Corps of Engineers. January 12, 2015. Regional Compensatory Mitigation and Monitoring Guidelines for South Pacific Division Final. Available at: http://www.spd.usace.army.mil/Portals/13/docs/regulatory/mitigation/MitMon.pdf

H-2 To the extent practicable, activities occurring within riparian or aquatic habitat shall take place during periods of no-flow or low-flow.

H-3 When biological surveys and/or Covered Activities are required in aquatic habitats suitable for covered amphibian species, all decontamination procedures outlined in the *Fieldwork Code of Practice* by the Declining Amphibian Populations Task Force shall be followed at all times.[498]

H-4 Any equipment or vehicles driven and/or operated within or adjacent to riparian or aquatic habitat shall be checked daily and maintained to prevent leaks of materials that, if introduced to water, could be harmful to aquatic life. All refueling and maintenance of vehicles and equipment shall be conducted at a minimum distance of 100 feet away from the edge of riparian or aquatic habitat. If it is infeasible to maintain a 100-foot buffer for fueling activities, appropriately sized secondary containment shall be utilized to prevent any accidental spills or leaks from reaching waterbodies.

H-5 When dewatering is necessary in habitats suitable for covered aquatic species, submersible pumps shall be appropriately screened to prevent entrainment of fish and amphibians.

H-6 Temporary ground disturbances to wetland or riparian areas larger than 0.1 acre shall be revegetated with native plant species representative of the preexisting plant community. Areas subject to regular and persistent disturbance (e.g., sediment basins) are not subject to this revegetation requirement.

6.2.3 Water Quality Best Management Practices

Covered Activities have the potential to adversely affect water quality directly through contribution of pollutants from equipment and/or indirectly through erosion and sedimentation, that might contribute to habitat degradation for Covered Species dependent upon natural hydrological processes for all or a portion of their lifecycle. Covered Activities that meet the definition of Linear Underground/Overhead Projects (LUPs) over one acre in size but meet the definition of routine maintenance in the CGP (SWRCB Order No. 2009-009-DWQ) are exempt from permit coverage.[499] Routine maintenance activities are not defined as construction activity. Covered Activities that are not LUPs, and are one acre or greater in size, are subject to storm water control regulations in the California Construction General Storm Water Discharge Permit (CGP) established by the California

[498] Declining Amphibian Populations Task Force. 27 June 1998. The Declining Amphibian Populations Task Force Fieldwork Code of Practice. FrogLog 27.

[499] CGP Attachment A.2

"*Projects and Activities Not Defined As Construction Activity*

1. LUP construction activity does not include routine maintenance projects to maintain original line and grade, hydraulic capacity, or original purpose of the facility. Routine maintenance projects are projects associated with operations and maintenance activities that are conducted on existing lines and facilities and within existing right-of-way, easements, franchise agreements or other legally binding agreements of the discharger. Routine maintenance projects include, but are not limited to projects that are conducted to:

- *Maintain the original purpose of the facility, or hydraulic capacity.*
- *Update existing lines and facilities to comply with applicable codes, standards and regulations regardless if such projects result in increased capacity.*
- *Repairing leaks."*

State Water Resources Control Board (SWRCB) Order No. 2009-009-DWQ, which requires the implementation of BMPs to protect water quality standards. While LUP routine maintenance projects are exempt from CGP coverage, SoCalGas implements applicable BMPs from the *SoCalGas Best Management Practices Manual for Water Quality and Storm Water Management* for all projects.[500] In addition, any activities involving hydrostatic testing or site dewatering activities related to the excavation, construction, testing, maintenance and/or repair of natural gas facilities must be undertaken consistent with the provisions of Order WQ 2017-0029-DWQ, requiring the implementation of BMPs for these specific types of activities.[501]

The SoCalGas Environmental Lead will be responsible for coordinating with SoCalGas Operations to identify structural and nonstructural BMPs to control sediment and non-storm water discharges from the work area for the Covered Activity: sediment controls, waste management and material controls, non-storm water discharge controls, and erosion control and soil stabilization.

Sediment Controls

Actions to prevent sediment from entering watercourses during and after construction may include, but are not limited to, the identified BMPs in this plan: scheduling, silt fencing, fiber rolls, gravel bag berms, sand bag barriers, storm drain/drainage inlet protection, tracking controls, stockpile management, sediment basins, proper material delivery and storage, solid waste management, concrete waste management, preservation of existing vegetation, temporary soil stabilization, dust and erosion control, soil binders, and straw mulch.

WQSC-1 Scheduling. Scheduling consists of the planning of soil disturbance activities to avoid periods of rain whenever practical.

WQSC-2 Silt Fence. Silt fences are temporary linear sediment barriers made of permeable fabric that lets water through but prevents the majority of sediment from passing through. Silt fences also act by intercepting and slowing the flow of sediment-laden runoff and allowing sediment to settle from the runoff before water leaves the construction site.

WQSC-3 Fiber Rolls. A fiber roll (straw waddle) consists of straw, flax or other similar materials that are rolled and bound into a roll. The fiber roll lets water through but prevents the majority of sediment from passing through. Fiber rolls also act by intercepting and slowing the flow of sediment-laden runoff and allowing sediment to settle from the runoff before water leaves the construction site.

In sensitive vegetation areas, only certified weed-free rice straw is to be used.

WQSC-4 Gravel Bag Berms. A gravel bag berm consists of at least a single row of gravel bags that are installed end-to-end to form a barrier across a slope to intercept runoff, slow flows and allow sediment to settle out of water

WQSC-5 Sandbag Barrier. A sandbag barrier is a temporary linear sediment barrier consisting of at least one row high of sandbags placed end-to-end, designed to intercept and slow sediment-laden

[500] Southern California Gas Environmental Services Department. March 2015 (rev 2). *SoCalGas Best Management Practices Manual for Water Quality and Storm Water Management*. Southern California Gas Company, 555 W. Fifth Street, Los Angeles, CA, 90013. Geosyntec Project No. SW0186.

[501] SoCalGas has coverage under Order WQ 2017-0029-DWQ for all dewatering and hydrostatic test water discharges to land and surface waters.

storm water and non-storm water runoff. Sandbag barriers allow sediment to settle from runoff before water leaves the construction site. Sandbag barriers tend to block and pond storm water flows.

WQSC-6 Storm Drain/Drainage Inlet Protection. A BMP or a combination of BMPs used at storm drains or other drainage inlets to protect against the discharge of sediment-laden storm water and non-storm water runoff from construction or O&M activities. The BMP slows or ponds the storm water flow, giving the sediment time to settle out before discharge to the storm drain.

WQSC-7 Tracking Controls. Tracking controls consist of constructed/manufactured steel plates (rumble plates) or gravel. Tracking controls reduce offsite tracking of sediment and other pollutants by providing a stabilized entrance at defined soil disturbance activity site entrances and exits with materials that aid in removing sediment from vehicles, especially their tires or tracks. Controls can also consist of providing methods to clean-up sediment or other materials to prevent them from entering a storm drain, such as sweeping or vacuuming. Tracking controls can also include implementing tire washing.

WQSC-8 Stockpile Management. Stockpile management consists of placing temporary BMPs, such as secured covers over the piles, and/or placing berms, silt fences, fiber rolls, sand/gravel bags or straw bale barriers around the perimeter of stockpiles. Soil stabilizers/binders may also be used to augment stockpile management.

WQSC-9 Sediment Basin. Sediment basins are temporary basins formed by excavation or by constructing an embankment to temporarily detain sediment-laden runoff, allowing sediment to settle out before water leaves the site. The CGP specifies that sediment basins be designed per the CASQA fact sheet SE-2.

WQSC-10 Sediment Trap. Sediment traps are small, temporary containment areas where sediment laden runoff is detained, allowing sediment to settle from the runoff before water leaves the site. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area, and usually have a gravel outlet. Sediment traps only remove large and medium-sized soil particles and require upstream erosion control.

WQSC-11 Check Dams. Check dams are small barriers constructed of rock, logs, gravel bags, sandbags, fiber rolls, or other suitable materials, placed across a swale or drainage ditch. Check dams create small pools and reduce the effective slope of the channel, reducing scour and erosion by reducing flow velocity and increasing residence time within the channel. Check dams promote sediment trapping.

Waste Management and Material Controls

Federal, State and local laws, regulations, ordinances and permits prohibit the discharge of contaminated storm water to storm drains, drainages, and surface waters. Pollutants such as litter, paint, solvents, fuel, lubricants and demolition waste can be transported by runoff from a work area associated with a Covered Activity; therefore, these BMPs address pollutants associated with material use and waste management to ensure that all pollutants are properly managed and are not discharged to storm drains, drainages, and surface waters.

WQWM-1 Material Delivery and Storage. Material Delivery and Storage Controls are procedural BMPs controlling the delivery and storage of construction materials, supplies and waste so that storm

water run-on and run-off and non-storm water discharges do not make contact with the material or waste.

WQWM-2 Material Use. Material Use is a procedural BMP that controls the amount or use of materials, chemicals, and/or hazardous substances stored onsite and minimizes their potential for contact with storm water run-on or runoff or by non-storm water discharges.

WQWM-3 Spill Control. Spill Control is a procedural BMP used to control, contain, and clean-up spills on site so that storm water run-on and runoff and non-storm water discharges do not become contaminated.

WQWM-4 Solid Waste Management. Solid Waste Management is a procedural BMP used to minimize site non-hazardous solid waste generation and control the contact of site non-hazardous solid waste with storm water or non-storm water runoff. Examples of potential solid waste requiring management control BMPs include, but are not limited to,

- Concrete, cement, asphalt rubble, masonry brick/block;
- Vegetation debris, general trash, and materials used to transport and package construction materials; and
- Steel and scrap metals, pipe, electrical cuttings and equipment parts.

WQWM-5 Hazardous Materials/Waste Management. Hazardous Materials/Waste Management is a procedural BMP for the use, control, containment, and disposal of hazardous materials and waste. This BMP is to be used in conjunction with SCG Environmental Standard (ES) 104.085 Hazardous Materials/Waste Management. Examples of potential hazardous materials and waste requiring management control BMPs may include, but are not limited to,

- Petroleum products such as oil, fuel, grease, cold mix, and tar;
- Glues, adhesives, and solvents;
- Herbicides, pesticides, and fertilizers;
- Paints, stains, and curing compounds; and
- Other hazardous or toxic substances.

WQWM-6 Contaminated Soil Management. Contaminated Soil Management is a procedural BMP for the control of contaminated soils, or soils suspected of being contaminated, that are encountered during site activities. Importation of fill shall also be managed in accordance with ES 104.0008 Import Fill Materials for Large Projects (>100 Cubic Yards), Projects within Coastal Zone, and Environmentally Sensitive Areas.

WQWM-7 Sanitary/Septic Waste Management. Sanitary/Septic Waste Management is a procedural BMP for the control of sanitary/septic waste. Sanitary/Septic waste is domestic (human) waste.

WQWM-8 Liquid Waste/Drilling Fluid Management. Non-hazardous Liquid Waste/Drilling Fluid Management is a procedural BMP for managing non-hazardous liquid waste on a construction or O&M activity site. Hazardous liquid waste, including water with an oily sheen, should be managed using BMP 2-05 "Hazardous Materials/Waste Management."

Dewatering operations, and concrete slurry residue should be managed according to BMP 3-01, and BMP 3-05, respectively.

Non-hazardous Liquid Waste includes, but is not limited to,

- Drilling slurries/muds and fluids, and wastewater and rinse water without an oil sheen (including pressure washing); and
- Dredging spoil and non-storm water liquid discharges that do not have discharge permits.

Non-Storm Water Discharge Controls

Storm water conveyance systems (natural or manmade, wet or dry) are, by regulation, for conveying storm water or exempt or permitted non-storm water discharges only. Storm water conveyance systems eventually discharge to natural water bodies. Non-storm water, which may reach these storm water conveyance systems, may contain pollutants, such as sediment, that are harmful to the natural water bodies. Also, sediment from construction sites can clog storm water systems or reduce the volume of storm water that can be handled by the storm water system.

WQNWD-1 Dewatering Operations. Dewatering Operations is a procedural BMP for controlling construction or O&M dewatering to assure regulatory compliance.

WQNWD-2 Paving Operations. Paving Operations is a procedural BMP for controlling non-storm water discharges associated with pavement surfacing or resurfacing, patching, or pavement removal.

Paving Operations activities may typically utilize the following materials:

- Cold mix;
- Asphalt;
- Chip Seal, Seal Coat, Tack Coat, Slurry Seal, Fog Seal; and
- Portland Cement Concrete.

WQNWD-3 Vehicle and Equipment Washing. Vehicle and Equipment Washing is a procedural BMP for controlling vehicle and equipment washing on construction or O&M activity sites.

WQNWD-4 Vehicle and Equipment Fueling. Vehicle and Equipment Fueling is a procedural BMP for controlling vehicle and equipment fueling on construction or O&M activity sites.

WQNWD-5 Concrete/Coring/Saw Cutting and Drilling Waste Management. Concrete/Coring/Saw Cutting and Drilling Waste Controls are procedural BMPs for the proper management of liquid and solid waste from concrete/coring/saw cutting and drilling activities.

WQNWD-6 Dewatering Gas Vaults. Dewatering Gas Utility Vaults is a procedural BMP for controlling water from dewatering gas utility vaults and underground structures (hereon known as vaults). This BMP does not apply to trench, excavation or other general dewatering associated with construction activities.

WQNWD-7 Over-Water Protection. Over-Water Protection is a procedural and containment system BMP for protecting watercourses from overhead construction and maintenance and repair activities.

- Over-water construction and maintenance activities include, but are not limited to, chipping, grinding, scraping, welding/burning, painting, wrapping and coating of pipes and conduits.
- Watercourses (dry or wet) include drainages, creeks, streams, rivers, lakes and wetlands, bays, estuaries and oceans.

WQNWD-8 Paint Removal Control. Paint Removal Control is a procedural BMP for protecting storm water and water courses from mark-out paint or graffiti paint removal activities.

WQNWD-9 Stream Crossings. A stream crossing is a culvert, ford, or bridge placed across a waterway to provide access for construction or O&M activities. Utility stream crossings are not intended to maintain public traffic and project-specific permits may be required for use (see "Limitations"). The crossing design and construction allows safe access and reduces erosion and downstream sediment from vehicles.

The project Field Environmental Lead should be consulted for any permit requirements and for the stream crossing location.

The following types of stream crossing should be considered:

- **Culverts:** Appropriate to control erosion but may cause erosion during installation/removal without appropriate BMP measures. Easily constructed and allows for heavy equipment loads.

- **Fords:** A ford is a streambed crossing alternative that involves crossing a waterbody at grade, on a hard surface maintained at the streambed bottom. Appropriate during dry weather and in arid areas in dry washes, ephemeral streams, and low-flow perennial streams. Ford crossings generally involve the placement of gravel or other non-erodible material to facilitate crossing and are appropriate for streams that would benefit from additional clean native or compatible gravel; for example, salmonid streams or rivers below reservoirs, and urban, channelized streams. Fords provide minimum sediment and erosion control in a stream channel and are most appropriate when the potential for stream channel erosion and dislodgement of sediment due to the addition of the material and traffic is low.

  A ford is the least expensive stream crossing, allows for maximum load limits, and offers very low maintenance. Fords may degrade water quality due to vehicle and equipment contact. Direct placement of gravel may be appropriate for short-term use. In addition, soil-confinement systems can also be used in low-flow intermittent stream crossings for ease with implantation and removal. Examples include

  - Cellular Confinement Systems (CCS) crossings consist of three-dimensional cellular-type material placed on the streambed bottom and filled with rock or soil. CCSs are an effective option when used in conjunction with ford crossings because it is sufficient to support most construction equipment and is readily removable.
  - Articulated concrete mats (e.g., concrete blocks held together by steel cable or interlocking concrete blocks) can also be used for fording a stream. Articulated concrete mats can be used to harden the streambed for crossing. Gravel should be placed on the mats to fill in the voids between concrete blocks.

- Gabion mattresses consisting of rock contained in rectangular, wire-mesh can also be used for constructing a hard driving surface. Gabion mattresses are strong and durable, flexible structures, and are easily constructed.

- **Bridges:** Appropriate for streams with high-flow velocities, steep gradients, and where temporary restrictions in the channel are not allowed. Bridges are more expensive to design and construct but provide the least streambed disturbance and waterway flow constriction.

Limitations:

- Installation may cause a waterway constriction, which can obstruct flood flow and cause flow backups, washouts, and/or scouring.
- Installation may require RWQCB 401 Certification, USACE 404 permit and approval by the CDFW. If numerical water quality standards are mentioned in any permits, sampling and testing may be required.
- Installation and removal will usually disturb the waterway and may require dewatering or temporary stream diversion.
- Soil confinement systems used for stream crossings must be constructed in accordance with the manufacturer's specifications and inspected and maintained for structural integrity.
- Gravel use in the stream for soil-confinement system crossings will require agency approval.
- Requires other BMPs to minimize soil disturbance during installation and removal.

WQNWD-10 Clear Water Diversion. Clear water diversion is a system of structures and measures that intercept clear surface water runoff upstream of a construction project or O&M activity, transport it around the work area, and discharge it downstream with minimal water quality degradation. It encloses a construction area in a waterway and reduces sediment pollution from construction in, or adjacent to water. Structures commonly used as part of this system include diversion ditches, berms, dikes, slope drains, rock, gravel bags, wood, aqua barriers, cofferdams, filter fabric, or turbidity curtains, drainage or interceptor swales, pipes, or flumes.

Limitations:

- Diversion activities will usually disturb the waterway during installation/removal.
- Installation may require RWQCB 401 Certification, USACE 404 permit, and approval by CDFW. If numerical water quality standards are mentioned in any permits, sampling and testing may be required.
- Diversion activities may constrict the waterway, obstruct flood flows, and cause flooding or washouts. Diversion structures should not be installed without identifying potential impacts to the stream channel.
- Diversion or isolation activities are not appropriate in channels where there is insufficient stream flow to support aquatic species in the dewatered area or if they will disturb sensitive aquatic species.
- Diversion or isolation activities are inappropriate in deep water unless designed and reviewed by a California Registered Civil Engineer.

- Diversion or isolation activities should not completely dam stream flow.
- Dewatering and removal may require additional sediment control or water treatment.

Erosion Control and Soil Stabilization

Erosion Controls are methods used to protect the soil surface and prevent the soil particles from being detached and transported by rain, flowing water, or wind. Erosion controls include limiting soil or vegetation disturbance to reduce erosion. Preservation of Existing Vegetation is an example of an Erosion Control BMP.

Soil Stabilization is the most widely used and most effective method of erosion control. Preventing or reducing erosion potential by directing or controlling drainage runoff, as well as preparing and stabilizing disturbed soil areas, protects the exposed soil surface from rain and wind thereby preventing erosion. Diversion Berms and Drainage Swales is an example of an erosion control BMP that intercepts and conveys run-on around or through the project reducing erosion potential. Hydroseeding is also an example of an erosion control BMP that stabilizes the soil.

WQEC-1 Preservation of Existing Vegetation. Preservation of Existing Vegetation is a procedural BMP that maximizes the preservation of existing trees, shrubs, bushes, and grasses on a construction or O&M activity site.

WQEC-2 Temporary Soil Stabilization (General). Temporary Soil Stabilization is a procedural BMP utilizing protective materials to cover exposed soil, where the soil exposure is caused by construction or O&M activities. Materials may include hydraulic mulch and seeding, soil binders, straw, geotextiles, plastic covers and erosion control blankets.

Temporary soil stabilization BMPs and their associated materials typically consider the feasibility of five primary methods:

- **Hydraulic Mulch:** Hydraulic Mulch is a procedural BMP for applying mulch to protect the soil surface from wind and rain erosion. Mulch consists of a mixture of shredded wood fiber or other fiber in water and a stabilizing emulsion, or tackifier. The mulch is applied with hydro-mulching equipment (water mixture spraying equipment).
- **Hydroseeding:** Hydroseeding is a procedural BMP for the application of vegetation seed in a protective mixture for both soil and seed. The seed then sprouts, providing vegetation that provides additional soil erosion control (holds the soil in place and shields the soil from erosion). Hydroseeding material typically consists of a mixture of fiber, seed, fertilizer, and stabilizing emulsion.
- **Soil Binders:** Soil Binders is a procedural BMP for applying soil binder material to the soil surface to temporarily prevent water-induced erosion of exposed soils on construction or applicable O&M sites. Soil binders bind with the soil, creating a crust that sheds water and prevents the water erosion. Soil binders also provide temporary dust, wind, and soil stabilization benefits.
- **Straw Mulch:** Straw Mulch is a procedural BMP for the application of a uniform layer of straw to exposed soil surfaces to protect exposed soil from rain and wind erosion. Straw mulch consists of straw and may incorporate a tackifier emulsion for stabilization of the mulch when used for protecting sloped areas of exposed soil.

- **Geotextiles, Plastic Covers and Erosion Control Blankets/Mats:** This Erosion Control and Soil Stabilization BMP is a procedural BMP for the installation of specific erosion control soil stabilization materials to control erosion from wind and water. These materials consist of

  - Geotextile blankets/mats,
  - Plastic covers, and
  - Natural/man-made material erosion control blankets.

  Geotextiles are permeable fabrics typically made from polypropylene (plastic) or polyester that have the ability to protect the soil from erosion but are able to allow some water to reach and to drain the soil. Geotextile fabrics come in three basic forms: woven, needle punched, or heat bonded. Geotextiles also allow controlled rate and filtered drainage from a slope for slope moisture control, while providing slope reinforcement and protection.

  Plastic Covers, such as Visqueen, are essentially impermeable and are used for immediate, temporary protection.

  Erosion control blankets/mats are meant to protect exposed soil from wind and rain impact and reduce the speed at which water moves across the soil surface. These blankets can be made out of straw, coconut fiber, aspen fiber, jute, and polypropylene. Permeability varies according to material and material weave.

WQEC-3 Dust (Wind Erosion) Control. Dust (Wind Erosion) Control is a procedural BMP that consists of applying water or other dust suppressant to prevent or alleviate dust nuisance generated by construction and O&M activities.

WQEC-4 Diversion Berms and Drainage Swales. A Diversion Berm is a temporary berm of compacted soil used to direct runoff water to a desired location. A Drainage Swale is a shaped and sloped soil depression used to convey runoff to a desired location. Diversion berms and drainage swales divert off site runoff around the construction or O&M site, divert runoff from flowing onto stabilized areas and disturbed areas, and direct runoff into sediment basins or traps. A diversion berm or swale itself does not control erosion or remove or trap sediment from runoff.

Limitations:

- Diversion berms may create disturbed areas and become construction equipment barriers.
- Diversion berms must be stabilized immediately, adding cost and maintenance.
- Diverted storm water may cause downstream flood damage.
- Berms should not be constructed of easily eroded soils.
- Re-grading the site to remove the berm may add cost.
- Other soil stabilization and sediment controls such as check dams, plastics, and blankets may be needed to prevent erosion in newly graded berms and swales.
- Sediment accumulation, scour depression, and/or persistent non-storm water discharges can result in standing water suitable for mosquito production.

WQEC-5 Velocity Dissipation Devices. Velocity Dissipation Devices are composed of rock, riprap, grouted riprap or concrete rubble, placed at the outlet of a pipe, channel, or waterbar to prevent scour and erosion caused by concentrated high-velocity flows. There are many types of dissipation devices.

Limitations:

- Large storms or high flows can wash away the outlet protection and leave the area susceptible to erosion.
- Sediment captured by the outlet protection may be difficult to remove without removing the protection.
- Outlet protection may negatively impact the channel habitat.
- Grouted riprap may break up in areas of freeze and thaw.
- With inadequate drainage, water may build up behind and break grouted riprap.
- Sediment accumulation, scour depression, and/or persistent non-storm water discharges can result in standing water suitable for mosquito production.

WQEC-6 Slope Drains. A Slope Drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area. Slope drains are typically used with diversion berms and drainage ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes. Slope drains prevent storm water from flowing directly down the slope by confining the runoff into an enclosed pipe or channel. The slope drain may be installed as a rigid pipe such as corrugated metal, a flexible conduit, or a lined terrace drain with a top of a slope inlet and a bottom of a slope outlet.

Limitations:

- Slope drain sizing, installation, and maintenance are critical to minimize the potential for failure. Severe erosion may result when slope drains fail by overtopping, pipe separation, or other signs of erosion.
- Dissipation of high flow velocities at the pipe outlet is required to avoid erosion.
- Sediment accumulation, scour depression, and/or persistent non-storm water discharges can result in standing water suitable for mosquito production.

WQEC-7 Streambank Stabilization. Streambank Stabilization includes measures to reduce the discharge of sediment from streambanks with exposed or disturbed soil or unstable banks. Streambank stabilization measures include preservation of existing vegetation, hydraulic mulch, hydroseeding, soil binders, straw mulch, geotextiles and mats, berms, and drainage swales, velocity dissipation devices, and slope drains. Streambank sediment controls include silt fences, fiber rolls, gravel bag berms, rock filters, and K-rail barriers, and padding. Each of these measures has different applications, limitations, and maintenance requirements for use as streambank stabilization.

Stream channels, streambanks, and associated riparian areas are dynamic and sensitive ecosystems that respond to changes in land use. Streams on the 303(d) list and listed for sediment may require numerous measures to prevent any increases in sediment load to the stream.

General Streambank Stabilization Limitations:

- Specific permit requirements or mitigation measures such as RWQCB 401 Certification, USACE 404 permit and approval by the California Department of Fish and Game supersede the guidance in this BMP.
- If numerical water quality standards are mentioned in any of these and other related permits, testing and sampling may be required. Soil disturbance activities in watersheds having streams listed as 303(d) impaired for sediment, silt, or turbidity, may require sampling to verify that there is no net increase in sediment load.

WQEC-8 Soil Preparation. Soil Preparation/Roughening involves assessment and preparation of surface soils for BMP installation. This includes soil testing (for seed base, soil characteristics, or nutrients), or roughening surface soils by mechanical methods (including sheepsfoot rolling, track walking, scarifying, stair stepping, and imprinting) to prepare soils for additional BMPs or to break up sheet flow. Soil preparation can also involve tilling topsoil to prepare a seed bed and/or incorporation of soil amendments to enhance vegetative establishment. Various roughening techniques on slopes can result in a significant erosion reduction as compared to smooth slopes.

Limitations:

- Preparation and roughening must take place prior to installing other erosion controls (such as hydraulically applied stabilizers) or sediment controls (such as fiber rolls) on slope faces.
- In cases where slope preparation is minimal, erosion control/revegetation BMPs that do not require extensive soil preparation (such as hydraulic mulching and seeding applications) should be employed.
- Consideration should be given to the type of erosion control BMP that follows surface preparation, as some BMPs are not designed to be installed over various types of tillage/roughening.

6.2.4 Jurisdictional Waters

The Streambed Program provides guidance to protect and compensate for impacts to drainages, wetland, riparian, and aquatic habitats under the jurisdiction of the USACE under Section 404 of the federal Clean Water Act and under the jurisdiction of the CDFW pursuant to Sections 1600 *et seq.* of the Fish and Game Code that have been identified by the SoCalGas Environmental Lead in the screening process using GEARS, conjointly with eTS, and/or a site inspection. SoCalGas will either secure an Individual Permit, from the USACE, for Covered Activities addressed in the CRCP Plan Area or will seek authorization under Nationwide Permit 3, 6, 7, 12, 13, 33, or 44 for any Covered Activity not covered by an Individual Permit, prior to initiating an activity that involves dredge or fill in Waters of the United States. Similarly, SoCalGas will either secure a programmatic Lake or Streambed Alteration Agreement, from the CDFW, for Covered Activities addressed in the CRCP Plan Area, or will obtain a Lake or Streambed Alteration Agreement for any Covered Activity not addressed in a Programmatic Agreement, prior to initiating any non-emergency project that would alter Waters of the State afforded protection pursuant to Section 1600 *et seq.* of the State Fish and Game Code. The State Water Board and RWQCB regulate activities involving Waters of the State and all Waters of the United States, as mandated by both the federal CWA and the California Porter-Cologne Water Quality Control Act.

To offset unavoidable impacts on streambed and wetland/riparian habitats, thereby achieving an overall no-net-loss of streambed functions and values, compensatory mitigation will be provided according to a Habitat Restoration Plan (HRP) and/or Habitat Mitigation and Monitoring Plan (HMMP) approved by the relevant regulatory oversight party: USACE, CDFW, and/or RWQCB (if warranted). The mitigation plans may be implemented in advance of impacts, if possible, to offset temporal loss.

Conservation Strategy for Jurisdictional Waters

Additional protection measures shall be required for certain species or habitat types in order to adequately avoid or minimize the potential effects of Covered Activities (see H-1, H-2, H-3, H-4, H-5, and H-6 of *Riparian and Aquatic Habitats*). Habitat Measures specifically address riparian, aquatic, and nesting bird habitats. These measures shall be applied to Covered Activities conducted in riparian or aquatic habitat areas or in proximity to nesting bird habitat during the breeding season (February 15 to August 31).

6.2.5 Safety and Fire Prevention Practices

SoCalGas tailors safety procedures on a project by project basis to address the potential hazards that are inherent to the site conditions where O&M activities are undertaken. Wildfires can be ignited as a result of natural and anthropogenic sources. Safety is a component of the tailboard project kick-off meeting conducted prior to the initiation of work, with SoCalGas crew and contractors. These tailboards typically focus on location of hospitals, site-specific work hazards, and people safety.

General safety precautions are employed in proximity to manmade or natural flammable materials:

SFP-1 Fire Clearance: A minimum 5-foot clearance is required to mineral soil around each working site.

SFP-2 Hand-held equipment: A shovel, fire extinguisher, and five-gallon backpack pump are required to be accessible within 25 feet of areas where small hand-held equipment, such as chain saws and weed-eaters, are being used to support O&M activities

SFP-3 Welding, cutting, or grinding: Additional precautions apply to activities that have a potential for "sparking:"

- A minimum 10-foot-radius cleared area to mineral soil, the use of a welding tent during operations, and the surrounding area within 25 feet in all directions be wet down prior to and after the welding operation with a 0.3 percent Class A Foam solution.
- A charged hose from a Water Truck or Trailer and a capable operator to be within 50 feet of each project area. If project is more than 200 feet from a Water Truck, the hose must be capable of reaching 100 feet beyond the project site.

SFP-4 Heavy equipment: Use of drill rigs, dozers, or other heavy equipment must have a 300-gallon Water Truck in the immediate vicinity of the project. An operator must be available and capable of taking suppression action, if required.

SFP-5 Excavation and backfilling: A 2,500-gallon water truck must be present adjacent to project areas during grading, excavation, backfilling, mastication, and pioneering operations to facilitate fire suppression, if required.

Specific conditions apply for work undertaken in the National Forests.

- **NF-1 Smoking and Fire Rules:** Smoking shall not be permitted except in a barren area or in an area cleared to mineral soil at least three feet in diameter (California Public Resources Code 4423.4). In areas closed to smoking, the Forest Service representative may approve special areas to be used for smoking. The Permittee/Permittee's Agent(s) shall sign designated smoking areas. Permittee/Permittee's Agent(s) shall post signs regarding smoking and fire rules in conspicuous places for all employees to see. Permittee/Permittee's Agent(s) supervisory personnel shall require compliance with these rules. Under no circumstances shall smoking be permitted while employees are operating light or heavy equipment or walking or working in grass and woodlands. If the National forest goes into Emergency Fire Conditions, smoking is allowed in enclosed vehicles and buildings only.
- **NF-2Storage and Parking Areas:** Equipment service areas, parking areas, and gas and oil storage areas shall be cleared of all flammable material for a radius of at least ***10 feet*** unless otherwise specified by local administrative unit. Small mobile or stationary internal combustion engine sites shall be cleared of flammable material for a slope distance of at least ***10 feet*** from such engine. The Forest Service representative shall approve such sites in writing.
- **NF-3 Welding: BY PERMIT ONLY,** SoCalGas shall confine welding activity to cleared areas having a minimum radius of ***10 feet*** measured from place of welding and utilize a welding tent or metal shield where possible to deflect sparks.
- **NF-4 Blasting: NO BLASTING ALLOWED.**
- **NF-5 Oil Filter and Glass Jugs**: SoCalGas shall remove all oily rags and used oil filters from the National Forest. SoCalGas shall prohibit use of glass bottles and jugs on project operations.
- **NF-6 Reporting Fires:** As soon as feasible, after initial control action is taken, within one hour, the SoCalGas shall notify the Forest Service of any fires along roads or project area within designated contract.
- **NF-7Communications:** SoCalGas shall furnish an agreed upon communication system connecting each operation with the designated Forest Service Dispatch Center. The communications system shall be capable of contacting the designated Forest Service Dispatch Center within five minutes of discovery of a fire in the SoCalGas operating area. The communications system shall be operable during the operations undertaken in the fire precautionary period.
- **NF-8Fire Patrol Person:** When required, the sole responsibility of the Fire Patrol person shall be to patrol the operation for prevention and detection of fires, to make sure all State, County, and Federal regulations and Project Fire Plan conditions are met, and to take suppression action where necessary. By agreement, one Fire Patrol person may provide patrol on this and adjacent projects.

6.2.6 Wildlife Connectivity

SoCalGas considers the importance of maintaining wildlife temporary and permanent connectivity during O&M activities. Wildlife connectivity was considered as a component for the development of the predicative model. Over three million acres of essential wildlife connection habitat is built into the model (Table 6.2.6-1, *Essential Connectivity Areas in the CRCP Plan Area*). O&M activities located within or adjacent to essential connectivity areas, or other areas of local importance for wildlife movement corridors or connects between nursery and foraging habitats will be taken into consideration to maintain essential habitat linkages.

TABLE 6.2.6-1
ESSENTIAL CONNECTIVITY AREAS IN THE CRCP PLAN AREA

Essential Connectivity Areas	Plan Area (acres)
Los Angeles County	
Castro Peak/Santa Monica Mountains – Pine Mountain/Sespe Condor	52,714
Contract Point – Santa Susana Mountains	44,921
Pine Mountain/Sespe Condor – Lucas Creek	19,838
San Gabriel Mountains West – San Francisquito	181,972
Sugarloaf Mountain/Keller Peak – San Gabriel/ Cucamonga	210,795
Total	**510,241**
San Bernardino County	
San Bernardino Mountains – Calico Mountains	86,921
San Jacinto Mountains – San Bernardino Mountains	27,797
Sugarloaf Mountain/Keller Peak – San Gabriel/ Cucamonga	346,680
The Badlands West – Box Springs Mountains	1,358
Total	**462,758**
San Luis Obispo County	
La Panza Range – San Geronimo	504,439
Pancho Rico Valley – Los Padres National Forest	591
San Geronimo – Los Padres National Forest	213,184
San Geronimo – Weferling Canyon	66,720
Total	**784,935**
Santa Barbara County	
La Panza Range – San Geronimo	27,249
San Ynez Mountains West – Casmalia Hills	111,982
Sulphur Mountain – Sierra Madre Mountains	322,478
Total	**461,709**
Ventura County	
Castro Peak/Santa Monica Mountains – Pine Mountain/Sespe Condor	248,326
Contract Point – Santa Susana Mountains	12,988
Pine Mountain/Sespe Condor – Lucas Creek	409,745
Sulphur Mountain – Pine Mountain/Sespe Condor	154,612
Sulphur Mountain – Sierra Madre Mountains	337,276
Total	**1,162,948**
Grand Total	**3,382,591**

The Environmental Project Lead will notify the Operations Division if a Covered Activity is located in or adjacent to essential connectivity areas, or other areas of local importance for wildlife movement corridors or connects between nursery and foraging habitats that must be maintained during and subsequent to the O&M activity. If it is determined in collaboration with USFWS that an existing structure functions as an important wildlife crossing and is proposed to be altered by the

project in a manner that would have the potential to adversely affect wildlife movement, the Operations Lead will be required to implement appropriate design features to ensure that the wildlife crossing maintains or improves functionality during and subsequent to the Covered Activity. Design elements and/or project options may include, but not limited to, steps to maintain suitable terrestrial and aquatic habitat, on either side of the work area to facilitate local and regional connectivity, minimize human activity at dawn and dusk, reduce noise and lighting, provide funneling/fencing, improve internal habitat, and incorporate ledges or other appropriate structural features. Where pipelines cross under, within, or are suspended above or over aquatic or riparian habitats with surface water, temporary diversion plans may be required. Where required, a schematic diversion plan will be submitted to the USFWS 30 days prior to implementation for review and approval. It will be the sole responsibility of SoCalGas to obtain any required related authorization for implementation of the diversion plan pursuant to Sections 401 and 404 of the federal Clean Water Act and Section 1600 of the California Fish and Game Code.

6.2.7 Nesting Bird Policy

The MSHCP shall implement a Nesting Bird Policy to adhere to the protection of nesting birds following the MBTA of 1918.[502] Under the MBTA, it is unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; or possess any migratory bird, part, nest, egg, or product, (manufactured or not) of any such bird listed in international wildlife protection treaties.[503] Migratory birds are defined to include all members of bird families considered migratory, whether or not the species in question exhibits migratory behavior.

Field crews shall avoid performing vegetation management activities or conducting ground disturbing activities within or adjacent to nesting bird habitat during the avian breeding season, March 1 to September 15. Should work be required during this time, the Project Biologist and/or biological monitors shall conduct a survey at least two weeks prior to the start of construction activities for nesting activity within an appropriate buffer distance to the disturbance area. If an active bird nest is observed, a 250-foot buffer for Covered Species or raptors and a 50-foot buffer for other avian species shall be established. The established buffer area shall not be disturbed, and no entry shall be allowed, until the young have fledged and are no longer dependent on the nest or parents for survival. If the buffer falls within an access road used for construction activities, the ingress and egress to the work areas will be managed to avoid take of an active nest while allowing use of the road.

If excluding work activities from any established buffers is not feasible, the avian qualified biologist may establish a modified buffer exclusion, utilizing specific biological and/or ecological attributes of the project location and avian species, including the minimal invasive nature of the work to be performed, sight line from the nest to the worksite, and the nesting bird's behavior.. The active nest shall be monitored by the Project Biologist and/or biological monitors for the duration of construction until the young have fledged and are no longer dependent on the nest or parents for survival. If the Project Biologist determines nesting activities could fail as a result of work activities, all work shall cease within the buffer exclusion (except access along established roadways), and no entry into the buffer will be reestablished.

[502] 50 CFR 10.13

[503] Fish and Game Code Section 3503, 3503.5, 86

The Project Biologist and/or biological monitors shall conduct a pre-activity survey for nests during vegetation clearing. If nests are discovered the Project Biologist and/or biological monitors shall be present to ensure these procedures are followed, buffers are maintained, and minimize likelihood that active nests are abandoned or fail due to construction activities. The Project Biologist and/or biological monitors shall submit weekly monitoring reports to the MSHCP Administrator and shall report any violation of the Nesting Bird Policy.

6.2.8 Covered Plant Policy

There are 22 covered plant species: Braunton's milk vetch (BMV), California seablite, Chorro Creek bog thistle (CCBT), conejo dudleya, Gambel's water cress (GWC), Gaviota tarplant, Indian Knob mountainbalm (IKMB), Lompoc yerba santa (LYS), Lyon's pentachaeta, marcescent dudleya, Morro manzanita, Nevin's barberry, Nipomo Mesa lupine (NML), Pismo clarkia, San Fernando Valley spineflower (SFVS), Santa Ana River woollystar (SARW), Santa Monica Mountains dudleya (SMMD), seaside bird's beak (SBB), slender-horned spineflower (SHS), Vandenberg monkey flower (VMF), Ventura Marsh milk-vetch (VMMV), and Verity's dudleya. Twenty-one of these are endemic to the state of California. GWC is also known to occur in Baja California. These endemics have restrictive habitat, localized soil, and/or other ecological requirements that contribute to their limited distribution. Due to variations in seasons, climatic changes, biotic factors, and physical disturbance, their status and population distribution are difficult to predict. To ensure that impacts to these species are addressed, SoCalGas will implement the Covered Plant Policy. This policy involves the use of project-specific field surveys and mitigation of impacts using credits based on Preserve field surveys and efforts taken to enhance, restore, and create viable populations of covered plant species as part of approved SoCalGas restoration projects. SoCalGas is to maintain credits and debts with a ledger accounting system.

The Covered Plant Species Policy will be implemented based on the following:

Credits: SoCalGas will receive credits for conservation efforts that result in habitat preservation, population recruitment, and/or population creation, except for those efforts that minimize or mitigate for project impacts. Where excess mitigation credits are purchased, they will be held for future actions pursuant to this MSHCP.

Preserves: If SoCalGas opts to purchase/manage mitigation lands, then it will have an ongoing obligation to manage any mitigation lands when it selects to hold title in fee. Where SoCalGas selects or opts to purchase land that is not part of an approved mitigation bank, a conservation easement shall be recorded and a commitment will be made to manage the land in perpetuity, as reviewed and approved by the USFWS. Population size of covered species in selected preserves (Table 6.2.8-1, *Conservation Lands in the CRCP Plan Area*) will be quantified with baseline surveys that will focus on floristic rare plant surveys conducted by qualified biologist(s) during the appropriate blooming period(s). This will serve to quantify the baseline population and measure any subsequent improvements/additions to the known populations for earned credits. Yearly monitoring efforts will be conducted to measure quantitative progress. SoCalGas will provide CDFW and/or USFWS with annual documentation for review and approval to receive credits.

Debts: Impacts to covered plant species from Covered Activities will be tracked and quantified as debts. SoCalGas will complete floristic rare plant surveys during the appropriate blooming time to identify covered plants within project areas. The Project Lead will make adjustments to project design where feasible to avoid or minimize impacts on the covered plant species populations. If impacts cannot be avoided the Project Lead will mitigate impacts based on the following:

- **Mitigation Ratio:** The number of affected plants will be determined through field surveys. Individual plants will be counted or the area affected shall be multiplied to a known density of plants (e.g., number of plants/square foot). The required debt amount will be calculated using a 3:1 mitigation ratio. If SoCalGas does not have enough credits, it can opt to coordinate with CDFW and/or USFWS to carry out a restoration project and/or acquire a preserve to partner with and achieve appropriate mitigation.

- **Biological Superior Alternative:** In coordination with CDFW and/or USFWS, SoCalGas has the option of project-specific salvage efforts to minimize impacts and conserve covered species. Plant salvage efforts may involve saving topsoil, seeds, and bulbs within the affected area. SoCalGas will determine in coordination with CDFW and/or USFWS an appropriate location for relocation of topsoil, seeds, and/or bulbs. Successful covered plant species establishment must be documented before receiving credit(s).

Cap on Impacts: Cumulative impacts on covered plant species due to Covered Activities will be capped off at 500 individuals of each plant species. With this, the Plan does not authorize impacts to unknown populations that may be within the project footprint of Covered Activities. Impact to more than 500 individuals may be authorized through an amendment to the Plan with CDFW and/or USFWS approval.

TABLE 6.2.8-1
CONSERVATION LANDS IN THE CRCP PLAN AREA

County	Name	Type	CDFW Owned	Total in Plan Area
Los Angeles County	Airport Mesa & Grapevine Mesa Conservation Easement	Conservation Easement/Mitigation	No	65
	Ballona Wetlands Ecological Reserve	Ecological Reserve	Yes	587
	Castaic Conservation Easement	Conservation Easement/Mitigation	No	882
	DWR Mitigation -- L.A. Property	Conservation Easement/Mitigation	Yes	908
	Forest Lawn Conservation Easement	Conservation Easement/Mitigation	No	89
	Gordon Highlands Conservation Easement	Conservation Easement/Mitigation	No	17
	Hermosa Beach Fishing Pier	Public Access/Recreational	No	1
	Little Los Flores Canyon Conservation Easement	Conservation Easement/Mitigation	No	72
	Peck Lake Fishing Access	Public Access/Recreational	No	149
	Portal Ridge Conservation Easement	Conservation Easement/Mitigation	No	282
	Puente Hills Conservation Easement	Conservation Easement/Mitigation	No	21
	Rose Hills -- Turnbull Canyon Conservation Easement	Conservation Easement/Mitigation	No	155
	San Gabriel River Conservation Easement	Conservation Easement/Mitigation	No	15
	Violin Canyon Conservation Easement	Conservation Easement/Mitigation	No	10
Total				**3,253**
San Bernardino County	Baldwin Lake Ecological Reserve	Ecological Reserve	Yes	163
	Big Bear Conservation Easement	Conservation Easement/Mitigation	No	4
	Chino Creek Conservation Easement	Conservation Easement/Mitigation	No	2
	Chino Fish & Wildlife Base	Miscellaneous	Yes	1
	San Bernardino Mountains Wildlife Corridor	Wildlife	Yes	116
	Shay Meadow	Conservation Easement/Mitigation	Yes	7
Total				**293**
San Luis Obispo County	Big Sandy Wildlife Area	Wildlife	Yes	388
	Cambria Pines Ecological Reserve	Ecological Reserve	Yes	86
	Chorro Creek Ecological Reserve	Ecological Reserve	Yes	615
	Morro Bay Wildlife Area	Wildlife	No	5
	Morro Dunes Ecological Reserve	Ecological Reserve	Yes	278
	Morro Rock Ecological Reserve	Ecological Reserve	No	32
	Pismo Beach Pier	Public Access/Recreation	No	1
	San Luis Obispo Wildlife Area	Wildlife	Yes	451
Total				**1,855**
Santa Barbara County	Burton Mesa Ecological Reserve	Ecological Reserve	Partial	5,211
	Gaviota Conservation Easement	Conservation Easement/Mitigation	No	35
	Goleta Slough Ecological Reserve	Ecological Reserve	Partial	381
Total				**5,627**
Ventura County	Coldwater Canyon Ecological Reserve	Ecological Reserve	Yes	61
	Conservation Easement	Conservation Easement/Mitigation	No	198
	Fillmore Fish Hatchery	Fish Hatchery	Partial	25
	Fitzgerald Road - Simi Valley Conservation Easement	Conservation Easement/Mitigation	No	2
	Twin Lakes Conservation Easement	Conservation Easement/Mitigation	No	10
	Ventura Fishing Pier	Public Access/Recreational	No	1
Total				**297**
Grand Total				**11,325**

6.2.9 Emergency Response

The MSHCP Administrator, working with the Project Biologist, shall provide guidance to field crews regarding implementation of the AMMs during emergency responses. When such coordination is not feasible, given the emergency nature of the response, the MSHCP Administrator shall determine appropriate measures to address impacts once the emergency has been stabilized. A written summary of emergency actions undertaken, the AMMs deemed impracticable to implement at the time of the emergency, and the applicable restoration or mitigation implemented under the MSHCP to offset any impacts to Covered Species or habitat, shall be provided to USFWS within 90 days of the emergency response and as part of the Annual Report.

6.2.10 Species-Specific Measures

When the predictive suitability model indicates that an activity will impact a Covered Species, AMMs shall be implemented for that species. If the activity shall not occur within suitable habitat, no Species-Specific Measures shall be required. If suitable habitat is present, determine whether the activity is likely to adversely impact the species or its habitat. If the activity is not likely to adversely impact the species, or if the activity is redesigned to avoid any such effect, no additional measures for the species shall be required. Species-Specific Measures have been developed to ensure that each Covered Species receives the protection required that is beyond what is outlined in the General Measures and Habitat Measures. The implementation of Species-Specific measures shall ensure the potential impacts of SoCalGas' Covered Activities on these species shall be avoided or minimized to the maximum extent practicable

Thirty-two of the 41 Covered Species meet the criteria and are subject to Species-Specific Measures:

Invertebrates

- DSFF
- ESBB
- MSS

Amphibians

- Arroyo toad
- CRLF
- CTS
- MYLF

Birds

- CAGN
- LBV
- SWF
- WYBC

Mammals

- SJKF
- SBKR
- SKR

Plants

Annual Plants

- Gaviota tarplant
- NML
- Pismo clarkia
- SFVS

Perennial Plants

- Adobe sanicle
- BMV
- California seablite
- CCBT
- CPC
- GWC
- IKM
- LYS
- Marcescent dudleya
- Morro manzanita
- SARW
- SMMD
- VMMV
- Verity's dudleya

6.2.10.1 Invertebrates

Impacts to covered invertebrate species from project activities would vary depending on the type of work conducted. Impacts on covered invertebrates could result from vehicle strikes, changes in water quality due to pollutant release. Ground-disturbing activities such as grading of larger areas could result in crushing or buried invertebrates.

DSFF

A Project Biologist shall determine habitat suitability by the presence of Delhi sands soil series. If modeled suitable habitat is present for DSFF that will be permanently or temporarily impacted, species specific measures shall be required in order for the activity to proceed.

Species-Specific Measures:

Avoidance and Minimization Measures

- If feasible, construction activities shall be conducted outside of the flight season (September 21 to July 31).
- Ground disturbance may affect DSFF outside of the flight season. Ground disturbance to suitable habitat during all seasons shall be minimized to the greatest extent feasible.

ESBB

A biological monitor shall determine habitat suitability by the presence of El Segundo sand dunes, seacliff buckwheat, and sand verbena-beach bursage series vegetation types. If modeled suitable habitat is present for ESBB that will be permanently or temporarily impacted, species specific measures shall be required in order for the activity to proceed.

Species-Specific Measures:

Minimization Measures

- If feasible, construction activities shall be conducted during the flight season (June 14–September 30) to avoid impacts to the subterranean phase of the lifecycle.

- If construction cannot be undertaken during the flight season, salvage host plants and the soil surrounding the host plant and store in nursery conditions comparable to on-site conditions and return materials when construction is completed.

MSS

A Project Biologist shall determine habitat suitability by the presence of coastal dune scrub vegetation on sandy soils with less than 10 percent slope, coastal sage scrub, grasslands and swales with shrubs that provide canopy and leaf litter, or areas with dense veldt grass or ice plant. If modeled suitable habitat is present for MSS that will be permanently or temporarily impacted, species specific measures shall be required in order for the activity to proceed.

Species-Specific Measures:

Avoidance and Minimization Measures

- Prior to conducting the activity, a Project Biologist shall install exclusionary fencing (silt fencing) around the project site.

- Prior to an anticipated need for relocation of individuals, the nearest suitable habitat for MSS shall be identified and evaluated by permitted Project Biologist. The relocation site and methods shall be approved by USFWS.

- Individual snails detected within the exclusionary fencing shall be relocated to the nearest suitable habitat by a Project Biologist.

6.2.10.2 Amphibians

Impacts to covered amphibian species from project activities would vary depending on the type of habitat affected. Generally, activities within or directly proximate to aquatic breeding habitats would have the potential to affect all life stages of covered amphibians, while activities occurring in adjacent uplands or dispersal areas would affect adults and juveniles but would not affect aquatic life stages (eggs, tadpoles, and metamorphs). Impacts on covered amphibians in aquatic habitats could result from vehicle strikes, changes in water quality due to pollutant releases or increased turbidity, and hydrologic changes caused by temporary impoundments or diversions (excessive flow velocities can displace egg masses and tadpoles). In the event that temporary dewatering of streams or ponds is necessary, all life stages of covered amphibians could potentially be affected. Effects could include desiccation of egg masses, stranding of aquatic life stages of covered amphibians in the dewatered area, and potential impingement of all life stages during pumping operations.

Proposed activities occurring in dispersal habitats adjacent to aquatic breeding habitat would have the potential to affect adult and juvenile amphibians due to equipment strikes. Grading of large areas, such as staging areas, could expose amphibians to predation when dispersing across these areas.

Arroyo Toad

A biological monitor shall consider the following factors in determining habitat suitability:

- Aquatic: Low gradient, slow moving streams and riparian habitats, presence of shallow, still pools, sandy or gravel stream substrate, and exposed sandy stream sides with suitable terraces and scattered vegetation cover.

- Upland: Upland habitat within 656 feet of suitable aquatic habitat (as defined above) supporting coastal sage scrub, chaparral, grassland, oak woodland, or agricultural vegetation communities, and containing appropriate friable soils or the presence of small mammal burrows.

If modeled suitable habitat is present for arroyo toad that will be permanently or temporarily impacted, species specific measures shall be required in order for the activity to proceed.

Species-Specific Measures:

<u>Avoidance and Minimization Measures</u>

Aquatic Habitat:

- If feasible, the construction activity shall be conducted during the non-breeding season (July 2 to March 14).

- If not feasible for the construction activity to be conducted during the non-breeding season, fencing shall be installed to exclude toads from the activity area. Prior to an anticipated need for relocation of individuals, the nearest suitable habitat for arroyo toad shall be evaluated by a biological monitor. The relocation site and methods shall be approved by USFWS. Any toads found within the fenced area shall then be relocated by a biological monitor.

- After installation of exclusionary fencing, prior to the start of the construction activity, and as early in the breeding season as feasible, a biological monitor shall conduct at least three focused surveys within the fenced area to determine presence/absence of toads.

- If toads are found during these surveys, the qualified biologist shall relocate toads to the nearest suitable breeding habitat.

- A biological monitor shall monitor the fence for signs of damage or the presence of toads within the fenced area. Fence repairs and toad relocations shall occur promptly.

Upland Habitat:

- Exclusionary fencing shall be installed along the perimeter of the activity area prior to the start of work.

- Any toads found within the fenced area shall be relocated to the nearest suitable habitat.

- A biological monitor shall monitor the fenced area for signs of damage or presence of toads within the fenced area before the start of work each day. Fence repairs and toad relocations shall occur promptly.

CRLF

A biological monitor shall determine breeding habitat suitability by the presence of features such as ponds or deep pools, emergent vegetation, undercut banks or semi-submerged rootballs that provide shelter from predators, and small mammal burrows and other refugia on the banks within 328 feet of aquatic habitat.[504] Dispersal habitat suitability shall be determined based on a location within 9,186 feet of aquatic/breeding habitat, and characteristics compatible with CRLF movement. Areas occupied by urban development or separated from aquatic habitat by excessive slopes or other barriers will not be considered dispersal habitat.

If modeled suitable habitat is present for CRLF that will be permanently or temporarily impacted, species specific measures shall be required in order for the activity to proceed.

Species-Specific Measures. If field verification of modeled suitable habitat indicates that the project is located within 328 feet of aquatic habitat, the following species-specific avoidance measures shall be implemented:

[504] For CRLF, a qualified biologist may conduct habitat assessments, surveys, and monitoring, but a permitted biologist is required for handling and relocation (Appendix F).

Aquatic Habitat Avoidance and Minimization Measures

1. Exclusionary fencing shall be installed around the work site at the discretion of a biological monitor to minimize the potential for CRLF individuals to enter the work site.

2. Prior to the start of the construction activity and after installation of exclusionary fencing, if necessary, a biological monitor shall conduct up to three focused surveys within the fenced area to determine presence/absence of CRLF.

3. A biological monitor shall be present during construction and shall work to detect and protect any CRLF that may be present.

4. Prior to an anticipated need for relocation of individuals, the nearest suitable aquatic habitat for CRLF shall be evaluated by a biological monitor. The relocation site and methods shall be approved by USFWS. If CRLF are found during pre-activity surveys, or during monitoring, a Project Biologist shall relocate CRLF to the nearest suitable aquatic habitat.

5. A biological monitor shall inspect the fence for signs of damage or the presence of CRLF within the fenced area.

6. Fence repairs and CRLF relocations shall occur immediately. Fencing should be checked prior to the start of work each day.

7. Prior to ground disturbance, SoCalGas shall submit a frac-out plan to the USFWS for all projects involving HDD under aquatic resources (drainages, ponds, or other wetlands) containing suitable CRLF breeding habitat.

8. Only an approved Project Biologist shall participate in activities associated with the capture and handling of CRLF.

9. Ground disturbance shall not begin until written approval is received from USFWS for a Project Biologist to conduct the work.

10. If any life stage of the CRLF is found and these individuals are likely to be killed or injured by work activities, the permitted biologist shall be allowed sufficient time to move them from the site before work begins. The permitted biologist shall relocate the CRLF the shortest distance possible to a location that contains suitable habitat, and that would not be affected by activities associated with the proposed project. The relocation site should be in the same drainage to the extent practicable. SoCalGas shall coordinate with the USFWS on the relocation site prior to the capture of any CRLF.

11. Before any activities begin on a project, the Project Biologist shall conduct a training session for all construction personnel. At a minimum, the training shall include a description of the CRLF and its habitat, the specific measures that are being implemented to conserve the CRLF for the current project, and the boundaries within which the project may be accomplished. Brochures, books, and briefings shall be used in the training session.

12. A Project Biologist shall be present at the work site until all CRLF have been relocated out of harm's way, and project-associated workers have been informed of CRLF relocation and avoidance strategy, and disturbance of habitat has been completed. After this time, the Project Biologist shall be designated, subject to USFWS approval, to monitor on-site compliance with all minimization measures. The Project Biologist shall receive the training outlined in Measure 4 above and in the identification of CRLF. The Project Biologist and any biological monitors under his or her supervision shall have the authority to halt work immediately if impacts to CRLF could be caused by project activities not anticipated by SoCalGas. If the work is halted by a biological monitor, the monitor shall notify the Project Biologist immediately. The Project Biologist shall resolve the situation by eliminating the potential to adversely affect the CRLF. Work may resume only after the USFWS approves that CRLF is being avoided.

13. During project activities, all trash that could attract predators shall be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris shall be removed from work areas.

14. All refueling, maintenance, and staging of equipment and vehicles shall occur at least 100 feet from riparian habitat or water bodies and in a location from where a spill would not drain directly toward aquatic habitat (e.g., on a slope that drains away from the water). The monitor shall ensure contamination of habitat does not occur during such operations. Prior to the onset of work, SoCalGas shall ensure that a plan is in place for prompt and effective response to any accidental spills. All workers shall be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.

15. Habitat contours shall be returned to their original configuration at the end of project activities. This measure shall be implemented in all areas disturbed by activities associated with the project, unless USFWS and SoCalGas determine that it is not feasible or modification of original contours would benefit the CRLF.

16. The number of access routes, size of staging areas, and the total area of the activity shall be limited to the minimum necessary to achieve the project goals. Environmentally Sensitive Areas shall be delineated to confine access routes and construction areas to the minimum area necessary to complete construction and minimize the impact to CRLF habitat; this goal includes locating access routes and construction areas outside of wetlands and riparian areas to the maximum extent practicable.

17. If work must occur during the breeding season, SoCalGas shall implement the following additional measures:

    a. No work would occur during or 24 hours after any rain event to minimize impacts to dispersing and breeding CRLF. A rain event is considered any precipitation resulting in 0.2 inch or greater of precipitation. A biological monitor shall survey the project site immediately before resuming project activities.

b. SoCalGas shall conduct project activities no earlier than 30 minutes after sunrise and no later than 30 minutes before sunset each day when feasible.

c. SoCalGas shall survey the project area daily before activities begin and all project activities shall be monitored by biological monitors under the supervision of the Project Biologist.

18. SoCalGas shall cover dirt or sand piles left overnight with tarps or plastic to prevent CRLF from sheltering in the material. All holes and trenches shall be inspected each morning by a biological monitor. A Project Biologist shall relocate any CRLF found in a hole or trench.

19. To control sedimentation during and after project implementation SoCalGas shall implement BMPs outlined in any authorizations or permits issued under the authorities of the Clean Water Act that it receives for the specific project. If BMPs are ineffective, SoCalGas shall attempt to remedy the situation immediately, in coordination with USFWS.

20. If a work site is to be temporarily dewatered by pumping, intakes shall be completely screened with mesh not larger than 0.2 inch to prevent CRLF from entering the pump system. Water shall be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any diversions or barriers to flow shall be removed in a manner that would allow flow to resume with the least disturbance to the substrate. Alteration of the streambed shall be minimized to the maximum extent practicable; any imported material shall be removed from the streambed upon completion of the project unless otherwise authorized.

21. Unless approved by USFWS, water shall not be impounded in the course of project activities in a manner that could attract CRLF.

22. A biological monitor shall permanently remove any individuals of non-native species, such as bullfrogs (*Lithobates catesbeianus*), signal and red swamp crayfish (*Pacifastacus leniusculus*; *Procambarus clarkii*), and centrarchid fishes from the project area, to the maximum extent practicable. The biological monitor shall be responsible for ensuring his or her activities comply with the California Fish and Game Code.

23. To ensure that diseases are not conveyed between work sites by the biological monitor, the *Fieldwork Code of Practice* developed by the Declining Amphibian Populations Task Force shall be followed at all times.[505]

24. Project sites shall be revegetated to reflect near pre-construction conditions with an assemblage of native riparian, wetland, and upland vegetation where appropriate. Locally collected plant materials shall be used to the extent practicable. Invasive, exotic plants shall be controlled to the maximum extent practicable. This measure

[505] Declining Amphibian Populations Task Force. 1998. The Declining Amphibian Populations Task Force Fieldwork Code of Practice. Froglog 27.

shall be implemented in all areas disturbed by activities associated with the project, unless USFWS and the sponsoring agency determine that it is not feasible or practical.

25. If SoCalGas determines the use of herbicides is necessary for their project, they shall coordinate further with USFWS to develop suitable avoidance and minimization measures for herbicide use for their project.

If field verification of modeled suitable habitat indicates that the project is located within upland/dispersal habitat, the following species-specific avoidance measures shall be implemented:

Upland Habitat Avoidance and Minimization Measures

- Project Biologists shall conduct pre-construction surveys of small mammal burrows within 33 feet of disturbance areas for the presence of the CRLF and/or other state- or federally listed species. A Project Biologist shall survey small mammal burrows using a fiber-optic scope. Once a Project Biologist deems the portion of the burrow accessible to the scope vacant, he or she shall excavate the burrow by hand. Project Biologists shall relocate any CRLF they discover to the approved relocation site.

- A Project Biologist shall monitor all construction-related ground disturbances to at least the upper 18 inches of soil where suitable upland habitat containing small mammal burrows is present.

- A Project Biologist, and/or trained biological monitors shall regularly inspect all fencing and erosion control fabrics for trapped CRLF, and to ensure the materials are functioning properly. If project materials trap a CRLF individual, a Project Biologist shall relocate the individual.

Project personnel shall cover all steep-walled holes or trenches that may act to trap CRLF at the end of each workday. If this is not feasible, SoCalGas shall install wildlife escape ramps so that any trapped CRLF can have the opportunity to escape. The Project Biologist and/or biological monitors shall inspect the holes and trenches each day.

CTS

A Project Biologist shall determine habitat suitability using field verification of modeled breeding habitat by the presence of vernal pools and other temporary rainwater ponds following periods of rainfall. If field verification of modeled suitable habitat is present for CTS that will be permanently or temporarily impacted, species-specific measures shall be required in order for the activity to proceed.

Species-Specific Measures:

- Before any activities begin on a project, the Project Biologist and/or a biological monitor shall conduct a training session for all construction personnel, as described in General Measure G-1. The training shall include identification and avoidance of small mammal burrows that could provide refuge for the CTS and other protected wildlife species. The training shall include a description of CTS and the laws protecting them, avoidance measures, and site rules to avoid impacts to them.

- Prior to an anticipated need for relocation of individuals, the nearest suitable habitat for CTS shall be evaluated by a Project Biologist. The relocation site shall be in the shortest distance possible to a location that contains suitable habitat that would not be affected by the project, in the same drainage to the extent practicable, and shall be free of exotic predators. The relocation site and methods shall be approved by USFWS.

- The Project Biologist shall survey the project site no more than 48 hours before the onset of work activities. If project personnel find any life stage of CTS onsite and the animal is in harm's way, the Project Biologist shall have sufficient time to move them from the site before work begins. Only a Project Biologist may capture and relocate CTS.

- The Project Biologist shall be present at the work site until all CTS are relocated out of harm's way, training for all workers and biological monitors is provided, and observe all initial disturbance of habitat, including excavations to a depth of 18 inches. After this time, the Project Biologist, if not the same person as the Project Biologist, shall monitor onsite compliance with all minimization measures. The Project Biologist shall ensure that the Project Biologist and all biological monitors have received the training outlined General Measure G-1 and in the identification of CTS.

- The Project Biologist and all biological monitors have the authority and obligation to stop work if they observe CTS in harm's way, or if the project would affect listed species in a manner not anticipated in this MSHCP.

- Temporary impacts shall be revegetated to reflect near pre-construction conditions with an assemblage of native riparian, wetland, and upland vegetation where appropriate. Locally collected plant materials shall be used to the extent practicable. Invasive, exotic plants shall be controlled to the maximum extent practicable. This measure shall be implemented in all areas disturbed by activities associated with the project, unless USFWS and the sponsoring agency determine that it is not feasible or practical.

Aquatic Habitat Avoidance and Minimization Measures

- During the CTS breeding season (December–July), trenching or ground disturbance within known breeding ponds shall be avoided by using trenchless technology to implement any repairs that may be needed in these areas.

- A biological monitor shall be present at the start of construction within 24 hours of a rain event totaling 0.5 inch or more. The biological monitor shall clear equipment and work areas prior to the start of construction activities.

- Unless approved by USFWS, SoCalGas shall not impound water in a manner that may attract CTS.

- A biological monitor shall permanently remove, from within the project area, any individuals of exotic species, such as bullfrogs or crayfish, to the maximum extent

possible and ensure that activities are in compliance with the California Fish and Game Code.

- SoCalGas shall halt construction activities and movement of vehicles during nighttime rain events. If any measurable amount of rain (i.e., greater than 0.01 inch) is predicted with a likelihood of greater than 30 percent at night, activities shall not be conducted between dusk and dawn.

- If work occurs during daytime rain events, a minimum of two biological monitors must be onsite to observe construction activities, including movement of vehicles.

- To control erosion and sedimentation during and after project implementation, SoCalGas shall implement BMPs, such as measures identified by the appropriate RWQCB. SoCalGas shall only use tightly woven netting or similar material for all geo-synthetic erosion control materials such as coir rolls and geo-textiles. SoCalGas shall not use products that contain plastic monofilament netting.

- If a work site is to be temporarily dewatered by pumping, intakes shall have screens with wire mesh not larger than 0.2 inch to prevent CTS from entering the pump system (e.g., during culvert replacement). Personnel shall release or pump water downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, personnel shall remove any diversions or barriers to flow in a manner that would allow flow to resume with the least disturbance to the substrate.

Upland Habitat Avoidance and Minimization Measures

- Prior to an anticipated need for relocation of individuals, the nearest suitable habitat outside the disturbance area for CTS shall be identified and evaluated by a Project Biologist. Burrow excavation methods and the relocation site shall be approved by USFWS.

- Project Biologists shall conduct pre-construction surveys of small mammal burrows within 33 feet of disturbance areas for the presence of the CTS and/or other state- or federally listed species. A Project Biologist shall survey small mammal burrows using a fiber-optic scope. Once a Project Biologist deems the portion of the burrow accessible to the scope vacant, he or she shall excavate the burrow by hand. Project Biologists shall relocate any CTS they discover to the approved relocation site.

- A Project Biologist shall monitor all construction-related ground disturbances to at least the upper 18 inches of soil where suitable upland habitat containing small mammal burrows is present within 1.24 miles of known or potential CTS breeding ponds.

- A Project Biologist shall supervise the construction of all exclusion fencing and ensure proper installation.

- A Project Biologist, and/or trained biological monitors shall regularly inspect all fencing and erosion control fabrics for trapped CTS, and to ensure the materials are

functioning properly. If project materials trap a CTS, a Project Biologist shall relocate the individual.

Project personnel shall cover all steep-walled holes or trenches that may act to trap CTS at the end of each workday. If this is not feasible, SoCalGas shall install wildlife escape ramps so that any trapped CTS can have the opportunity to escape. The Project Biologist and/or biological monitors shall inspect the holes and trenches each day.

MYLF

A biological monitor shall determine habitat suitability using field verification of modeled habitat for MYLF by the presence of rocky, shaded, perennial streams with steep gradients and open stream and lake margins with gentle slopes. If field verification of modeled suitable habitat is present for MYLF that will be permanently or temporarily impacted, species specific measures shall be required in order for the activity to proceed.

Species-Specific Measures:

Avoidance and Minimization Measures

- If feasible, conduct activity during the non-breeding season (August 1 to March 31).
- A biological monitor shall be present during construction in order to detect and protect any MYLF present.
- Prior to an anticipated need for relocation of individuals, the nearest suitable habitat for MYLF shall be identified and evaluated by a biological monitor. The relocation site and methods shall be approved by USFWS.
- Exclusionary fencing shall be installed around the work site. The biological monitor shall inspect the fence for signs of damage and the presence of MYLF on a regular basis. MYLF found within the fenced work site shall be relocated to nearby habitat by a biological monitor.
- If dewatering is required, intakes for pumps shall be screened with wire mesh not larger than five millimeters (mm) to prevent the species from entering the pump system.

6.2.10.3 Birds

Impacts to covered bird species from project activities would vary depending on the type of work conducted and whether work is conducted during the breeding season. Impacts on covered bird species could result from vehicle strikes, crushing of individuals, nest disturbance and abandonment, and destruction of eggs and nest during shrub/tree trimming.

CAGN

A Project Biologist shall determine habitat suitability by the presence of coastal sage scrub, alluvial fan scrub, chaparral, or intermixed adjacent areas of grassland and riparian habitat. If modeled

suitable habitat is present for CAGN that will be permanently or temporarily impacted, species specific measures shall be required within a radius of 500 feet from the suitable habitat in order for the activity to proceed.

Species-Specific Measures:

Avoidance and Minimization Measures

- If feasible, construction activities shall be conducted outside of the breeding season (February 15 to August 30).

- If the activity must occur during the breeding season, the activity shall not occur within 500 feet from the edge of any observed nesting location, and the established buffer shall not be disturbed. If a nest is observed during protocol surveys, pre-construction clearance surveys, or construction monitoring, no entry shall be allowed until the young have fledged or the nest is no longer active. Nests shall be monitored by a Project biologist.

- If the 500-foot buffer is not feasible, a buffer exclusion plan shall be presented to USFWS for approval. Compliance with this measure should follow the guidelines set forth in measure H-8.

LBV

A biological monitor shall determine habitat suitability by the presence of riparian habitats with understory vegetation in the immediate vicinity of small streams and rivers. If modeled suitable habitat is present for LBV that will be permanently or temporarily impacted, species specific measures shall be required within a radius of 500 feet from the suitable habitat in order for the activity to proceed.

Species-Specific Measures:

Avoidance and Minimization Measures

- If feasible, construction activities shall be conducted outside of the breeding season (February 15 to August 30).

- If the activity must occur during the breeding season, the activity shall not occur within 500 feet from the edge of any observed nesting location, and the established buffer shall not be disturbed. If a nest is observed during protocol surveys, pre-construction clearance surveys, or construction monitoring, no entry shall be allowed until the young have fledged or the nest is no longer active. Nests shall be monitored by a Project Biologist.

- If the 500-foot buffer is not feasible, a buffer exclusion plan shall be presented to USFWS for approval. Compliance with this measure should follow the guidelines set forth in measure H-8.

SWF

A biological monitor shall determine habitat suitability using field verification of modeled habitat for SWF by the presence of thickets along wetted streams in broad valleys, in canyon bottoms, or at the margins of ponds and lakes. If modeled suitable habitat is present for SWF that will be permanently or temporarily impacted, species specific measures shall be required within a radius of 500 feet from the suitable habitat in order for the activity to proceed.

Species-Specific Measures:

Avoidance and Minimization Measures

- If feasible, construction activities shall be conducted outside of the breeding season (February 15 to August 30).
- If the activity must occur during breeding season, the activity shall not occur within 500 feet from the edge of any observed nesting location, and the established buffer shall not be disturbed. If a nest is observed during protocol surveys, pre-construction clearance surveys, or construction monitoring, no entry shall be allowed until the young have fledged or the nest is no longer active. Nests shall be monitored by a permitted biologist.
- If the 500-foot buffer is not feasible, a buffer exclusion plan shall be presented to USFWS for approval. Compliance with this measure should follow the guidelines set forth in measure H-8.

WYBC

A biological monitor shall determine habitat suitability. If modeled suitable habitat is present that for WYBC will be permanently or temporarily impacted, species specific measures shall be required within a radius of 500 feet from the suitable habitat in order for the activity to proceed.

Species-Specific Measures:

Avoidance and Minimization Measures

- If feasible, construction activities shall be conducted outside of the breeding season (February 15 to August 30).
- If the activity must occur during breeding season, the activity shall not occur within 500 feet from the edge of any observed nesting location, and the established buffer shall not be disturbed. If a nest is observed during protocol surveys, pre-construction clearance surveys, or construction monitoring, no entry shall be allowed until the young have fledged or the nest is no longer active. Nests shall be monitored by a Project Biologist.
- If the 500-foot buffer is not feasible, a buffer exclusion plan will be presented to USFWS for approval. Compliance with this measure should follow the guidelines set forth in measure H-8.

6.2.10.4 Mammals

Impacts to covered mammal species from project activities would vary depending on the type of work conducted. Impacts on covered mammals could result from vehicle strikes, crushing and entrapment of individuals in subterranean burrows and dens, or causing them to vacate the area to avoid high levels of noise and activity. Covered mammal species could also be affected by loss of foregoing vegetation.

SJKF

A biological monitor shall determine potentially suitable subterranean dens, defined as any subterranean hole five to eight inches in diameter with no visible bottom or back and with appropriate structure. If modeled suitable habitat and suitable subterranean dens are present that will be permanently or temporarily impacted, species specific measures shall be required in order for the activity to proceed.[506]

Species-Specific Measures:

Avoidance and Minimization Measures

- If the survey identifies a potential or atypical den that cannot be avoided by the appropriate buffers, the den must be monitored for three days by a biological monitor using appropriate tracking medium, motion sensing camera, or burrowing scoping if avoidance is not possible. If monitoring indicates that the species is not present, the potential den shall be excavated and collapse to deter SJKF from occupying the den.

- Potential and atypical dens that do not undergo monitoring must establish a 50-foot work exclusion zone; if the survey indicates a known den, establish a 100-foot work exclusion zone.

- If the survey indicates that the den is a natal/pupping den (i.e., a larger den having numerous entrances and a greater incidence of tracks, scat, and prey remains in the vicinity of the den than a non-natal den), USFWS must be contacted when encountered.

- If the den is occupied and cannot be avoided, the den may be excavated or closed at any time of year under the direct supervision of a biological monitor during the period in which the den is temporarily unoccupied (e.g., during normal foraging activities), with the following exception:

    - Natal dens shall only be closed between August 15 and November 1, or upon a determination by a biological monitor that juveniles no longer rely on the den site and only after receiving approval to excavate from USFWS.

[506] U.S. Fish and Wildlife. January 2011. U.S. Fish and Wildlife Service Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance. Sacramento, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/mammals/san_joaquin_kit_fox/SanJoaquinKitFox_GroundDisturbanceProtection_201101.pdf

- If a kit fox is observed in the vicinity of the project site, the activity shall cease until a biological monitor has determined the kit fox has moved out of harm's way.

SKR and SBKR

A biological monitor shall determine habitat suitability. If modeled suitable habitat is present for SKR or SBKR that will be permanently or temporarily impacted, species specific measures shall be required in order for the activity to proceed.

Species-Specific Measures:

Avoidance and Minimization Measures

- Prior to initiating construction activities, the perimeter of the action area will be delineated with temporary barrier fencing under the supervision of a biological monitor.
    - The height of the fence should be at least three feet with an additional two feet bent or folded to lay flat on the ground. The folded section is to be on the outside of the fence and weighted down with sandbags or other material. The entire length of the folded section should be pressed firmly to the ground. The bottom two feet of the erect portion of the fencing needs to be covered in a material that cannot be climbed or chewed through by SBKR; metal flash or similar material is recommended.
    - The fence should be installed under the supervision of a biological monitor to ensure that no burrow entrances covered by the portion of the fence that is to be flattened to the ground.
    - The biologist will inspect the fence before leaving the job site in the evening, making sure there are no breaks in the fencing where SKR can enter the construction area.
- No gaps greater than one inch shall be allowed within the exclusionary fence. Fences shall be checked at the close of each workday. If detected, gaps shall be repaired. Fencing shall remain in place and maintained without gaps until construction activities have been completed.
- Prior to an anticipated need for relocation of individuals a translocation plan should be approved by USFWS. The plan will include a viability assessment of the nearest unoccupied suitable habitat for SBKR or SKR shall be evaluated by a biological monitor. The relocation site and trapping methods shall be approved by the agencies. All trapping and relocation shall be conducted by a biological monitor. Mitigation will generally occur within the population unit.
- Traps shall be set and monitored for a minimum of five consecutive nights and will continue until there are two consecutive nights of unsuccessful trapping.

- If disturbance to an area is temporary, it may be feasible to release animals at the point of capture. If disturbance to an area shall persist for fewer than 10 days, animals shall be held in captivity for the duration of disturbance and then released at the point of capture.

- Before any activities begin on a project, the Project Biologist shall conduct a training session for all construction personnel, as described in General Measure G-1. The training shall include identification and avoidance of SKR and SBKR burrows, a description of SKR and SBKR and the laws protecting them, avoidance measures, and site rules to avoid impacts to them.

- The Project Biologist and all biological monitors shall have the authority to halt/suspend all activities until appropriate corrective measures have been completed and shall also be required to report violations immediately to CDFW.

6.2.10.5 Plants

Impacts to covered plant species from project activities would vary depending on the type of work conducted. Impacts to covered plant species could result from removal during vegetation clearing, habitat loss, and introduction of invasive plant species.

Annual Plants

Determine if the activity shall occur within modeled suitable habitat for the annual plant. If modeled suitable habitat is present for annual plants that will be permanently or temporarily impacted, species specific measures shall be required in order for the activity to proceed.

Species-Specific Measures:

<u>Avoidance, Minimization, and Mitigation Measures</u>

- Conduct the activity prior to germination and/or after seed set for the annual plant.

- Determine through a biological monitor that seeds have set for the annual plant. If the seeds have set, the activity shall be conducted prior to the end of the current bloom period.

- Topsoil, defined as the upper 18 inches of soil, shall be conserved and clearly marked. Upon completion of the ground-disturbing activity, the topsoil shall be returned back onto the surface of any filled trenches, pits, or holes.

Perennial Plants

Determine if the activity shall occur within modeled suitable habitat for the perennial plant. If modeled suitable habitat is present for perennial plants that will be permanently or temporarily impacted, species specific measures shall be required in order for the activity to proceed.

Species-Specific Measures:

Avoidance, Minimization, and Mitigation Measures

- Avoid the individual plants, if feasible.
- If avoidance is not feasible, SoCalGas shall provide the USFWS and/or CDFW a minimum 10-day advanced notification to allow the agencies an opportunity to salvage the plants.
- Individual plants shall be salvaged and relocated as described in a mitigation plan approved by the USFWS.

6.3 Measures to Mitigate Unavoidable Take

Compensatory mitigation for impacts to habitat shall be secured prior to construction. Under certain circumstances, and with the USFWS approval, onsite restoration and/or revegetation activities shall satisfy the mitigation requirement for any particular activity site. Although the implementation of a regularly reoccurring O&M activity would not be expected to result in habitat loss, the implementation could result in other forms of take, such as direct take caused by a vehicular strike.

Mitigation will be approved by the USFWS prior to project impacts by Covered Activities. To the maximum extent practicable, mitigation will occur prior to project impacts to decrease the effect of habitat loss on Covered Species. Mitigation credits for conservation efforts not directly related to habitat protection or enhancement (e.g., funding of captive breeding and reintroduction programs) shall be approved by the USFWS and, if appropriate, CDFW, on a case-by-case basis. SoCalGas anticipates pursuing a number of conservation strategies for mitigation under this Plan, including, but not limited to,

- Purchasing high-quality habitat and providing for long-term management
- Purchasing mitigation credits from acceptable mitigation banks or conservation agencies/organizations
- Restoring or enhancing disturbed activity sites and providing for long-term management
- Funding research or recovery actions
- Funding agricultural land retirements
- Funding certain land management tasks on already protected lands (e.g., fence installation or repair, predator or invasive species control, or species monitoring)
- Purchase or placement of conservation easements on land appropriate for maintaining Covered Species corridors
- Partnerships with and/or contributions to existing conservation planning and recovery efforts

Mitigation banking, for example, may not be available for certain narrow endemic species with habitat requirements in specific regions or land types. Purchasing land in locations with high-quality suitable habitat shall be implemented to fulfill compensatory mitigation obligations for these species, and management shall be executed to monitor effectiveness of long-term conservation using factors such as occupation of Covered Species within acquired lands, presence of vegetation supporting suitable habitat, and linkage of acquired lands to nearby areas where preexisting populations of Covered Species occur.

Habitat disturbances shall be avoided until appropriate mitigation has been acquired or a performance security has been established. All mitigation transactions shall be subject to the USFWS approval.

6.3.1 Mitigation Ratios for Unavoidable Impacts

Mitigation for circumstances where adverse impacts to a Covered Species or its occupied habitat cannot be avoided is addressed further in Chapter 8. SoCalGas has established the following mitigation ratios for unavoidable impacts to the modeled suitable habitat of the Covered Species:

- 3:1 habitat replacement ratio in modeled suitable habitat of equal to or better quality for permanent losses.
- 1:1 habitat replacement ratio in modeled suitable habitat of equal to or better quality for temporary ground disturbances.

Mitigation obligations for each Covered Species has been calculated and compiled into the Mitigation Banks Summary Table (Appendix G).

For CRLF, estimation of mitigation requirements entails species-specific considerations. To determine compensatory mitigation requirements for CRLF, anticipated project impacts shall be characterized into eight categories based on the location, timing, and duration of the impact (Table 6.3.1-1, *Effects Analysis*; Appendix D).

TABLE 6.3.1-1
EFFECTS ANALYSIS MATRIX

Dispersal Habitat				Aquatic or Upland Habitat (Breeding)			
Dry Season (May 1–Nov 15)		Wet Season (Nov 16–Apr 30)		Dry Season (May 1–Nov 15)		Wet Season (Nov 16–Apr 30)	
Temporary (1)	Permanent (2)*	Temp. (3)	Perm. (4)*	Temp. (5)*	Perm. (6)*	Temp. (7)	Perm. (8)*

NOTE: *Compensatory mitigation for CRLF Dispersal and Breeding habitat includes only columns (2), (4), (5), (6) and (8) due to Mitigation measures specific to O&M activities performed during the dry and wet season**.**

Mitigation for Dispersal Habitat

Dry season temporary impacts located at a minimum distance of 328 feet from aquatic habitat do not require mitigation.

For dry season permanent impacts located at a minimum distance of 328 feet from aquatic habitat, the USFWS shall be notified of the area of impact, and SoCalGas shall be required to pay a compensatory mitigation fee.

For wet season temporary impacts located at a minimum distance of 328 feet from aquatic habitat, no mitigation is required if a single project is completed in less than 10 days. If a single project requires 10 or more days to complete, the USFWS shall be notified of the area of impact and SoCalGas shall be required to pay a compensatory mitigation fee to the appropriate mitigation bank (Appendix G, *Mitigation Banking Summary Table*).

For wet season permanent impacts located at a minimum distance of 328 feet from aquatic habitat, the USFWS shall be notified of the area of impact, and SoCalGas shall be required to pay a compensatory mitigation fee.

Mitigation for Aquatic or Upland Habitat

For dry season temporary or permanent impacts located within 328 feet of aquatic breeding habitat, the USFWS shall be notified of the area of impact, and SoCalGas shall be required to pay a compensatory mitigation fee.

For wet season temporary impacts located within 328 feet of aquatic or upland breeding habitat, the USFWS shall be notified of the area of impact, and SoCalGas shall be required to pay a compensatory mitigation fee. If the activity is completed in less than 10 days, the mitigation fee shall be calculated as though the impact had occurred in the dry season as allowed by the USFWS Strategic Conservation Plan for the species.

For wet season permanent impacts located within 328 feet of aquatic or upland breeding habitat, the USFWS shall be notified of the area of impact and SoCalGas shall be required to pay a compensatory mitigation fee.

6.3.2 Bio-Regional and Habitat-Based Mitigation Strategy (Conservation Design)

The CRCP Plan Area spans a wide geographic range that contains a diversity of habitats due to variability in topography, soils, temperature, and rainfall. Vegetation types exhibit different characteristics, structural variation, and species composition across gradients within the CRCP Plan Area, which further contributes to habitat diversity. These gradients occur from north to south, from coastal to interior regions, and from lowland to high elevation areas. Moreover, several Covered Species are closely associated with local climatic, soil or vegetative conditions, or have a very limited or disjunct distribution.

To account for the geographic and biological diversity across the CRCP Plan Area, the CRCP habitat compensation strategy is based on two of the fundamental principles of conservation planning: (1) mitigate in proximity to the impacts; and (2) mitigate with similar habitat types and conditions. Although mitigation under this MSHCP could include activities not directly related to habitat protection or enhancement (e.g., contributing to a research or recovery action), SoCalGas' primary focus for mitigation will be habitat related. Using the two principles outlined above, SoCalGas shall apply the following process for wide ranging-species (Appendix B):

> Impacts to a Covered Species' suitable habitat shall be mitigated on a bioregional basis using the Geographic Subdivisions of California (*Jepson Manual: Higher Plants of California*;[507] *Jepson Manual: Vascular Plants of California*[508]). That is, impacts occurring within a particular Biological Subregion (e.g., the South Coast Subregion) shall be mitigated within that same subregion.

[507] Hickman, J.C., ed. 1993. The Jepson Manual: Higher Plants of California. Jepson Flora Project.

[508] Baldwin, B., et al., eds. 2012. The Jepson Manual: Vascular Plants of California. Jepson Flora Project.

For narrow ranging species, a conservative compensation strategy shall be implemented, which will mitigate by individual species using modeled suitable habitat (Chapter 8, Appendix B and G).

6.4 Monitoring

The CRCP shall include two types of monitoring: (1) Effectiveness Monitoring—tracks the impacts of Covered Activities on Covered Species and tracks the progress of the conservation strategy in meeting the MSHCP's biological goals and objectives; and (2) Compliance Monitoring—tracks the permit holder's compliance with the requirements specified in the MSHCP and permit.

All maintenance and construction activities that could result in take shall be monitored by a qualified biologist. Qualified biologists shall be present during maintenance to assist in the implementation of on-site mitigation measures for covered species and to monitor compliance. The appropriate number of qualified biologists shall be dependent upon the nature and extent of the work being conducted.

SoCalGas shall provide Annual Reports to the USFWS each year that describe the previous year's construction and O&M activities for the duration of the permit. The Annual Reports shall include the following information:

1. Project Status and Impacts (e.g., Completed Stages)—Location of sampling/monitoring sites with narrative description of work performed the previous year; area and type of Covered Species' habitat affected by activities in the previous year.

2. Take Tracking—Description of any take of Covered Species that occurred: form, cause, take amount, location and time of day, and deposition of dead or injured individuals.

3. Avoidance, Minimization, and Monitoring—A table of the AMMs implemented and brief evaluations of effectiveness and practicability.

4. Mitigation—Any temporary and permanent impacts (in acres) to Covered Species' occupied (or assumed to be occupied) habitat that occurred during the reporting year, as well as the cumulative total; mitigation credit balance.

5. Changed Circumstances—Any changed or unforeseen circumstances that occurred, and how they were addressed, including any unscheduled activities and the agency authorizations to proceed. Changed circumstances are defined as changes in circumstances affecting a species or geographic area covered by an HCP that can reasonably be anticipated by SoCalGas and the CDFW, and that can be planned for, including listing of a new species or a natural catastrophic event that may affect the ability of covered species to survive and recover in the wild, thus potentially triggering the need to reassess the proposed AMMs.

6.4.1 Effectiveness Monitoring

Effectiveness monitoring shall assess the effectiveness of the MSHCP Conservation Strategy in its progress towards achieving its biological goals and objectives. It is intended to provide data regarding effectiveness of avoidance and mitigation measures and mitigation to potential impacts to the

Covered Species and their habitats, and provide information required for decisions in Adaptive Management Strategies. Effectiveness monitoring shall include an assessment of the effectiveness and practicability of the AMMs.

6.4.2 Compliance Monitoring

Compliance monitoring shall document the Covered Activities' adherence to the permit's terms and conditions, and shall include a summary of the following information:

- Verification of implementation of proposed AMMs
- Verification that impacts to Covered Species do not exceed the level of take authorized under the permit
- Verification that mitigation credits were replenished prior to or concurrent with actual and/or anticipated impacts.
- Verification of the progress of mitigation acquisitions

6.5 Adaptive Management Strategy

Adaptive management shall be used as a tool to address uncertainty in the conservation of Covered Species. The process is consistent with the guidance for adaptive management provided in the 2016 *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*.[509,510] The handbook defines adaptive management as "a strategy for addressing uncertainty associated with an HCP's conservation program, specifically the uncertainty that poses a significant risk to Covered Species, where adjustments can be made in response to what is learned." Adaptive management is important in instances where significant data or information gaps exist, particularly with respect to the ecology of the species or its habitat, species or habitat management techniques, or the potential effect of an activity on Covered Species.

The MSHCP is intended to proactively avoid or minimize impacts to Covered Species and their habitat and offset impacts through an acceptable set of mitigation options. The CRCP's AMMs may require minor adjustments over the life of the permit to ensure long-term success in achieving the CRCP's goal and objectives. The CRCP's adaptive management shall include evaluations of the effectiveness and practicability of the AMMs with recommendations to fine-tune specific measures when and where appropriate. Any proposed modification to the AMMs would be expected to occur through the MSHCP minor modification process discussed in Chapter 9.0, *Permit/MSHCP Administration*. Adjustments or updates may also be required for the Predicative Model's habitat mapping tools.

[509] Federal Register. 1 June 2000. 65 (106): 35242.

[510] U.S. Fish and Wildlife Service. December 2016. Habitat Conservation Planning and Incidental Take Permit Processing Handbook.

6.6 Impact and Mitigation Tracking and Reporting

SoCalGas proposes to provide upfront and comprehensive mitigation for effects on Covered Species and their habitats on an annual basis. Wherever Covered Activities are predicted to occur as a result of Covered Activities, compensatory mitigation will be provided through one of two mechanisms: (1) payment of a fee to an existing mitigation bank; or (2) provision of long-term conservation of comparable mitigation lands. Mitigation credits are further discussed in Chapter 8. The conservation actions taken as part of the Plan can be used as mitigation only for the Covered Activities.[511]

SoCalGas shall submit two reports for each year of the years covered pursuant to the Permit: (1) Anticipated Covered Activities Report for upcoming Fiscal Year; and (2) Annual Report of Covered Activities. The Annual Report of Covered Activities shall be provided to the USFWS by March 15 in the year following completion of Covered Activities. that describe the previous year's construction and O&M activities for the duration of the permit.

6.6.1 Anticipated Covered Activities Report

The Anticipated Covered Activities (ACA) Report will be provided to USFWS Carlsbad, Palm Springs, and Ventura Field Offices on an annual basis for each year in the 30-year term of the permit, not less than 45 days prior to upcoming fiscal year (January to December). The report will identify all known Covered Activities that are scheduled to occur in the CRCP Plan Area. The Report will indicate the requirements to comply with AMMs. For each Covered Activity, SoCalGas will identify anticipated permanent, temporary, and indirect impacts. Documentation of the associated compensatory mitigation for both direct and indirect permanent impacts will be provided.

Due to the nature of SoCalGas Covered Activities, it is anticipated that additional Covered Activities (that are not known, anticipated, or rare in occurrence at the time of preparation of the report will be required) will need to be conducted. To the extent that an additional Covered Activity is required, SoCalGas would notify USFWS and demonstrate that the anticipated temporary and permanent direct and indirect impacts would be comparable to those evaluated in this HCP. These activities have already been factored into the MSHCP, and SoCalGas will notify USFWS of any additional Covered Activities that need to be undertaken in suitable habitat for Covered Species, at least 30 days prior to conducting such activities. The notification of supplemental activities will indicate the requirements to comply with AMMs. For each supplemental Covered Activity, SoCalGas will identify anticipated permanent, temporary, and indirect impacts. Documentation of the associated compensatory mitigation for permanent and indirect impacts will be provided.

[511] The compensatory mitigation has been designed to meet the requirements for associated with state and federal wetland regulations administered by the USACE, State Water Resources Control Board, and CDFW for Covered Activities that incur on Waters of the United States or Waters of the State. Authorizations pursuant to Section 401 and 404 of the Federal Clean Water Act and Section 1600 of the State Fish and Wildlife Service are the sole responsibility of SoCalGas. If no-net-loss standards are unable to be accomplished for impacts on ACOE or CDFW jurisdictional streambeds at these mitigation sites, additional compensatory mitigation may be required. Additionally, for temporary impacts on streambeds and associated riparian habitat, the Construction Lead will restore the impact site to its pre-project condition, when appropriate, to achieve no-net-loss standards. Restoration plans, as approved by CDFW, USFWS, and, if warranted, the USACE and State Water Resources Control Board, will be implemented at the sites.

6.6.2 Covered Activities Report

The Covered Activities (ACA) Report shall include information on the project status and impacts; take tracking; avoidance, minimization, and monitoring; mitigation; changed circumstances; funding; and other MSHCP measures.

Tracking Project Status and Impacts

As the Plan is implemented, SoCalGas will be responsible for tracking three types of impacts on natural resources resulting from Covered Activities to ensure that the amount of impacts that ultimately occur under the Plan stays below the amount of impacts estimated during Plan development:

1. Temporary impacts to habitat types resulting from Covered Activities,
2. Permanent impacts to habitat types resulting from Covered Activities, and
3. Indirect impacts to habitat types resulting from Covered Activities,

All of which shall include estimated or observed take of wildlife.

Project Status

For each project that was identified in the ACA Report, and supplemental Covered Activities, the report will provide in tabular and narrative format the location of the covered activities, whether presence was presumed or if surveys were undertaken to assess presence or absence of species, Covered Activities undertaken in the fiscal year, and associated temporary, permanent, and indirect on suitable habitat for covered species. This report will also estimate "take" of Covered Species. In the unanticipated event that "take" of Covered Species (wildlife) occurs, the coordination that was undertaken with USFWS will be documented.

Tracking Temporary Impacts on Habitat Types

SoCalGas will track the amount of temporary impacts on individual natural habitat types resulting from Covered Activities to ensure the amount of impacts stays within predicted caps for each species (see Table 5.1-1, *Summary of Direct Effects*). The process to track temporary impacts on habitat type will include four steps:

1. Biological field surveys will be completed prior to the covered activity to field verify the habitat types assessed in the predictive model and GEARs (Chapter 4.2, *Biological Resources: Bioregions, Wildlife, Fish, and Vegetation*; and Appendix D). This will involve vegetation mapping based on field surveys typically using detailed vegetation categories.

2. Based on the project-specific biological surveys, avoidance and minimization measures will be incorporated into the implementation and scheduling of Covered Activities (please see Chapter 6.2, *Measures to Avoid and Minimize Take*).

3. For each Covered Activity, SoCalGas will complete a quantification of temporary impacts on suitable habitat for each Covered Species by overlaying the impact footprint with the mapping of suitable habitat for each species. Temporary impact

areas will be required to be restored to their pre-project condition at a ratio of not less than 1:1, which could be accomplished by use of in-lieu mitigation fees or restoration at 1.5:1. The first three years of mitigation would be done in year one, and annually thereafter.

4. SoCalGas will keep an accounting of the Plan-to-date temporary impacts on habitat types for each Covered Activity and report such impacts on an annual basis. The documentation of annual and cumulative impacts will be compiled in matrix format (Appendix H, *Cumulative Permanent Impact Tracking Template*), accompanied by a narrative description in a concise report format.

Tracking Permanent Impacts on Habitat Types

SoCalGas will track the amount of permanent impacts on individual natural habitat types resulting from Covered Activities to ensure the amount of impacts stays within an approved set of caps for each species (see Table 5.1.1-1). The process to track permanent impacts on habitat type will include four steps:

1. Biological field surveys will be completed prior to the covered activity to field verify the habitat types assessed in the predictive model and GEARs (Chapter 4.2 and Appendix D). This will involve vegetation mapping based on field surveys typically using detailed vegetation categories or soil type when applicable.

2. Based on the project-specific biological surveys, avoidance and minimization measures will be incorporated into the implementation and scheduling of Covered Activities (see Chapter 6.2).

3. For each Covered Activity, SoCalGas will complete a quantification of permanent impacts on suitable habitat for each Covered Species by overlaying the impact footprint with the mapping of suitable habitat for each species. Permanent impact areas will be required to be compensated through purchase of credits in an established mitigation bank or long-term conservation of comparable suitable habitat at a ratio of not less than 3:1.

4. SoCalGas will keep an accounting of the Plan-to-date permanent impacts on habitat types for each Covered Activity and report such impacts on an annual basis. The documentation of annual and cumulative impacts will be compiled in matrix format (Appendix H), accompanied by a narrative description in a concise report format.

Tracking Indirect Impacts on Habitat Types

SoCalGas will track the amount of indirect impacts on individual natural habitat types resulting from Covered Activities to ensure the amount of impacts stays within approved set of caps for each species (see Table 5.1.1-1). Indirect effects are defined as any impact or a result caused by a project action. Indirect effects can occur later in time and possibly at some distance, or they may occur at the time of the proposed action but beyond the footprint of a project or activity (i.e., the effects are beyond the area of land cover disturbance but still reasonably foreseeable). Although more difficult to detect and track, indirect effects can undermine species viability or habitat quality, especially if multiple indirect or direct effects work cumulatively to impair the species or degrade the habitat. The ITP

limits construction of new roads to not exceed ¼ mile per year. The ITP limits the construction of small capital projects to not exceed 1 acre per year. The process to track indirect impacts on habitat type will include four steps:

1. Biological field surveys will be completed prior to the Covered Activity to verify the habitat types assessed in the predictive model and GEARs within the project footprint and a 500-foot buffer from the edges of the worksite, including construction of new access or egress roads or any small capital improvement project undertaken in a previously undeveloped area (Chapter 4.2 and Appendix D). This will involve vegetation mapping based on field surveys typically using detailed vegetation categories.

2. Based on the project-specific biological surveys, avoidance and minimization measures will be incorporated into the implementation and scheduling of Covered Activities (please see Chapter 6.2).

3. For each Covered Activity, SoCalGas will complete a quantification of indirect impacts on suitable habitat for each Covered Species by overlaying the impact footprint with the mapping of suitable habitat for each species. Indirect impact areas will be required to be compensated through purchase of credits in an established mitigation bank or long-term conservation of comparable suitable habitat at a ratio of not less than 0.5:1, such that there is no net loss of habitat.

4. SoCalGas will keep an accounting of the Plan-to-date indirect impacts on habitat types for each Covered Activity and report such impacts on an annual basis. The documentation of annual and cumulative impacts will be compiled in matrix format (Appendix H), accompanied by a narrative description in a concise report format.

Tracking "Take" of Covered Species

SoCalGas will track the amount of direct "take" of Covered Species to ensure the amount of impact stays within approved set of caps for each species (see Table 5.1.1-1).

Plant Species

For each Covered Activity, SoCalGas will document that there was no "take" of individuals of Covered Species. Where plants are listed under CESA and cannot be avoided, SoCalGas will notify CDFW 10 days prior to facilitate salvage. "Take" will be estimated based on estimated density per acre multiplied area (in acres) of impact.

Wildlife Species

USFWS (Ventura, Carlsbad, and Palm Springs Field Offices) will be notified within 24 hours of any unanticipated "take" of a wildlife species. In the unanticipated event that "take" of a wildlife species occurs, the CA Report will provide a description of any take of Covered Species that occurred: form, cause, take amount, location and time of day, deposition of dead or injured individuals, and documentation of notification of USFWS. Where the Covered Species is afforded protection pursuant to CESA, documentation of notification of CDFW will also be provided.

6.6.3 Monitoring Effectiveness of Avoidance and Minimization Measures

The CA Report will include a table of the AMMs implemented and brief evaluations of effectiveness and practicability.

6.6.4 Monitoring Mitigation

The USFWS *HCP Policy Handbook* provides that mitigation for project impacts should generally occur prior to or concurrent with the impacts.

Implementation of conservation measures roughly proportional in time and extent to impacts on natural communities and Covered Species will be measured as follows: (1) for in-lieu mitigation fees, the date of receipt of the in-lieu mitigation fee by the mitigation bank or conservation organization; and (2) for habitat acquired, the date of recordation of a conservation easement or other approved site protection mechanism. For the purpose of maintaining rough proportionality, SoCalGas will ensure that a minimum 3:1 mitigation ratio for permanent impacts will be maintained for each vegetation community, within the Plan Area. Thus, for each acre of chaparral, riparian vegetation, scrub, and woodland that is directly impacted, at least three acres will have been conserved or restored before the impacts take place.

For the purpose of maintaining rough proportionality, SoCalGas will ensure that a minimum 1:1 mitigation ratio for temporary impacts will be maintained for each vegetation community, within the Plan Area. Thus, for each acre of chaparral, riparian vegetation, scrub, and woodland that is directly impacted, at least three acres will have been conserved or restored before the impacts take place.

Compliance with the requirement to maintain rough proportionality will be monitored by SoCalGas and will be reported on an annual basis as part of the Annual Report. The Annual Report shall include a description of any take of Covered Species that occurred: form, cause, take amount, location and time of day, and deposition of dead or injured individuals. It shall also include any temporary and permanent impacts (in acres) to Covered Species' modeled habitat that occurred during the reporting year, as well as the cumulative total, and if any mitigation credits are required. Mitigation credits are discussed further in Chapter 8. Because SoCalGas has accelerated the implementation of conservation actions (Preserve acquisitions and restoration projects) through the EAP, it is expected that most or all of the conservation actions under the Plan will be completed (i.e., conservation easements recorded for SoCalGas Preserves and restoration projects signed off as meeting their success criteria) within 10 years after permit issuance. This will be prior to when a substantial percentage of the impacts from Covered Activities occur. To ensure that rough proportionality will be maintained during the first few years of the Plan, SoCalGas will either record a conservation easement for at least one Preserve or be able to demonstrate that one or more restoration projects have received Wildlife Agency sign-off as meeting their success criteria within 2 years of permit issuance.

Chapter 7.0
CHANGED AND UNFORESEEN CIRCUMSTANCES

Section 10 of the ESA specifies that, as long as an HCP permit holder is properly implementing their HCP and the associated ITP, no additional commitment of land, water, or financial compensation will be required with respect to Covered Species; and no restrictions on the use of land, water, or other natural resources will be imposed beyond those specified in the HCP without the consent of the permittee (codified at 50 CFR 17.3, 17.22(b)(5), 17.32(b)(5); 50 CFR 222.307(g)). These provisions are known as "No Surprises Assurances." The No Surprises rule has two major components: changed circumstances and unforeseen circumstances. Changed and unforeseen circumstances must be considered and are typically required to be included in HCPs. Changed and unforeseen circumstances apply to the mitigation lands and to the operation of the HCP. However, in rare instances it may be determined that it is not necessary to include changed and unforeseen circumstances in the HCP, such as low-effect HCPs with a short duration.[512]

Changed circumstances are those that can be reasonably anticipated and addressed through advanced planning.[513] One way to differentiate between a changed and unforeseen circumstance is to use a risk assessment or probability of that condition occurring. For example, the probability of a 100-year flood event is likely to occur within the life of the 30-year term permit, but a 500-year flood event is not.[514]

7.1 Changed Circumstances

Changed circumstances are defined in the No Surprises rule as "changes in circumstances affecting a species or geographic area covered by [an HCP] that can reasonably be anticipated by [plan] developers and the Services and that can be planned for (e.g., the listing of new species, or a fire, or other natural catastrophic event in areas prone to such events)" (50 CFR 17.3). If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances, and such measures were provided for in the HCP, the permittee will be required to implement such measures (50 CFR 17.22(b)(5)(i), 17.32(b)(5)(i); 50 CFR 222.307(g)(1)). If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances, and such measures were not provided for in the HCP, the USFWS and CDFW will not require any additional measures beyond those provided for in the HCP, without the consent of the permittee, provided the HCP is being properly implemented (50 CFR 17.22(b)(5)(ii), 17.32(b)(5)(ii); 50 CFR 222.307(g)(2)).[515]

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[512] U.S. Fish and Wildlife Service. n.d. Habitat Conservation Plan Handbook. Section 9.6: Changed and Unforeseen Circumstances. Available at: https://www.fws.gov/midwest/endangered/permits/hcp/hcphandbook.html. Accessed 7 September 2017.

[513] U.S. Fish and Wildlife Service. n.d. Habitat Conservation Plan Handbook. Section 9.6.5: Determining Changed v. Unforeseen Circumstances. Available at: https://www.fws.gov/midwest/endangered/permits/hcp/hcphandbook.html. Accessed 10 October 2017.

[514] U.S. Fish and Wildlife Service. n.d. Habitat Conservation Plan Handbook. Section 9.6.4: Differentiating Between and Changed and an Unforeseen Circumstance. Available at: https://www.fws.gov/midwest/endangered/permits/hcp/hcphandbook.html. Accessed 10 October 2017.

[515] U.S. Fish and Wildlife Service. n.d. Habitat Conservation Plan Handbook. Section 9.6: Changed and Unforeseen Circumstances. Available at: https://www.fws.gov/midwest/endangered/permits/hcp/hcphandbook.html. Accessed 7 September 2017.

As stated in the HCP Handbook, it is possible that no response will be needed for a particular changed circumstance, such as flooding in a healthy river system or fire in a fire-adapted community, if vegetation is likely to regenerate naturally, and covered species will recover and possibly benefit from the event. However, it is key that SoCalGas consider potential changed circumstances and that the MSHCP include a robust set of plan responses if those changes could affect the success of the conservation measures.[516]

The Changed Circumstances listed below are recognized by the MSHCP. Follow-up actions to address the Changed Circumstances are also described below.

- Emergency gas O&M situations
- Drought
- Earthquake/tsunami
- Fire
- Flooding
- Disease
- Introduction of invasive species
- New species listing / designation of critical habitat
- Extreme weather conditions

If SoCalGas becomes aware that a Changed Circumstance has occurred and that remedial activities (such as O&M activities deemed necessary to respond to the Changed Circumstance) may necessitate impacts to the Covered Species, SoCalGas will be responsible for initiating coordination with the USFWS to determine the appropriate level of amendment to be undertaken to the MSHCP:

- Notify the USFWS in writing and within 30 days that a Changed Circumstance has occurred.

- Prepare an assessment to determine the severity of an event and its impacts on SoCalGas facilities and the Covered Species, and associated areas being used as compensatory mitigation, within the CRCP Plan Area, that were adversely affected by the changed circumstance.

- Prepare a draft remediation plan, timeline, and cost estimate and determine if supplemental environmental compliance is required pursuant to NEPA. SoCalGas will make reasonable efforts to provide the draft remediation plan to the USFWS and may initiate responses within 60 days of the determination of Changed Circumstance. The USFWS will use their reasonable efforts to provide their concurrence or nonconcurrence within 60 days from receipt of the draft plan, including any specific recommendations to modify the plan. In the absence of a response within 60 days, SoCalGas shall be deemed authorized to proceed with the remedial activities.

- SoCalGas will use the approved remediation plan to implement the identified adaptive management activities, and if necessary to reallocate funds. All required

[516] U.S Fish and Wildlife Service. n.d. Habitat Conservation Plan Handbook. Section 9.6.4 Differentiating Between a Changed and an Unforeseen Circumstance. Available at: https://www.fws.gov/midwest/endangered/permits/hcp/hcphandbook.html. Accessed 10 October 2017.

environmental compliance will be completed before actions are implemented; if an emergency response is required, SoCalGas will follow up with all required post-action documentation. A summary report will be prepared by SoCalGas on the Changed Circumstance event/condition, actions implemented, results of the actions, and any recommendations for future activities. SoCalGas will provide a post-response summary to the USFWS within 60 days of completion of the response.

7.1.1 Emergency Situations

A Changed Circumstance due to an emergency is an event that involves federal, state, or local public agency or SoCalGas declaration or designations of an emergency, consistent with the definition of "Emergency Projects" per the USFWS NEPA Handbook[517] or the State CEQA Guidelines.[518]

Definition. Emergency situations are defined as any natural or human-caused events that require an immediate response by SoCalGas to protect human health, welfare, property, the natural environment, or system reliability. Emergency response actions are not limited to the actual repair of SoCalGas facilities but also include preliminary site assessments conducted to understand the extent of the potential problem. These response actions are also designed to limit further potential threats.

Risk Assessment. Most O&M activities can routinely be conducted on specific schedules. Emergency situations, however, may require SoCalGas to take immediate responsive action, and in some instances, implementation of avoidance and minimization measures will not be practical. Emergency repairs may be necessary to address pipeline leaks or breaks, to prevent leaks from occurring in the near future, to repair access roads severely damaged by storms or earthquakes, or any other property, or the environment. The necessity of responding immediately to emergency situations leaves open the possibility that an emergency response might occur during nesting and/or breeding seasons, and/or require encroachment into a nesting/breeding site or other area potentially occupied by species covered by the MSHCP.

Preventive Measures and Responses. Most emergency repair situations affect less than one acre, although the amount of habitat disturbance varies depending upon the nature of the emergency and the weather conditions. Weather conditions may require additional equipment such as dewatering equipment, vacuum trucks, or dust abatement equipment. Firefighting equipment may also be required.

In some instances, pipeline integrity inspection or leak survey data identify pipeline anomalies or leaks that require an immediate response to rectify the issue, possibly resulting in emergency work. Depending upon the nature of the anomaly/leak and the level of urgency required, several excavations may be necessary. Repair activities under these circumstances would be conducted in accordance with federal regulations. Digs to inspect and repair anomalies or leaks will consist, at a minimum, of excavating and inspecting the pipeline, completing the repair, and backfilling the excavation hole. Remediation and restoration could include excavation, recontouring, and revegetation. If the emergency situation requires the removal of contaminated soils and vegetation, the topography of the site will be restored as close as possible to the original topography. Where soil

[517] U.S. Fish and Wildlife Service. December 2003. NEPA Reference Handbook. Available at: ttps://www.fws.gov/r9esnepa/NEPA%20Handbook%20TOC.pdf. Accessed 10 October 2017.

[518] 2017 California Environmental Quality Act (CEQA) Statute and Guidelines, Section 15269. Emergency Projects (Public Resources Code 21000-21189) and (California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387).

removal is not required, contaminated vegetation will be removed using hand tools. The site will be revegetated to provide erosion control and restoration consistent with the surrounding vegetation community.

Emergency situations may require SoCalGas to take immediate action and, as a result, preclude the implementation of certain mitigation measures. If the affected area is located in potentially suitable habitat for Covered Species, SoCalGas environmental personnel shall notify the USFWS within 48 hours, visit the site as soon as it is safe, and provide guidance to field crews regarding the implementation of the mitigation measures. A written summary of the emergency actions undertaken; the mitigation measures applied and those deemed impracticable to implement at the time of the emergency; resulting impacts; and the site stabilization, revegetation, and/or mitigation implemented under the MSHCP shall be provided as part of the Annual Report. SoCalGas will continue to assess the effectiveness of the MSHCP Conservation Strategies, as described in Chapter 6, Section 6.5.1.

7.1.2 Drought

A Changed Circumstance due to reduced precipitation is an event that involves federal or state drought emergency declarations or designations of a drought.

Definition. Drought is a condition of water shortage for a particular user in a particular location.[519] The USGS defines drought as a period of drier-than-normal conditions that results in water-related problems. When rainfall is below normal for several weeks, months, or years, stream and river flows decline, water levels in lakes and reservoirs fall, and the depth to water in wells increases. If dry weather persists and water-supply problems develop, the dry period can become a drought.[520]

Risk Assessment. The ability to reliably predict drought conditions at seasonal or annual timescales is very limited.[521] While California's native species are adapted to periods of drought, some are more vulnerable than others to extended or frequent severe drought and may be at risk of extirpation due to factors such as small population size, short life expectancy relative to the drought duration, and inability to adequately cope with extreme events. Depending on the severity of a drought event, basic biological requirements for water-dependent species may be compromised. Some taxa, such as fish, require oxygenated water to breathe and therefore cannot exist without it. Others, such as amphibians, may not die from lack of water, but may fail to reproduce. Many adult amphibians (e.g., frogs, toads, and salamanders) can survive periods of no water, but most require water for the egg and larval/tadpole life stages. Other more terrestrial species are only able to successfully breed when food, such as vegetation or prey species that feed on vegetation, is available for the young. Severe, extended absence of precipitation reduces the amount of forage available to wildlife and may therefore lead to population declines through lack of recruitment of young. Whether an extended drought is causing a species to decline towards extinction depends on a number of factors, including how widely distributed the species is relative to extreme drought conditions, the degree to which microhabitats remain available to serve as refugia, and the ability for animals to relocate to less impacted areas. With adequate behavioral or genetic diversity and enough time, some animals can adapt to or evolve with changing conditions. For many species, however, the information required

[519] California Department of Water Resources, 7 January 2016. Drought Information, Drought Background. Available at: http://www.water.ca.gov/waterconditions/background.cfm. Accessed 20 September 2017.

[520] U.S. Geological Survey, California Water Science Center. 31 May 2017. California Drought: Drought Defined. Available at: https://ca.water.usgs.gov/data/drought/. Accessed 4 September 2017.

[521] California Department of Water Resources, Natural Resources Agency. Fall 2012. Drought in California, p. 6.

to predict drought vulnerability is not known.[522]

Preventative Measures and Responses. If, during routine inspections or other means, SoCalGas learns that significant, widespread damage or losses of individuals or habitat is occurring due to drought, and that impacts to SoCalGas facilities (such as compromised stability or safety) may necessitate O&M work within the habitat of the Covered Species, SoCalGas will notify USFWS within 30 days. In collaboration with USFWS, SoCalGas will assess impacts to Covered Species and their habitats and begin implementation of mitigation measures as specified in Chapter 6, *Conservation Program*. SoCalGas will also assess the effectiveness of the MSHCP Conservation Strategies, as described in Section 6.5.1, *Effectiveness Monitoring Consistent with Permit Obligations*. SoCalGas and USFWS will engage in a dialogue regarding appropriate corrective action to restore habitat for the Covered Species within existing ROWs. Both SoCalGas and USFWS will collaborate to develop a plan to lessen the impact on Covered Species and their habitats.

7.1.3 Earthquake/Tsunami

A Changed Circumstance due to an earthquake occurs when the earthquake is classified by the USGS as having an intensity over 5.0 on the Richter Scale.[523,524] A Changed Circumstance due to a tsunami event is one where an official tsunami warning is broadcast through local radio and television, marine radio, wireless emergency alerts, NOAA Weather Radio, and NOAA websites (like Tsunami.gov) or social media accounts (Facebook and Twitter).[525]

Definition. California maintains a database of Earthquake Fault Zone and Seismic Hazard Zone, as well as Tsunami Inundation maps on the California Geological Survey's website.[526] Earthquake Fault Zones are defined as regulatory zones around active faults that constitute a potential hazard to structures from surface faulting or fault creep such that avoidance as described in California Public Resources Code (PRC) Section 2621.5(a) would be required. Seismic Hazard Zone maps include liquefaction zones and earthquake-induced landslide zones that have the potential for permanent ground displacements such that mitigation as defined in PRC Section 2693(c) would be required. These zones are established by the State Geologist to comply with the Alquist-Priolo Earthquake Fault Zoning Act and the Seismic Hazards Mapping Act.[527] Tsunami Inundation maps cover most residentially and transient populated areas at risk to tsunamis in California and represent a combination of the maximum considered tsunamis for each area.[528]

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[522] California Department of Fish and Wildlife, Wildlife Branch, Nongame Wildlife Program. 22 January 2016. A Rapid Assessment of the Vulnerability of Sensitive Wildlife to Extreme Drought, p. 1.

[523] U.S. Geological Survey. n.d. Magnitude/Intensity Comparison. Available at: https://earthquake.usgs.gov/learn/topics/mag_vs_int.php. Accessed 8 September 2017.

[524] U.S. Geological Survey. n.d. The Modified Mercalli Intensity Scale. Available at: https://earthquake.usgs.gov/learn/topics/mercalli.php. Accessed 8 September 2017.

[525] U.S. Department of Commerce, NOAA/National Weather Service, U.S. Tsunami Warning Center. n.d. Tsunami Frequently Asked Questions, Question 5. Available at: http://www.tsunami.gov/?page=tsunamiFAQ. Accessed 4 September 2017.

[526] California Department of Conservation, California Geological Survey, n.d., Official Tsunami Inundation Maps. Available at: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/. Accessed 20 September 2017.

[527] California Department of Conservation. n.d. CGS Information Warehouse: Regulatory Maps. Available at: http://maps.conservation.ca.gov/cgs/informationwarehouse/. Accessed 4 September 2017.

[528] California Department of Conservation. n.d. Official Tsunami Inundation Maps. Available at http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Pages/index.aspx. Accessed 28 August 2017.

Risk Assessment. There are earthquake fault zones, landslide zones, and liquefaction zones located within the CRCP Plan Area. These zones are concentrated south of Santa Barbara in Ventura and Los Angeles Counties. Damage from an earthquake, liquefaction, or landslide is more likely to affect infrastructure than the Covered Species. As the proposed project does not constitute constructing substantial infrastructure, the risk with regard to the MSHCP would be reduced compared to other development projects in the same region. There are also tsunami inundation zones located in the CRCP Plan Area, as discussed in Section 4.1.2.3, *Geologic and Seismic Hazards*. Considering its proximity to the Pacific Ocean, the inundation by tsunamis can occur along the California coast in the event of a significant earthquake. Therefore, Covered Species found in coastal zones would be at risk from tsunami events.

Preventative Measures and Responses. SoCalGas may evaluate the Tsunami Inundation maps, Seismic Hazard Zone maps, and Earthquake Fault Zone maps to better determine preventative measures to reduce the impact of earthquakes and tsunamis on the Covered Activities within the CRCP Plan Area. In the event of an earthquake, SoCalGas will repair or rebuild infrastructure and perform monitoring of species, populations, or habitats that are identified as being potentially negatively affected by O&M activities required in response to the incident. During O&M activities, SoCalGas will implement mitigation measures as specified within the CRCP MSHCP. If the urgency of a given repair precludes certain avoidance strategies, such as conducting work outside the breeding or nesting season, SoCalGas will coordinate with the USFWS regarding steps to avoid further impacts to Covered Species. Once O&M activities are completed, SoCalGas and the USFWS will engage in a dialogue regarding the appropriate corrective action to restore habitat for the Covered Species within existing ROWs. Immediate emergency responses to repairing pipeline infrastructure in the event of a catastrophic geologic activity occurs independent of the MSHCP and is not considered part of the Covered Activities of the MSHCP. In order to determine whether the tsunami event caused a long-term impact on Covered Species, SoCalGas will conduct species surveys following the remediation work, as appropriate times of the year, within the footprint of the affected environment, plus a 200-foot buffer. The species surveys will follow all HCP guidelines. SoCalGas will document its findings and submit a report to the USFWS.

7.1.4 Fire

A Changed Circumstance due to a fire is in an area where ignition occurs in native vegetation that triggers a response by the California Department of Forestry and Fire Protection (CAL FIRE) or a county or local municipal fire department.[529]

[529] Cambridge Dictionary. n.d. Wildfire. Available at: http://dictionary.cambridge.org/dictionary/english/wildfire?a=british. Accessed 4 September 2017.

Definition. Fire is a natural and necessary component of California's natural ecosystems. It can promote ecosystem health by removing decaying vegetation and supporting new plants and wildlife.[530] Many vegetation communities in southern California have evolved with, or even depend on, natural fire events to perpetuate favorable growth conditions. Conversely, fires occurring too frequently can disrupt natural regeneration cycles, including loss of mature native plants and seed banks, which may lead to the expansion of non-native, invasive species that can greatly disrupt natural communities.

Pursuant to PRC Sections 4201–4, CAL FIRE maps fire hazard severity zones according to the level of risk (moderate, high, and very high) within State Responsibility Areas. In addition, pursuant to Government Code Sections 51175–89, CAL FIRE publishes maps identifying Very High Fire Hazard Severity Zones (VHFHSZ) within Local Responsibility Areas. These zones are defined by expected fire behavior, expected burn probabilities, and nature of vegetation.[531]

Risk Assessment. Given the 30-year duration of the permit and large geographic area, it is inevitable that fire will occur within the CRCP Plan Area. Within the CRCP Plan Area, fires from natural or human-caused events can result in a wide range of adverse consequences to Covered Species and their habitats. While some instances of fire may be beneficial to certain habitat within the CRCP Plan Area, SoCalGas will be prepared to address more severe fires and their impacts to the Covered Activities. The likelihood of fires in the CRCP Plan Area depends on the location and history of such events; the magnitude of the effects depends on the severity and duration of the event, and habitat affected. Tolerance for fire varies among different types of vegetation and is measured by the acceptable frequency of fire for that vegetation community to continue to thrive (Figure 7.1.4-1, *Wildfire Threat within the CRCP Plan Area*). Increased temperatures would have the potential to increase the intensity and frequency of fires, which would place natural vegetation communities at higher risk.[532]

Preventative Measures and Responses. SoCalGas will prepare a fire response plan for O&M activities deemed necessary following a major fire event within the habitat of the Covered Species. SoCalGas will submit the fire response plan to the USFWS and may initiate responses within 60 days of a major fire event. These responses will be catalogued and taken into consideration with SOPs, which will serve as guidance in SoCalGas' response to the fire event. In the event of a possible rupture to the pipeline due to fire, SoCalGas will deploy qualified personnel to assess the impacted area and determine specific actions to be implemented. SoCalGas will additionally coordinate with the designated primary responder for fire safety, where feasible. Potential remedial actions for O&M activities conducted in response to a fire event that constitute a Changed Circumstance may involve firebreaks or fire roads, installation of temporary erosion control measures, revisions to area management plans for access, restoration activities, invasive species control measures, native plant reseeding, and vegetation and wildlife monitoring. SoCalGas may use aerial photography to assess the extent of damage from the fire event with respect to the baseline condition of the habitat of Covered Species and listed species. In order to determine whether the fire caused a long-term impact on Covered Species within the footprint of fire response work areas, SoCalGas will conduct species

[530] California Department of Forestry and Fire Protection (CalFire). n.d. California Fire Plan Overview. Available at: http://www.fire.ca.gov/communications/downloads/fact_sheets/FirePlan.pdf. Accessed 4 September 2017.

[531] California Department of Forestry and Fire Protection (CalFire). n.d. GIS data. Available at: http://frap.fire.ca.gov/data/frapgisdata-subset. Accessed 4 September 2017.

[532] National Wildlife Federation, 2008. Increased Risk of Catastrophic Wildfires: Global Warming's Wake-Up Call for the Western United States. Available at: https://www.nwf.org/~/media/PDFs/Global-Warming/NWF_WildFiresFinal.ashx. Accessed 20 September 2017.

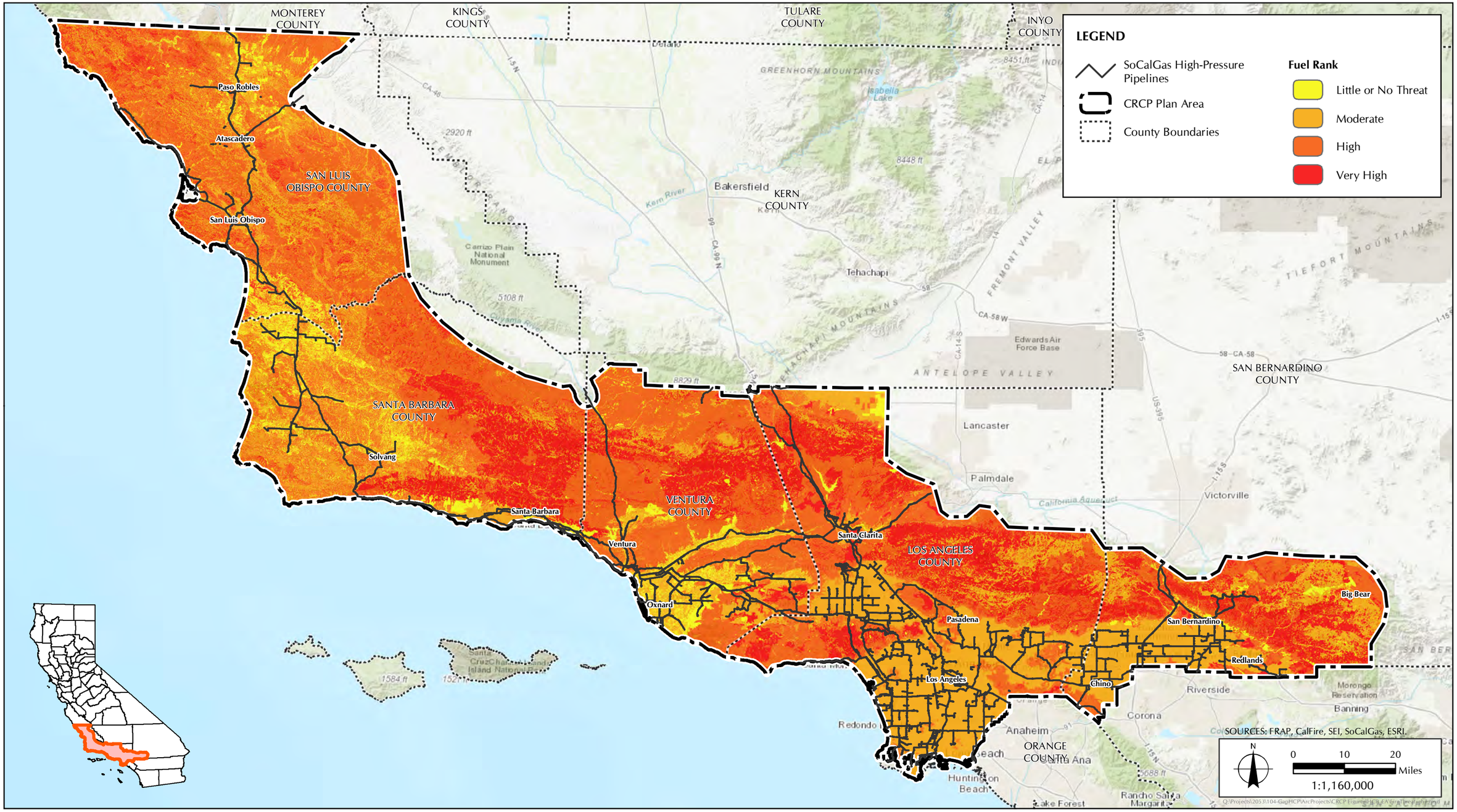

FIGURE 7.1.4-1

Wildfire Threat within the CRCP Plan Area

surveys following any remediation work, at appropriate times of the year, within the footprint of the affected environment, plus a 200-foot buffer. The species surveys will follow all HCP guidelines. SoCalGas will document its findings and submit a report to the USFWS.

7.1.5 Flooding

A Changed Circumstance flood event will be defined as an event that exceeds the 100-year flood level, as defined by the Federal Emergency Management Agency (FEMA) or more detailed mapping prepared by a local flood management authority and causing temporary or permanent impacts to occupied habitat or designated critical habitat within the CRCP Plan Area.

Definition. A flood event could have a beneficial or adverse effect to a Covered Species and its habitat. Similar to fire, flooding is a recurring natural event that shapes ecological communities—particularly in riparian areas—with which the Covered Species have evolved and, in some cases, depend on. Approximately 228,403.83 acres of the CRCP Plan Area are located in 100-year floodplains. FEMA defines a 100-year flood as a flood that has a 1 percent change of occurring in any given year. Similarly, a 50-year flood is that which has a 2 percent chance of occurring in any given year. These are areas of inundation that are associated with high-magnitude storms and associated flood events that have a low probability of occurrence.

Risk Assessment. Predicting the potential for future flooding events is difficult because they depend on a complex mixture of rainfall, soil moisture, and the recent history of precipitation, in addition to the contributions of snowmelt and storm surge.[533] Since the 100-year flood level is statistically computed using past, existing data, as more data comes in, the level of the 100-year flood will change (especially if a huge flood hits in the current year). As more data are collected, or when a river basin is altered in a way that affects the flow of water in the river, scientists reevaluate the frequency of flooding. Dams and urban development are examples of some human-made changes in a basin that affect floods.[534] SoCalGas will use the most up-to-date data on flooding to best determine potential areas of inundation.

Preventative Measures and Responses. SoCalGas will be responsible for repairs to structures or facilities in response to floods that adversely affect gas transmission systems and adversely affect Covered Species and their habitats. Immediate action may be necessary to stabilize gas facilities (and protect from floodwaters, including erosional and depositional forces). SoCalGas may use aerial photography to assess the extent of damage from the flood event as compared to the USGS flood inundation maps for the affected area with respect to the baseline condition of the habitat of covered and listed species. Possible remedial actions to a flood event that may necessitate completion of O&M activities within the habitat of the Covered Species may involve installation of temporary or permanent erosion control measures, emergency sandbagging, temporary access roads to mobilized personnel and equipment, revisions to area management plans for access, restoration activities, invasive species control measures, native plant reseeding, and vegetation and wildlife monitoring.

[533] NASA Science. 21 July 2015. Predicting Floods. Available at: https://science.nasa.gov/science-news/science-at-nasa/2015/22jul_floods. Accessed 28 August 2017.

[534] U.S. Geological Survey. 9 December 2016. The USGS Water Science School, Floods: Recurrence Intervals and 100-Year Floods. Available at: https://water.usgs.gov/edu/100yearflood.html. Accessed 4 September 2017.

If, during routine inspections or other means, SoCalGas determines that pipelines and other facilities have been affected by flooding and that necessary O&M activities within the existing ROW may result in impacts to the Covered Species, the USFWS shall be notified within 30 days. During O&M activities, SoCalGas will implement mitigation measures as specified within the CRCP MSHCP. If the urgency of a given repair precludes certain avoidance strategies, such as conducting work outside the breeding or nesting season, SoCalGas will coordinate with the USFWS regarding steps to avoid further impacts to Covered Species. Once O&M activities are completed, SoCalGas and the USFWS will engage in a dialogue regarding the appropriate corrective action to restore habitat for the Covered Species within existing ROWs. As the permit term is for 30 years, it is probable that one or more flood events in excess of a 50-year magnitude will occur, which will most likely necessitate this coordination.

7.1.6 Introduction of Invasive Species and/or Disease

A Changed Circumstance regarding the introduction of invasive species and/or disease will be defined as an event where a federal, state, or local agency declares the presence or exacerbation of an invasive species or disease that could threaten the status of a Covered Species or the quality of designated critical habitat.

Definition. A Changed Circumstance event due to disease or invasive species within the CRCP Plan Area will be an event where the presence of the disease or invasive species has the potential to directly or indirectly affect occupied habitat or designated critical habitat in a manner that would adversely affect the population size of the Covered Species. Such adverse effects could include net reduction in habitat due to removal or adverse alteration of breeding habitat, foraging habitat, roosting habitat, nesting habitat, primary movement corridors, or nursery habitat with SoCalGas ROWs or lands owned in fee title or administered pursuant to long-term leases, or lands used as compensatory mitigation in conjunction with the ITP.

Risk Assessment. Invasive, non-native species presently occur throughout the CRCP Plan Area and on ROWs and facilities in the CRCP Plan Area. It is also anticipated that new invasive, non-native species will colonize or become established within the CRCP Plan Area during the 30-year permit term. These species could reach temporary, but problematic, levels after a disturbance such as drought, excessive precipitation or fire, or as a result of importation by humans.

Preventative Measures and Responses. If a Changed Circumstance event for invasive species or disease is determined by SoCalGas to have occurred on lands administered by SoCalGas within the CRCP Plan Area, SoCalGas will have a qualified individual (e.g., a biologist or pest control specialist) assess the condition to determine specific actions that are appropriate to be implemented. Possible responses to a Changed Circumstance invasive species or disease would be undertaken in consideration of the four principles of integrated pest management (IPM):

- **Set Action Thresholds.** Before taking any pest control action, IPM first sets an action threshold, a point at which pest populations or environmental conditions indicate that pest control action must be taken.

- **Monitor and Identify Pests.** IPM programs work to monitor for pests and identify them accurately, so that appropriate control decisions can be made in conjunction with action thresholds. This monitoring and identification removes the possibility that herbicide or pesticides will be used when they are not warranted or appropriate.

- **Prevention.** As a first line of pest control, IPM programs work to manage the natural habitat to prevent pests from becoming a threat. This may involve planting disease or pest-resistant strains of common plant species.

- **Control.** Once monitoring, identification, and action thresholds indicate that pest control is required, and preventive methods are no longer effective or available, proper control methods would be evaluated in conjunction with the USFWS both for effectiveness and risk. Effective, less risky pest controls are chosen first, including highly targeted chemicals, such as pheromones to disrupt pest mating, or mechanical control, such as trapping or weeding. If further monitoring, identifications, and action thresholds indicate that less risky controls are not working, then additional pest control methods would be employed, such as targeted spraying of pesticides. Broadcast spraying of nonspecific pesticides is a last resort.

SoCalGas will assess whether any proposed construction activities may contribute to any identified Changed Circumstances by associated agencies on a case-by-case basis. It is reasonable to expect that the invasive species or disease of concern may not affect a particular Covered Species within existing ROWs or facilities where SoCalGas' Covered Activities are conducted. Based on the results of SoCalGas' assessment, reasonable efforts will be made to prepare and implement an invasive species/disease response plan within 60 days of determining that this Changed Circumstance has occurred, consistent with all applicable federal, state, and local statutes and regulations governing such activities. Based submittal of a report within the 60-day window and subsequent discussions with the USFWS, SoCalGas will implement responsive actions in addition to standard invasive species/disease control practices.

7.1.7 New Species Listing/Designation of Critical Habitat

Future listings of species excluded from the current list of Covered Species but that are known to occur within the CRCP Plan Area; and designation of proposed or revised critical habitat for any species potentially occurring within the CRCP Plan Area, covered or otherwise, are reasonably foreseeable during the term of the permit and would constitute a Changed Circumstance.

Definition. In the event that a species that is not a Covered Species pursuant to the MSHCP and associated ITP is listed by either the USFWS or CDFW, or critical habitat is designated or revised for a listed species within the CRCP Plan Area subsequent to the issuance of a take permit pursuant to the MSHCP, such listing will be considered a Changed Circumstance, and would be required to be assessed pursuant to a Plan Modification.

Risk Assessment. There are more than a hundred special-status species of plants and animals with the potential to occur within the CRCP Plan Area that are not afforded protection pursuant to the ESA or CESA at the time of preparation of this MSHCP.

Preventative Measures and Responses. If a new species that is not covered by the MSHCP but may be affected by the Covered Activities is listed under the ESA or CESA during the term of the Section 10(a)(1)(B) or Section 2081 permit, respectively, the take permits will be reevaluated by the USFWS and CDFW, as necessary, to ensure that the activities covered under the MSHCP are not likely to jeopardize or result in the take of the newly listed species. USFWS will also determine whether the Section 10 permit ensures that adverse modification of any newly designated critical habitat is avoided. SoCalGas shall implement the modifications to the MSHCP Covered Activities identified by the USFWS and CDFW as necessary to avoid the likelihood of jeopardy to or take of the newly

listed species or adverse modification of newly designated critical habitat. SoCalGas shall continue to implement such modifications until the USFWS and CDFW have approved an amendment of the Section 10(a)(1)(B) and Section 2081 permits, in accordance with applicable statutory and regulatory requirements, to cover the newly listed species or until SoCalGas is notified in writing that the modifications to the MSHCP's Covered Activities are no longer required to avoid the likelihood of jeopardy of the newly listed species or adverse modification of newly designated critical habitat.[535]

7.1.8 Extreme Weather Conditions

Extreme weather conditions such as high temperatures, heavy rainfall or drought, ice melt, and sea level rise along the coastline could drastically change the landscape within the CRCP Plan Area. These factors may result in changes to areas of occupied or suitable habitat for the Covered Species from their known historic ranges at the time of preparation of this HCP, constituting a Changed Circumstance.

Risk Assessment. Within the CRCP Plan Area, extreme weather conditions have the potential to alter precipitation patterns, vegetation community structure and composition, microclimates, and the extent of microhabitats, potentially expanding or reducing suitable and occupied habitat for listed species. The USFWS advises taking a Strategic Habitat Conservation approach to address changing conditions into an adaptive management framework. The adaptive management framework focuses on biological planning to define conservation deficit and refine species-habitat relationships, conservation design to meet population objectives, and monitoring and research to improve conservation outcomes.[536]

Preventative Measures and Responses. If the range of a species covered by the HCP changes significantly due to extreme weather conditions during the term of the Section 10(a)(1)(B) permit, the take permits will be reevaluated by the USFWS and CDFW, as necessary, to ensure that the activities covered under the HCP are not likely to jeopardize or result in the take of habitat or adverse modification of any newly designated critical habitat. SoCalGas shall implement the modifications to the HCP Covered Activities identified by the USFWS as necessary to avoid the likelihood of jeopardy to or take of the revised range for the listed species or adverse modification of newly designated critical habitat. SoCalGas may revise the predictive models using empirical data and surveys to reflect the altered range of Covered Species due to extreme weather conditions impacts such as temperature or water supply.

SoCalGas shall continue to implement such modifications until the USFWS and CDFW have approved an amendment of the Section 10(a)(1)(B) permit, in accordance with applicable statutory and regulatory requirements, to cover the revised range for the Covered Species or until the USFWS notifies SoCalGas in writing that the modifications to the HCP Covered Activities are no longer required to avoid the likelihood of jeopardy of the newly listed species or adverse modification of newly designated critical habitat.[537] SoCalGas has estimated the funding for the implementation of the HCP, including avoidance and minimization measures (please see Chapter 8, *Funding*, for additional details).

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[535] U.S. Fish and Wildlife Service. n.d. HCP Template. Available at: https://www.fws.gov/cno/docs/hcptemplate.doc. Accessed 7 September 2017.

[536] U.S. Fish and Wildlife Service. n.d. Strategic Habitat Conservation. Available at: https://www.fws.gov/landscape-conservation/shc.html. Accessed 7 September 2017.

[537] U.S. Fish and Wildlife Service. n.d. HCP Template. Available at: https://www.fws.gov/cno/docs/hcptemplate.doc. Accessed 7 September 2017.

7.2 Unforeseen Circumstances

Unforeseen circumstances are defined as changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by SoCalGas and the USFWS at the time of the negotiation and development of the plan and that result in a substantial and adverse change in the status of the Covered Species (50 CFR 17.3).[538] The purpose of the No Surprises rule is to provide assurances to nonfederal landowners participating in habitat conservation planning that no additional land restrictions or financial compensation will be required for species adequately covered by a properly implemented HCP, in light of unforeseen circumstances, without the consent of the permittee.[539]

7.2.1 Planned Response in the Event of Unforeseen Circumstances

Unforeseen Circumstances will require immediate consultation and discussion between the USFWS and SoCalGas, within 30 days of USFWS notification to SoCalGas of determination of an unforeseen circumstance that affects the viability of a covered species addressed by this MSHCP. USFWS bears the burden of demonstrating that unforeseen circumstances exist using the best available scientific and commercial data available while considering certain factors (50 CFR 17.22(b)(5)(iii)(C) and 17.32(b)(5)(iii)(C); 50 CFR 222.307(g)(3)(iii)).[540] In its evaluation, the USFWS will consider, but not be limited to, the following factors, which will then be the basis for evaluating what could be affected:

- The size of the current range of the affected Covered Species
- The percentage of the range of the affected Covered Species that has been adversely affected by Covered Activities under the MSHCP
- The percentage of the range of the affected Covered Species that has been conserved by the MSHCP
- The ecological significance of that portion of the range of the affected Covered Species affected by the MSHCP
- The level of knowledge about the affected Covered Species and the degree of specificity of the Covered Species conservation program under the MSHCP
- Whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected Covered Species in the wild

If the USFWS determines that additional conservation and mitigation measures are necessary to respond to the unforeseen circumstances where the MSHCP is being properly implemented, the

[538] U.S. Fish and Wildlife Service. n.d. HCP Template. Available at: https://www.fws.gov/cno/docs/hcptemplate.doc. Accessed 7 September 2017.

[539] U.S. Fish and Wildlife Service. n.d. HCP Template. Available at: https://www.fws.gov/cno/docs/hcptemplate.doc. Accessed 7 September 2017.

[540] U.S. Fish and Wildlife Service. n.d. HCP Template. Available at: https://www.fws.gov/cno/docs/hcptemplate.doc. Accessed 7 September 2017.

additional measures required of the permittee must be as close as possible, as determined as a result of consultation between the USFWS and SoCalGas, to the terms of the original MSHCP; and must be limited to modifications within lands that have been designated for the implementation of compensatory mitigation, or to adjustments within lands or waters already set aside in the MSHCP's operating conservation program. Additional conservation and mitigation measures shall involve the commitment of additional land or financial compensation or restrictions on the use of land or other natural resources otherwise available for development or use under original terms of the MSHCP, but only with the consent of the permittee.[541]

[541] U.S. Fish and Wildlife Service. n.d. HCP Template. Available at: https://www.fws.gov/cno/docs/hcptemplate.doc. Accessed 7 September 2017.

Chapter 8.0
FUNDING

This section describes the funding mechanism that will be used to ensure that mitigation and monitoring will be implemented.

8.1 MSHCP Implementation Costs

The cost to implement this MSHCP over the 30-year permit term based on 2018 dollars is estimated at $276,508,050. The anticipated annual MSHCP Implementation Cost is based on administrative cost, implementation of avoidance and minimization measures, and compensatory conservation measures (Table 8.1-1, *Summary of Annual MSHCP Implementation Costs*).

TABLE 8.1-1
SUMMARY OF ANNUAL MSHCP IMPLEMENTATION COSTS

Category	Cost Estimate
Plan Administration	$261,840
Avoidance and Minimization Measures	$2,023,306
Mitigation	$6,931,789
Annual Cost	**$9,216,935**

8.1.1 Plan Administration

Roles and responsibilities of SoCalGas staff for administration of this MSHCP are described in Chapter 5. Plan administration costs include staff time and expenses for completing a number of tasks in support of the MSHCP, including:

- General administration and record keeping
- Coordination, tracking and reporting
- Development of Environmental Standards and training materials
- Data management and maintenance (eTS, GEARS, GIS, Predictive Model)

Total costs for Plan administration including contingency are anticipated to average $261,840 per year over the 30-year permit term (Table 8.1.1-1, *Annual Plan Administration Cost*).

TABLE 8.1.1-1
ANNUAL PLAN ADMINISTRATION COSTS

Category	Cost Estimate	Assumptions
Administration and project coordination (SoCalGas)	$131,250	0.75 FTE @ 175,000/yr
Administration and project coordination (Consultant)	$28,800	2 days/month @ $150/hr
Administrative tools (SoCalGas)	$43,750	0.25 FTE @ $175,000/yr
Administrative tools (Consultant)	$14,400	12 days @ $150/hr
Subtotal per year	**$218,200**	**2018 dollars**
Contingency	$43,640	20%
Annual Cost	**$261,840**	

8.1.2 Avoidance and Minimization Measures

As described in Chapter 5, all Covered Activities taking place within a natural area, or otherwise occurring within an area known to be occupied by a Covered Species, shall be subject to the implementation of a comprehensive set of Avoidance and Minimization Measures (AMMs). The total costs for implementing the MSHCP's AMMs are anticipated to average $2,023,306 per year and would be expected to be in force over the 30-year permit term of the permit (Table 8.1.2-1, *Annual Avoidance and Minimization Measures Costs*).

TABLE 8.1.2-1
ANNUAL AVOIDANCE AND MINIMIZATION MEASURES COSTS

Category	Anticipated Party	Cost Estimate	Assumptions
Tailgates, biological monitoring, surveys and agency coordination	SoCalGas	$11,088	12 hr/month ($77/hr)
Tailgates, biological monitoring, surveys and agency coordination	Consultant	$150,000	1,000 hours (20 hr/wk/50 weeks) $150/hr average
Burrow excavations, exclusionary fencing, live trapping, and protocol surveys	Consultant	$750,000	50 activities @ $15K
Erosion & sediment controls	SoCalGas	$600,000	40 activities @ $15K
Revegetation activities	Consultant	$175,000	5 activities @ $35K
Subtotal per year		**$1,686,088**	**2018 dollars**
Contingency		$337,218	20%
Annual Cost		**$2,023,306**	

8.1.3 Mitigation

SoCalGas will provide mitigation in circumstances where adverse impacts to a Covered Species or its occupied (or assumed to be occupied) habitat cannot be avoided. Mitigation options include acquiring, restoring, enhancing or otherwise protecting suitable replacement habitat; purchasing mitigation bank credits[542]; or contributing to a research, recovery or other conservation action administered by an approved entity (Table 8.1.3-1, *Annual Mitigation Costs*). Total costs for mitigation are anticipated to average $5,715,559 per year, recurring over the 30-year permit term.

[542] In all instances where mitigation bank costs were stated in a range, the highest cost value was used within that range.

TABLE 8.1.3-1
ANNUAL MITIGATION COSTS

Category	Cost Estimate	Assumptions
Conservation land acquisition (temporary impacts)	$51,495	$1,544,841 for 64.7 acres over 30 years
Conservation land acquisition (permanent impacts)	$50,459	$1,513,782 for 31.2 acres over 30 years
Mitigation Bank Fees (temporary impacts)	$1,325,743	$39,772,300 for 744.9acres over 30 years
Mitigation Bank Fees (permanent impacts)	$1,668,079	$50,042,394 for 726.8 acres over 30 years
Real Estate Fees/Legal Fees & Taxes	$619,155	20%
Baseline Studies & Surveys	$523,000	$10,000 per year per acre x 52.3 acres
Management/Operating costs	$261,500	$5,000 per year per acre x 42.6acres
Endowment	$1,046,000	$20,000 per year per acre x 42.6 acres
Subtotal per year	**$5,545,431**	**2018 dollars**
Contingency	$1,386,358	25%
Annual Cost	**$6,931,789**	

The mitigation area of this MSHCP refers to both facilities and non-facilities planned activities that overlap with suitable habitat and historic ranges of Covered Species according to GIS-based predicted species distribution models (Appendix D, *Effects Analysis Methods*). The ratios of required mitigation area to planned activities area are 1:1 for temporary impacts, and 3:1 for permanent impacts projected in the MSHCP.

Over 30 years, 1,471.7 acres will be needed for mitigation and conservation of Covered Species. Suitable habitat and historic ranges of an estimated 41 species are expected to intersect with facilities and non-facilities activities of the MSHCP. A total of nine mitigation banks are available in nearby regions that will provide suitable habitat for 24 of these species. Suitable habitat for the remaining 17 species will be established through conservation land acquisition. Mitigation bank fees range from $2,500 to $300,000 per acre depending on the species and location (Table 8.1.3-2, *Mitigation Banking Fees*), and conservation land acquisition costs range from $6,335 to $398,067 (Table 8.1.3-3, *Conservation Land Acquisition*). For mitigation banking, the area of suitable habitat that will be established due to temporary and permanent impacts range from 0.9 acres for the WYBC to 550.9 for the CRLF. The area needed for conservation land acquisition range from 0.9 acres for several species to 33.2 for the VMMV. For additional information, please see Appendix G, *Mitigation Banking Summary Table*.

TABLE 8.1.3-2
MITIGATION BANKING FEES

Mitigation Bank	Covered Species Common Name	Acres Needed	Price per Acre
Santa Paula Creek Mitigation Bank	CRLF	550.9	$80,000
	Arroyo toad	13.3	
	CAGN	249.9	
	LBV	15.9	
	MYLF	5.8	
	SWF	7.2	
	SWPT	67.0	
Petersen Ranch Mitigation Bank	BMV	18.0	$100,000
	Lyon's pentachaeta	7.2	
	Nevin's barberry	1.7	
	SFVS	2.1	
La Purisma Conservation Bank	CTS	61.4	$32,000
	ESBB	3.8	
	LYS	22.9	
Colton Dunes Conservation Bank	DSFF	2.1	$275,000
Cajon Creek Conservation Bank	SBKR	17.7	$300,000
	SARW	3.0	
	SHS	1.9	
Palo Prieto Conservation Bank	SJKF	21.3	$3,500
Resource Conservation District	SAS	1.3	$80,000
Soquel Canyon Mitigation Bank	SRB	15.5	$100,000
	SKR	2.1	
	WYBC	0.9	
Palo Prieto Conservation Bank	Burrowing owl	282.9	$2,500

TABLE 8.1.3-3
CONSERVATION LAND ACQUISITION

Zip Code	Covered Species Common Name	Acres Needed	Price per Acre
90265	BSS	1.1	$14,662
	Marcescent dudleya	0.9	
	SMMD	1.3	
	Verity's dudleya	1.1	
	Conejo dudleya	2.5	
93402	California seablite	0.9	$398,067
	IKM	0.9	
	Morro manzanita	1.5	
	MSS	1.0	
93430	CCBT	0.9	$9,777
93437	GWC	0.9	$6,335
	Gaviota tarplant	15.5	
	SBB	3.6	
	Vandenberg monkeyflower	6.8	
93420	NML	1.2	$9,755
	Pismo clarkia	22.3	
93001	VMMV	33.2	$22,764

8.2 Funding Sources

SoCalGas will fully fund the implementation of this MSHCP through its Capital Projects and O&M budgets. Proposed expenditures require California Public Utilities Commission (CPUC) approval through a General Rate Case (GRC) application. Like other California gas and electric investor-owned utilities, every three years, SoCalGas submits a forecast of future costs to the CPUC for the purpose of setting rates that are determined to be adequate for providing safe and reliable natural gas to all of its customers. SoCalGas filed their latest GRC application in November 2014, requesting operational budgets of $2.352 billion in 2016, $2.478 billion in 2017 and $2.572 billion in 2018. The CPUC issued a Final Decision on the GRC application on June 23, 2016.[543]

SoCalGas' policies require that all SoCalGas projects and operations meet all applicable environmental laws, regulations, and permit requirements. During the project planning process for Capital and O&M projects, SoCalGas identifies all applicable environmental requirements and measures. For projects contemplated under the MSHCP, project planning documents would include all applicable environmental conditions and measures required under this permit. The costs associated with compliance with the environmental requirements are then incorporated into the project budget. When the project is moved forward for budgetary approval, the environmental costs are included in the approved budget. A budgetary shortfall in a given year might cause a company decision to cancel a particular project or delay project planning on projects that have not commenced. But once a project progresses to the point that it triggers particular regulatory requirements or obligations, then those requirements or obligations are funded irrespective of other aspects of the project. As an investor-owned utility regulated by the CPUC, it does not operate in the same manner as typical corporations unregulated by state agencies such as the CPUC. Therefore, SoCalGas can see no scenario in which SoCalGas would not meet its implementation requirements.

8.3 Funding Assurance

SoCalGas is the nation's largest natural gas distribution utility, providing safe and reliable energy to more than 21.6 million consumers, connected through 5.9 million gas meters, in more than 500 communities. The Company's service territory encompasses approximately 20,000 square miles throughout central and southern California, from Visalia to the Mexican border. SoCalGas is a regulated subsidiary of Sempra Energy, a Fortune 500 energy services holding company with 2016 revenues of approximately $10 billion.[544] Sempra Energy and SoCalGas' financial health provides adequate assurance that the Company has the financial capability to fund implementation of all aspects of the CRCP.

[543] Southern California Gas Company (SoCalGas) 2016 General Rate Case (GRC). n.d. Available at: http://www.ora.ca.gov/general.aspx?id=2902. Accessed 7 July 2017.

[544] Sempra Energy. n.d. Balanced Growth: 2016 Annual Report. Available at: http://www.sempra.com/2016_annualreport/?utm_source=redirect&utm_medium=web&utm_campaign=2016_annual_report/. Accessed 7 July 2017.

Chapter 9.0
PERMIT/MSHCP ADMINISTRATION

9.1 Amendments

It is expected that situations will arise during the term of the Section 10(a) permit that may require changes to the MSHCP. These changes might include clerical/administrative changes; minor, nonsubstantive modifications; or major amendments necessitated by changing environmental conditions that would affect the administration of the MSHCP. Information necessary to document proposed changes to the MSHCP will be presented to the agencies in the form of an amendment. Any proposed amendment to the MSHCP would identify the recommended change and would be required to provide corroborating information such as the purpose and need for the change, and specific information and/or findings to justify the amendment.

9.1.1 Minor Modifications

Basic, internal modifications or corrections to the MSHCP that do not require preauthorization from the USFWS will be addressed as clerical changes. Changes could include grammatical changes, correction of any maps, editing errors that will not change the meaning or scope of the MSHCP, and updates to species occurrence data and the Habitat Suitability Model (unless the update modifies mitigation requirements, in which it would need approval from the USFWS). SoCalGas will document minor modifications in writing and provide a summary of changes to the USFWS in its Annual Reports.

9.1.2 Minor Amendments

The USFWS or SoCalGas may propose minor amendments to the MSHCP by providing written notice to the other party. Such notice will include a statement of the proposed minor amendment including a justification and an analysis of any potential environmental effects. Minor amendments are permissible without amending the underlying Section 10(a)(1)(B) permit provided that the USFWS determines the changes do not (1) cause additional take of covered wildlife species that was not analyzed in connection with the original Plan, (2) add a new Covered Species, (3) result in operations under the Plan that are significantly different from those analyzed in connection with the original Plan, (4) change significantly the boundaries of the MSHCP, or (5) have adverse effects on the environment that are new or significantly different from those analyzed in connection with the original Plan.

There are three anticipated categories of minor amendments. Other comparable circumstances may arise over the duration of the permit.

- Minor corrections to the CRCP Plan Area boundary or its description
- Minor adjustments to the AMMs, including the Red Flag Measures (i.e., changes that would not reduce a measure's effectiveness in protecting a Covered Species or involve new significant environmental effects not previously identified)
- Future Covered Activities not expressly identified in the MSHCP, where impacts would not exceed the level of take authorized under the permit

SoCalGas and USFWS will each apply reasonable efforts to respond to any proposed minor amendments within 60 days of receipt of written notice. If the agencies do not concur with the supporting analysis, the proposed amendment shall be subject to a major amendment. If the agencies approve of the supporting analysis, or fail to respond within the 60-day period, the proposed minor amendment for these projects shall be deemed approved. Proposed minor amendments will become effective upon the other party's written approval. Should the USFWS object to the use of the minor amendment process to incorporate a SoCalGas-proposed change to the MSHCP, the proposed change may be processed as a major amendment. SoCalGas may, at its sole discretion, object to any USFWS-proposed minor amendments.

9.1.3 Major Amendments

Proposed changes to the MSHCP that exceed the thresholds of a minor amendment, as described above, may be processed as a major amendment. Major amendments must be processed in accordance with all applicable statutory and regulatory requirements, including the ESA and NEPA, and will include a statement of the reason for the proposed major amendment and an analysis of its potential environmental effects. Major amendments often require additional public review and comment, and amendments to any USFWS decision documents, including the NEPA document and the findings and recommendations documents.

Examples of major amendments include, but are not necessarily limited to, the following:

- Substantial modifications to the CRCP Plan Area boundary (e.g., that include vegetation communities or listed species not already covered under the MSHCP)
- Substantial modifications to an AMM (i.e., changes that could reduce a measure's effectiveness in protecting a Covered Species or that may involve new significant environmental effects not previously identified)
- Proposed addition or removal of a Covered Species
- Increasing the level of take for a covered wildlife species

SoCalGas and USFWS will each apply reasonable efforts to respond to any proposed major amendment within 120 days of receipt of written notice. A proposed major amendment will become effective upon the other party's written approval. SoCalGas may, at its sole discretion, object to any USFWS-proposed major amendment.

9.2 Permit Renewal

SoCalGas' Section 10(a)(1)(b) permit may be renewed or extended beyond its initial 30-year timeframe before the term expires with the approval of the USFWS. USFWS regulations at 50 CFR 13.22 and NMFS regulations at 50 CFR 222.304 allow a permit to remain in effect while USFWS considers a renewal request if the request is received at least 30 days before expiration.

9.2.1 Renewal Process

To renew or extend the permit, SoCalGas shall submit to the USFWS a written application one year prior to the expiration date of the permit. SoCalGas must certify in the form required by Section 13.12(a)(5) that all statements and information in the original MSHCP and permit application, together with any approved MSHCP amendments, are still current and correct. If such information is no longer current, SoCalGas must provide the correct information. The agency shall issue a renewal

of a permit if SoCalGas meets the criteria for issuance in Section 13.21(b) and is not disqualified under Section 13.21(c). SoCalGas may continue with activities authorized by the expired permit until the USFWS acts on the application for renewal if the permit is currently in force and not suspended/revoked. The issuing officer may deny renewal of a permit to SoCalGas if it fails to meet the issuance criteria set forth in Section 13.21.

9.3 Permit Transfer

In the event of a sale or transfer of ownership of SoCalGas during the life of the permit, the new owner will assume the responsibilities associated with the MSHCP and will also expect to receive the benefits of the permit. The following will be submitted to the USFWS by the new owner(s): a new permit application, permit fee, and written documentation providing assurance pursuant to 50 CFR 13.25 and 50 CFR 22.305. The new owner will provide sufficient funding for the MSHCP and will implement the relevant terms and conditions of the permit, including any outstanding minimization and mitigation. The new owner(s) will commit to all requirements regarding the take authorization and mitigation obligations of this MSHCP unless otherwise specified in writing and agreed to in advance by the USFWS.

Chapter 10.0
REFERENCES

American Ornithologists' Union (AOU). 1957. The A.O.U. Check-List of North American Birds. 5th ed. Port City Press.

Antelope Valley Air Quality Management District. 20 April 2004. 2004 Ozone Attainment Plan (State and Federal).

Antelope Valley Air Quality Management District. 20 May 2008. Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area).

Antelope Valley Air Quality Management District. August 2016. AV CEQA & Conformity Guidelines.

Arnold, R.A. 1983. Ecological Studies of Six Endangered Butterflies (Lepidoptera: Lycaenidae); Island Biogeography, Patch Dynamics, and the Design of Habitat Preserves. Univ. California Pub. Ent. 99:1–161.

Atwood, J. L., and B. W. Massey. 1988. Site Fidelity of Least Terns in California. Condor 90:389-394.

Austin, C.C., and H. B. Shaffer 1992. Short, Medium, and Long-Term Repeatability of Locomotor Performance in the Tiger Salamander, Ambystoma californiense. Functional Ecology 6 (2): 145–153.

Baldwin, B., et al., eds. 2012. The Jepson Manual: Vascular Plants of California. Jepson Flora Project.

Baldwin, B.G., S. Boyd, B.J. Ertter, R.W. Patterson, T.J. Rosatti, and D.H. Wilken. n.d. Jepson Flora Project. Regents of the University of California. Available at: http://ucjeps.berkeley.edu/jepson_flora_project.html. Accessed 2003.

Baskin, J.N. 1974. Survey of the Unarmored Threespine Stickleback, Gasterosteus aculeatus williamsoni, in the Upper Santa Clara River Drainage. Unpublished Report, Contract No. 14-16-001-5387SE. U.S. Bureau of Sport Fish and Wildlife.

Baskin, J.N. 1975. Biology and the Habitat of the Unarmored Threespine Stickleback, Gasterosteus aculeatus williamsoni, in the Upper Santa Clara River, California. Unpublished Report, Contract No. Ab-27. California. Department of Fish and Game.

Baskin, J.N., and M.A. Bell. 1976. Unarmored Threespine Stickleback Survey and Report. Unpublished Report, Contract No. 39-5495. U.S. Department of Agriculture Forest Service.

Beyers, J.L., and W.O. Wirtz. 1997. Vegetative Characteristics of Coastal Sage Scrub Sites Used by California Gnatcatchers: Implications for Management in a Fire-Prone Ecosystem. In Proceedings: First Conference on Fire Effects on Rare and Endangered Species and Habitats, Coeur d'Alene, ID. International Association of Wildland Fire.

Big Pine Mountain, California. n.d. Peakbagger.com. Available at: http://www.peakbagger.com/peak.aspx?pid=1252. Accessed 10 August 2009.

Brattstrom, B.H. 1988. Habitat Destruction on California with Special Reference to Clemmys marmorata: A Perspective. In Proceedings of the Conference on California Herpetology, ed. H.F. DeLisle, P.R. Brown, B. Kaufman, and B.M. McGurty. Southwestern Herpetological Society.

Brattstrom, B.H., and D.F. Messer. 1988. Current Status of the Southwestern Pond Turtle, Clemmys marmorata pallida, in Southern California. Final Report for California Department of Fish and Game, Contract C-2044.

Brown, L.R., C.A. Burton, and K. Belitz. 2005. Aquatic Assemblages of the Highly Urbanized Santa Ana River Basin, California. American Fisheries Society Symposium 47: 267–87.

Bureau of Land Management, California State Office. 11 February 2010. Lnd_SurfaceEstate.shp. Shapefile.

Bury, R.B. 1970. Clemmys marmorata. Catalogue of American Amphibians and Reptiles 100: 1–3.

Cadre Environmental. 2002. Arroyo toad (Bufo californicus) Radio Telemetry and Pitfall Trapping Studies, Little Horsethief Canyon, Summit Valley Ranch, San Bernardino County, California. Prepared for California Department of Transportation.

CALFED Bay-Delta Program. November 2001. Guide to Regulatory Compliance for Implementing CALFED Actions Volume 2. Available at: http://www.calwater.ca.gov/content/Library/RegGuide/Volume%202/Voume%202%20PDF%20f/vol2chp2FINAL%20S1600_1101.pdf

California Air Resources Board. 20 April 2007. Proposed Early Action Measures to Mitigate Climate Change in California.

California Air Resources Board. 14 March 2014. California Air Basin Map. Available at: https://www.arb.ca.gov/ei/maps/statemap/abmap.htm. Accessed 19 July 2017.

California Air Resources Board. May 2014. First Update to the Climate Change Scoping Plan. Available at: http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.

California Air Resources Board. Accessed 15 October 2015. Cap and Trade Program. Available at: http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm.

California Air Resources Board. 5 May 2016. Air Quality Standards and Area Designations. Available at: https://www.arb.ca.gov/desig/desig.htm. Accessed 19 July 2017.

California Air Resources Board. n.d. Area Designations for State Ambient Air Quality Standards (for) Ozone. Available at: https://www.arb.ca.gov/desig/adm/2015/state_o3.pdf. Accessed 19 July 2017.

California Air Resources Board. 20 January 2017. The 2017 Climate Change Scoping Plan Update. Available at: https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf.

California Attorney General Office. January 2010. Addressing Climate Change at the Project Level. Available at: http://ag.ca.gov/globalwarming/pdf/GW_mitigation_measures.pdf.

California Coastal Commission. n.d. Maps Coastal Zone Boundary. Available at: https://www.coastal.ca.gov/maps/. Accessed 21 June 2017.

California Department of Conservation. n.d. CGS Information Warehouse: Regulatory Maps. Available at: http://maps.conservation.ca.gov/cgs/informationwarehouse/. Accessed 4 September 2017.

California Department of Conservation. n.d. Official Tsunami Inundation Maps. Available at: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Pages/index.aspx. Accessed 28 August 2017.

California Department of Conservation, California Geological Survey. 2002. California Geomorphic Provinces. Note 36.

California Department of Conservation, California Geological Survey. 2010. Fault Activity Map of California (2010). Available at: http://maps.conservation.ca.gov/cgs/fam/. Accessed 23 June 2017.

California Department of Conservation, California Geological Survey. n.d. Official Tsunami Inundation Maps. Available at: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/. Accessed 20 September 2017.

California Department of Conservation, Division of Land Resource Protection. n.d. Available at: http://www.conservation.ca.gov/dlrp/lca. Accessed 22 June 2017.

California Department of Conservation, Farmland Mapping and Monitoring Program. n.d. Available at: http://www.conservation.ca.gov/dlrp/Pages/qh_maps.aspx. Accessed 22 June 2017.

California Department of Fish and Game. 2000. Natural Diversity Database (RareFind 2), Version 2.1.2.

California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plants and Animals of California Species Accounts.

California Department of Forestry and Fire Prevention. 2017. CalFire FRAP GIS Data, Incorporated Cities, 2017. Available at: http://frap.fire.ca.gov/data/frapgisdata-sw-incorporated_download.

California Department of Fish and Wildlife. 7 March 2012. Staff Report on Burrowing Owl Mitigation. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843&inline

California Department of Fish and Wildlife. 2017. California Natural Diversity Database. Rare Find 5 Results for Cirsium fontinale var. obisponense.

California Department of Fish and Wildlife. 2017. California Natural Diversity Database (CNDDB). Rare Find 5 Results for Deinandra minthornii.

California Department of Fish and Wildlife. 20 March 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities. Sacramento, CA. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959&inline

California Department of Fish and Wildlife. n.d. Permits for Threatened and Endangered Plant Species. Sacramento, CA. Available at: https://www.wildlife.ca.gov/Conservation/Plants/Permits. Accessed 22 March 2018.

California Department of Fish and Wildlife. n.d. When a Memorandum of Understanding is Needed. Available at: http://www.dfg.ca.gov/wildlife/nongame/research_permit/mou.html. Accessed 22 March 2018.

California Department of Fish and Wildlife, Wildlife Branch, Nongame Wildlife Program. 22 January 2016. A Rapid Assessment of the Vulnerability of Sensitive Wildlife to Extreme Drought.

California Department of Forestry and Fire Protection (CalFire). n.d. California Fire Plan Overview. Available at: http://www.fire.ca.gov/communications/downloads/fact_sheets/FirePlan.pdf. Accessed 4 September 2017.

California Department of Forestry and Fire Protection (CalFire). n.d. GIS data. Available at: http://frap.fire.ca.gov/data/frapgisdata-subset. Accessed 4 September 2017.

California Department of Water Resources. 7 January 2016. Drought Information, Drought Background. Available at: http://www.water.ca.gov/waterconditions/background.cfm. Accessed 20 September 2017.

California Department of Water Resources. 2003. Bulletin 118.

California Department of Water Resources, Natural Resources Agency. Fall 2012. Drought in California.

California Department of Water Resources. 2014. Summary of Recent, Historical, and Estimated Potential for Future Land Subsidence in California 2014. Available at: http://www.water.ca.gov/. Accessed 20 June 2017.

California Employment Development Department. n.d. Major Employers in San Bernardino County. Available at: http://www.labormarketinfo.edd.ca.gov/majorer/countymajorer.asp?CountyCode=000071. Accessed 23 June 2017.

California Energy Commission. May 2011. California's Energy Future – The View to 2050.

California Environmental Protection Agency. Accessed 9 February 2015. Greenhouse Gas-Reduction Investments to Benefit Disadvantaged Communities. Available at: http://www.calepa.ca.gov/EnvJustice/GHGInvest/.

California Geological Survey. 2002. Guidelines for Evaluating the Hazard of Surface Fault Rupture. CGS Note 49.

California Geological Survey. n.d. Available at: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Pages/About_Tsunamis.aspx#historic. Accessed 20 June 2017.

California Native Plant Society. April 1998. Policy on Mitigation Guidelines Regarding Impacts to Rare, Threatened, and Endangered Plants. Available at: http://www.cnps.org/cnps/archive/mitigation.php.

California Native Plant Society. 2001. CNPS Botanical Survey Guidelines. In California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California, 6th ed., ed. D.P. Tibor, pp. 38–40. Special Publication No. 1.

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California. http://www.rareplants.cnps.org.

California Native Plant Society. April 1998. Policy on Mitigation Guidelines Regarding Impacts to Rare, Threatened, and Endangered Plants. Available at: http://www.cnps.org/cnps/archive/mitigation.php.

California Native Plant Society, Rare Plant Program. 2018. Inventory of Rare and Endangered Plants of California.

California Regional Water Quality Control Board, Central Coast Region. September 2017. Water Quality Control Plan for the Central Coastal Basin Plan. Available at: https://www.waterboards.ca.gov/centralcoast/publications_forms/publications/basin_plan/docs2017/2017_basin_plan_r3_complete.pdf

California Regional Water Quality Control Board, Central Valley Region. July 2016. Water Quality Control Plan for Tulare Lake Basin, Second Edition. Available at: https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/2016july_tlbp.pdf

California Regional Water Quality Control Board, Colorado River Region. August 2017. Water Quality Control Plan Colorado River Basin – Region 7. Available at: https://www.waterboards.ca.gov/coloradoriver/water_issues/programs/basin_planning/docs/bp032014/foreword.pdf.

California Regional Water Quality Control Board, Lahontan Region. March 1995. Water Quality Control Plan for the Lahontan Region. Available at: https://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/references.shtml.

California Regional Water Quality Control Board, Los Angeles Region. September 2014. Water Quality Control Plan Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties. Available at: https://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/basin_plan_documentation.shtml.

California Regional Water Quality Control Board, Santa Ana Region. February 2016. Water Quality Control Plan Santa Ana River Basin. Available at: https://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/.

California State Parks, Inland Empire District. 2000. Urban Edge Effects and their relationship with the natural environment. Available at: http://www.parks.ca.gov/pages/21280/files/urbanedge.pdf

California State University at Channel Islands. n.d. Nevin's barberry. Available at: https://nativeplants.csuci.edu/berberis-nevinii.htm. Accessed 5 July 2018.

California Stormwater Quality Association. 2017. Construction BMP Online Handbook. Available at: https://www.casqa.org/resources/bmp-handbooks/construction

California Water Resources Control Board. 23 January 2013. 2009-0009-DWQ Construction General Permit. Available at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

California Water Resources Control Board. n.d. Available at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/guidance/k_factor_map.pdf. Accessed 20 June 2017.

Cambridge Dictionary. n.d. Wildfire. Available at: http://dictionary.cambridge.org/dictionary/english/wildfire?a=british. Accessed 4 September 2017.

Center for Biological Diversity. 2003. Petition to the State of California Fish and Game Commission and Supporting Information for Listing the California Population of the Western Burrowing Owl (Athene cunicularia hypugaea) as an Endangered or Threatened Species under the California Endangered Species Act. Available at: http://www.biologicaldiversity.org/species/birds/western_burrowing_owl/pdfs/petition.pdf. Accessed 17 July 2017.

Center for Biological Diversity. n.d. Natural History (San Bernardino Kangaroo Rat). http://www.biologicaldiversity.org/species/mammals/San_Bernardino_kangaroo_rat/natural_history.html. Accessed 27 July 2017.

Comrack, L.A., and R.J. Logsdon. 2008. Status Review of the American Peregrine Falcon (Falco Peregrinus Anatum) in California. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2008-06.

Comrack, L., and Mayer, D. 2003. An Evaluation of the Petition to List the California Population of the Western Burrowing Owl (Athene cunicularia hypugaea) as an Endangered or Threatened Species. Available at: http://www.defenders.org/sites/default/files/publications/petition_evaluation_for_western_burrowing_owl.pdf. Accessed 27 July 2017.

Consortium of California Herbaria. 2017. Available at: http://ucjeps.berkeley.edu/consortium/. Accessed 11 July 2017.

County of Los Angeles Department of Regional Planning. Adopted 6 October 2015. Los Angeles County General Plan. Chapter 9: Conservation and Natural Resources Element. Available at: planning.lacounty.gov/assets/upl/project/gp_final-general-plan-ch9.pdf.

County of Los Angeles Department of Regional Planning. Adopted 6 October 2015. Los Angeles County General Plan. Chapter 11: Noise Element. Available at:

http://planning.lacounty.gov/assets/upl/project/gp_2035_Chapter11_2014.pdf. Accessed 11 February 2018.

County of Los Angeles Department of Regional Planning. November 1980. County of Los Angeles General Plan.

County of Los Angeles. N.d. County Noise Ordinance Section 12.08.010, et seq. Available at: http://lacounty-ca.elaws.us/code/coor_title12_ch12.08. Accessed 11 February 2018.

County of San Bernardino. 2007. County of San Bernardino 2007 General Plan. County of San Bernardino Land Use Services Division. Available at: http://sbcounty.gov/Uploads/lus/GeneralPlan/FINALGP.pdf.

County of San Bernardino. April 2007. San Bernardino County General Plan, Section V Conservation Element. Available at: http://www.sbcounty.gov/Uploads/lus/GeneralPlan/FINALGP.pdf. Accessed 1 September 2017.

County of San Bernardino. N.d. Development Code, Sections 83.01.080, Noise, and 83.01.080, Vibration. Available at: http://www.sbcounty.gov/Uploads/lus/DevelopmentCode/DCWebsite.pdf. Accessed 11 February 2018.

County of San Luis Obispo Planning and Building. 2009. County of San Luis Obispo Coastal Zone Land Use Ordinance Title 23 of the San Luis Obispo County Code. Available at: http://www.slocounty.ca.gov/getattachment/06db8004-8227-4723-b066-377e1c86ca55/Coastal-Land-Use-Ordinance-(Title-23).aspx.

County of San Luis Obispo Planning and Building. 2017. County of San Luis Obispo Lan Use Ordinance, Title 22 of the County Code. Available at: http://www.slocounty.ca.gov/getattachment/6d93f812-df15-4203-b033-7d802c5c9cf0/Inland-Land-Use-Ordinance-(Title-22).aspx.

County of San Luis Obispo Planning and Building. 2017. Oak Woodland Ordinance. Available at: https://www.slocounty.ca.gov/Departments/Planning-Building/Long-Range-Planning/Services/Oak-Woodland-Ordinance.aspx.

County of San Luis Obispo. 2017. Ordinance No. 3346 (Oak Woodland Ordinance). Available at: https://www.slocounty.ca.gov/Departments/Clerk-Recorder/Forms-Documents/County-Code/County-Ordinances-Adopted-But-Not-Yet-Codified/Oak-Woodland-Ordinance.aspx.

County of San Luis Obispo. N.d. County of San Luis Obispo General Plan. Available at: http://www.slocounty.ca.gov/Departments/Planning-Building/Forms-Documents/Plans/General-Plan.aspx.

County of San Luis Obispo. N.d. County of San Luis Obispo General Plan, Conservation and Open Space Element. Available at: http://www.slocounty.ca.gov/getattachment/ba01754b-50ac-4c13-ba16-1a9eb9d56a01/Conservation-and-Open-Space-Element.aspx.

County of San Luis Obispo. N.d. San Luis Obispo County General Plan, Noise Element. Available at: http://www.slocounty.ca.gov/getattachment/16c8da3e-c51b-4134-8cff-0ed21a577d2e/Noise-Element.aspx. Accessed 11 February 2018.

County of San Luis Obispo. n.d. San Luis Obispo Integrated Regional Water Management Plan, p. D-3. Available at: https://www.slocountywater.org/site/Frequent%20Downloads/Integrated%20Regional%20Water%20Management%20Plan/IRWM%20Plan%20Update%202014/pdf/Section%20D%20Water%20Supply%20Demand%20and%20Budget%2020140723_coverproof_accepted.pdf. Accessed 27 July 2017.

County of Santa Barbara Department of Planning and Development. July 2015. Environmental Thresholds and Guidelines Manual. Available at: http://www.countyofsb.org/plndev/permitting/environmentalreview.sbc.

County of Santa Barbara Department of Planning and Development. June 2015. Santa Barbara County General Plan, Noise Element. Available at: https://www.santabarbaraca.gov/gov/plan.asp. Accessed 11 February 2018.

County of Santa Barbara. August 2010. Santa Barbara County Comprehensive Plan. Available at: http://longrange.sbcountyplanning.org/general_plan.php.

County of Santa Barbara. August 2010. Santa Barbara County Comprehensive Plan. Conservation Element. Available at: http://longrange.sbcountyplanning.org/programs/genplanreformat/PDFdocs/Conservation.pdf.

County of Santa Barbara. June 2015. Santa Barbara County General Plan, Energy Element. Available at: http://longrange.sbcountyplanning.org/programs/genplanreformat/PDFdocs/Energy.pdf. Accessed February 11, 2018.

County of Ventura. 1995. County of Ventura General Plan. Available at: www.vcma.org.

County of Ventura. 2005. 2005 Ventura General Plan. Available at: https://www.cityofventura.ca.gov/DocumentCenter/View/1805. Accessed 11 February 2018.

County of Ventura. December 2016. Ventura County 2040 General Plan. County of Ventura Resource Management Agency Planning Division. Available at: http://vcrma.org/planning/plans/general-plan/index.html.

County of Ventura. December 2016. Ventura County General Plan – Goals, Policies & Programs. Available at http://vcrma.org/planning/pdf/plans/Goals-Policies-and-Programs.pdf. Accessed 11 February 2018.

Cuckoo; Proposed Rule. 2016. Federal Register 79: 48547–652.

Cypher, B., C. Van Horn Job, and S. Phillips. 2012. Conservation Strategies for San Joaquin Kit Foxes in Urban Environments. California State University, Stanislaus, Endangered Species Recovery Program.

Data Access and Dissemination Systems (DADS). May 2017. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2016. American Fact Finder. U.S. Census Bureau. Available at:

https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml?src=bkmk#. Accessed 23 June 2017.

Declining Amphibian Populations Task Force. 27 June 1998. The Declining Amphibian Populations Task Force Fieldwork Code of Practice. FrogLog 27.

De Groot, S., D. Gowen, and R. Patterson. 2016. Eriastrum densifolium subsp. sanctorum. Jepson eFlora. Available at: http://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=50332. Accessed 30 August 2017.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1992. Birds in Jeopardy: The Imperiled and Extinct Birds of the United States and Canada, Including Hawaii and Puerto Rico. Stanford University Press.

Encyclopedia Britannica. n.d. Tehachapi Mountains. Encyclopedia Britannica. Available at https://www.britannica.com/place/Tehachapi-Mountains. Accessed 19 July 2017.

Erdman, Jim, Dawne Emery, and Jack Crayon. 2016–2017. Mountain Yellow-Legged Frog Threats and Status. California Department of Fish and Wildlife.

Ernst, C. H., J. E. Lovich, and R.W. Barbour. 1994. Turtles of the United States and Canada. Smithsonian Institution Press.

Executive Department, State of California. 1 June 2005. Governor Issues Executive Order S-3-05. Available at: http://cetesb.sp.gov.br/proclima/wp-content/uploads/sites/36/2014/08/governor_state_california.pdf. Accessed 16 May 2018.

Feeney, F., and C. C. Swift. 2008. Description and Ecology of Larvae and Juveniles of Three Native Cypriniforms of Coastal Southern California. Ichthyological Research 55 (1): 65–77.

Forman, R. T., and L. E. Alexander. 1998. Roads and Their Major Ecological Effects. Annual Review of Ecology and Systematics 29:207.

Forman, R. T. T., D. S. Friedman, D. Fitzhenry, J. D. Martin, A. S. Chen, and L. E. Alexander. 1997. Ecological Effects of Roads: Toward Three Summary Indices and an Overview for North America.

Franzreb, K. E. 1989. Ecology and conservation of the endangered least Bell's vireo. U.S. Fish Wildlife Service. Biol. Rep. 89 (1).

George, M.R. n.d. Mediterranean Climate. UC Rangelands Research & Education Archive. Available at http://rangelandarchive.ucdavis.edu/Annual_Rangeland_Handbook/Mediterranean_Climate/. Accessed 19 July 2017.

Gervais, J.A., D.K. Rosenberg, and L.A. Comrack. 2008. Burrowing Owl. In California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California, ed. W. D. Shuford and T. Gardali. Studies of Western Birds 1. Western Field Ornithologists and California Department of Fish and Game.

Great Basin Bird Observatory (GBBO). 2010. Nevada Comprehensive Bird Conservation Plan. Version 1.0. Great Basin Bird Observatory.

Grishaver, M.A., P.J. Mock, and K.L. Preston. 1998. Breeding Behavior of the California Gnatcatcher in Southwestern San Diego County, California. Western Birds 29: 299–322.

Haas, W., and P Unitt. 2004. Willow Flycatcher Species Account. San Diego County Bird Atlas. Available at: http://sdplantatlas.org/birdatlas/pdf/Willow%20Flycatcher.pdf. Accessed 27 July 2017.

Halterman, M.D., M.J. Johnson, J.A. Holmes, and S.A. Laymon. 15 April 2015. A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-billed Cuckoo: U.S. Fish and Wildlife Techniques and Methods. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/yellow_billed_cuckoo/Yellow-billedCuckoo_SurveyProtocol_FinalDraft_20150422.pdf

Hayes, M.P., and M.R. Jennings. 1988. Habitat Correlates of Distribution of the California Red-Legged Frog (Rana aurora draytonii) and the Foothill Yellow-Legged Frog (Rana boylii): Implications for Management. In Management of Amphibians, Reptiles and Small Mammals in North America, R.C. Szaro, K.E. Severson, and D.R. Patton (Tech. Coords.), 144–158. General Technical Report RM-166. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station.

Hayes, M.P., and D.M. Krempels. 1986. Vocal Sac Variation among Frogs of the Genus Rana from Western North America. Copeia 1986 (4): 927–36.

Hickman, J.C., ed. 1993. The Jepson Manual: Higher Plants of California. Jepson Flora Project.

Holland, D.C. 1994. The Western Pond Turtle: Habitat and History. U.S. Department of Energy, Bonneville Power Administration.

Holmgren, M.A., and P.W. Collins, eds. 1995. Interim Report on the Distribution, Breeding Status, and Habitat Associations of Seven Federal Special-Status Bird Species and Brown-headed Cowbirds at Vandenburg Air Force Base, Santa Barbara County, California. Department of Ecology, Evolution and Marine Biology, University of California at Santa Barbara. Museum of Systematics and Ecology Environmental Report 3: 49–66.

Hoyer, R.F., and G.R. Stewart. 2000. Biology of the Rubber Boa (*Charina bottae*), with Emphasis on C. b. umbratica. Part I: Capture, Size, Sexual Dimorphism, and Reproduction. Part II: Diet, Antagonists, and Predators. Journal of Herpetology 34 (3): 348–60.

Jennings, M.R. 1988. Natural History and Decline of Native Ranids in California. In Proceedings of the Conference on California Herpetology, eds. H. F. DeLisle, P. R. Brown, B. Kaufman, and B. M. McGurty, 61–72. Southwestern Herpetologists Society, Special Publication 4.

Jennings, M.R., and M.P. Hayes. 1985. Pre-1900 Overharvest of California Red-Legged Frogs (Rana aurora draytonii): The Inducement for Bullfrog (Rana catesbeiana) Introduction. Herpetologica 41 (1): 94–103.

Jennings, M.R., and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game, Inland Fisheries

Division, Rancho Cordova, California, under Contract 8023. California Department of Fish and Game.

Jepson Flora Project. 2017. Jepson eFlora. Available at: http://ucjeps.berkerley.edu/eflora/. Accessed 27 July 2017.

Jochimsen, D.M., C.R. Peterson, K.M Andrews, and J.W. Gibbons. 2004. A Literature Review of the Effects of Roads on Amphibians and Reptiles and the Measures Used to Limit the Effects. Idaho Fish and Game Department, USDA Forest Service. Available at: http://fishandgame.idaho.gov/public/wildlife/collisionAmphibRep.pdf.

Johnsgard, P. A. 1988. North American Owls Biology and Natural History. Smithsonian Institution.

Kochert, M.N., K. Steenhof, C.L MacIntyre, and E.H Craig. 2002. Golden Eagle Aquila chrysaetos. The Cornell Lab of Ornithology: Birds of North America. Available at: https://birdsna.org/Species-Account/bna/species/goleag. Accessed 27 July 2017.

Koford, C.B. 1953. The California Condor. National Audubon Society.

Kus, B. E. 1991. Habitat Use and Breeding Status of the Least Bell's Vireo at the Tijuana River, California. International Boundary and Water Commission.

Kus, B. 1998. Use of Restored Riparian Habitat by the Endangered Least Bell's Vireo (Vireo belli pusillus). Restoration Ecology 6 (1): 75-82.

Kus, B. 2002. Least Bell's Vireo (Vireo bellii pusillus). In The Riparian Bird Conservation Plan: A Strategy for Reversing the Decline of Riparian-Associated Birds in California. California Partners in Flight. Available at: http://www.prbo.org/calpif/htmldocs/species/riparian/least_bell_vireo.htm. Accessed 27 July 2017.

Kus, B.E. and M.J. Whitfield. 2005. Parasitism, Productivity, and Population Growth: Response of Least Bell's Vireos (Vireo bellii extimus) and Southwestern Willow Flycatchers (Empidonax traillii extimus) to Cowbird (Molothrus spp.) Control.

Loredo, I., D. Van Vuren, and M.L. Morrison. 1996. Habitat Use and Migration Behavior of the California Tiger Salamander. Journal of Herpetology 30 (2): 282–85.

Lovitch, J.E. 1999. Western Pond Turtle Clemmys marmorata. Department of Biology, University of California, Riverside.

Matthews, J.R., and C.J. Moseley, eds. 1990. The Official World Wildlife Fund Guide to Endangered Species of North America. Beacham Publications.

Mattoni, R. 1990. Species Diversity and Habitat Evaluation Across the El Segundo Dunes at LAX. Final Report prepared for the Board of Airport Commissioners.

Metropolitan Water District of Southern California. 2015. 2015 Urban Water Management Plan. Available at: http://www.mwdh2o.com/PDF_About_Your_Water/2.4.2_Regional_Urban_Water_Management_Plan.pdf. Accessed 27 July 2017.

Michigan State University, RUSLE Online Soil Erosion Assessment Tool. n.d. Available at: http://www.iwr.msu.edu/rusle/kfactor.htm. Accessed 20 June 2017.

Mills, William, Jr. n.d. Description of the Santa Ynez River Watershed. Cachuma Member Units Exhibit No. 201.

Mock, P. 2004. California Gnatcatcher (Polioptila californica). In The Coastal Scrub and Chaparral Bird Conservation Plan: A Strategy for Protecting and Managing Coastal Scrub and Chaparral Habitats and Associated Birds in California. California Partners in Flight. Available at: http://www.prbo.org/calpif/htmldocs/scrub.html

Mojave Desert Air Quality Management District. n.d. Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area).

NASA Science. 21 July 2015. Predicting Floods. Available at: https://science.nasa.gov/science-news/science-at-nasa/2015/22jul_floods. Accessed 28 August 2017.

National Wildlife Federation. 2008. Increased Risk of Catastrophic Wildfires: Global Warming's Wake-Up Call for the Western United States. Available at: https://www.nwf.org/~/media/PDFs/Global-Warming/NWF_WildFiresFinal.ashx. Accessed 20 September 2017.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

Oberbauer, Thomas, Meghan Kelly, and Jeremy Buegge. March 2008. Draft Vegetation Communities of San Diego County. (Based on Preliminary Descriptions of the Terrestrial Natural Communities of California, Robert F. Holland, October 1986.)

Office of Historic Preservation. 14 March 2006. Technical Assistance Bulletin 6: California Register and National Register, A Comparison (for Purposes of Determining Eligibility for the California Register). Available at: http://www.ohp.parks.ca.gov.

Office of Historic Preservation. 4 September 2002. Technical Assistance Series #3, California Register of Historical Resources: Questions and Answers. Available at: http://www.ohp.parks.ca.gov.

Office of Planning and Research. 20 January 2016. Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA. Available at: https://www.opr.ca.gov/docs/Revised_VMT_CEQA_Guidelines_Proposal_January_20_2016.pdf.

Parametrix, Inc., and Southern Sierra Research Station. 2016. Yellow-billed Cuckoo Surveys on the Lower Colorado River, 2016 Annual Report. Submitted to the Bureau of Reclamation, Boulder City, Nevada, by D. Tracy and S.E. McNeil, Southern Sierra Research Station, and J. Lisignoli, Parametrix, Inc..

Petersen, M.D., W.A. Bryant, and C.H. Cramer. 1996. Probabilistic Seismic Hazard Assessment for the State of California Department of Conservation, Division of Mines. Geology Open-File Report issued jointly with U.S. Geological Survey, CDMG 96-08. U.S. Geological Survey.

Prism Climate Group. Northwest Alliance for Computational Science and Engineering. 30-Year Normals. Available at: http://prism.oregonstate.edu/normals/

Randall, J.A. August 2013. Vibrational Communication: Speiders to Kangaroo Rats. Biocommunication of Animals 2013: 103–33.

RBF. 2014. Habitat Conservation Plan for the Issuance of an Incidental Take Permit under Section 10(A)(1)(B) of the Endangered Species Act for the Federally Endangered Delhi Sands Flower-loving Fly Projects within Colton, California of San Bernardino County.

Richmond, J.Q., A.R. Backlin, C.Galst-Cavalcante, J.W. O'Brien, and R.N. Fisher. 2016. "Boom and Bust" Demography Distorts Genetic Signals of Population History in the Endemic Santa Ana Sucker (Catostomus santaanae) of Southern California. Unpublished manuscript.

Riverside County Habitat Conservation Agency.1998. Habitat Conservation for the Stephen's Kangaroo Rat in Western Riverside County, California. Available at: http://www.skrplan.org/skr.html. Accessed 27 July 2017.

Roberts, Fred. 2009. 19 September 2009. Email correspondence to Connie Rutherfored, Listing and Recovery Coordinator, Ventura Fish and Wildlife Office, regarding Dudleya cymosa sub sp. Ovatifolia, and the Santiago Fire of 2007.

Roth, B. 1985. Status Survey of the Banded Dune Snail, Helminthoglypta walkeriana. Prepared for U.S. Fish and Wildlife Services, Sacramento Endangered Species Office.

Sacramento Business Journal. 15 July 2014. Los Angeles Is Nation's 4th Largest Economy; Bay Area Ranks as 6th Largest. Available at: http://www.bizjournals.com/sacramento/news/2014/07/15/los-angeles-is-nations-4th-largest-economy-bay.html. Accessed 20 June 2017.

Safeguarding California Plan. 2017. 2017 Update Draft Report. Available at: http://resources.ca.gov/wp-content/uploads/2017/05/DRAFT-Safeguarding-California-Plan-2017-Update.pdf. Accessed 7 September 2017.

Saiki, M.K., B.A. Martin, G.W. Knowles, and P.W. Tennant. 2007. Life History and Ecological Characteristics of the Santa Ana Sucker, Castostomus santaanae. California Fish and Game 93 (2): 87–101.

Salinas River Watershed Management Action Plan. 22 October 1999. Central Coast Regional Water Quality Control Board.

San Antonio Creek Watershed Plan. March 2009.

San Gogonio Mountain, California. Peakbagger.com. Available at: http://www.peakbagger.com/peak.aspx?pid=1417. Accessed 22 November 2008.

San Luis Obispo Council of Governments. 2014. San Luis Obispo 2015 Regional Transportation Plan.

San Luis Obispo County Air Pollution Control District. 2015. 2015 Annual Air Quality Report.

Santa Ana Watershed Project Authority. 2012. Chapter 3: Watershed Setting. Available at: http://www.sawpa.org/wp-content/uploads/2012/05/Chapter-3-Final.pdf

Santa Ana Watershed Association. 2014. Habitat Variability and Distribution of the Santa Ana Sucker, Catostomus santaanae, in the Santa Ana River from the Confluence of the Rialto Channel to the Prado Basin. Prepared for Santa Ana Watershed Project Authority, Riverside, CA.

Santa Barbara County Air Pollution Control District. 2013. 2013 Clean Air Plan.

Santa Barbara County Association of Governments. August 2017. Fast Forward 2040, SBCAG Regional Transportation plan and Sustainable Communities Strategy.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. A Manual of California Vegetation, Second Edition. California Native Plant Society.

Searcy, C.A., and H.B. Shaffer. 2008. Calculating Biologically Accurate Mitigation Credits: Insights from the California Tiger Salamander. Conservation Biology 22 (4): 997–1005.

Sellers, Andreas. 2001. Ecological Effects of Roads: A Review. In Uppsala Grimsö Wildlife Research Station, Dept. of Conservation Biology, University of Agricultural Sciences, S-730 91, Riddarhyttan, Sweden.

Sempra Energy. Accessed 7 July 2017. Balanced Growth: 2016 Annual Report. Available at: http://www.sempra.com/2016_annualreport/?utm_source=redirect&utm_medium=web&utm_campaign=2016_annual_report/

Settevendemie, Marty. 2012 Crop Report. San Luis Obispo County Department of Agriculture.

Skinner, Mark W., and Bruce M. Pavlik, eds. 1994. Inventory of Rare and Endangered Vascular Plants of California. 5th ed. CNPS Special Publication No. 1. California Native Plant Society.

Small, Arnold. 1994. California Birds: Their Status and Distribution. IBIS Publishing Company.

Smith, J.P., and K. Berg. 1988. California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California. 4th ed. California Native Plant Society.

Sogge, M., D. Ahlers, and S. J. Sferra. 2010. A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher: U.S. Geological Survey Techniques and Methods 2A-10. Prepared in cooperation with the Bureau of Reclamation and the U.S. Fish and Wildlife Service. U.S. Geological Survey. Available at: https://pubs.usgs.gov/tm/tm2a10/pdf/tm2a10.pdf

Sogge, M.K., R.M. Marshall, S.J. Sterra, and T.J. Tibbitts. 1997. A Southwestern Willow Flycatcher Natural History Summary and Survey Protocol. Technical Report NPS/NAUCRS/NRTR-97/12. USGS Colorado Plateau Research Station, Northern Arizona University.

South Coast Air Quality Management District. 2016. 2016 Air Quality Management Plan. Available at http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/final-2016-aqmp/executive-summary.pdf. Accessed 23 June 2017.

Southern California Association of Governments. April 2016. The 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy.

Southern California Gas Company. 2016 General Rate Case (GRC). Available at: http://www.ora.ca.gov/general.aspx?id=2902. Accessed 7 July 2017.

Southern California Gas Company Environmental Services Department. March 2015. SoCalGas Best Management Practices Manual for Water Quality and Storm Water Management. Southern California Gas Company, 555 W. Fifth Street, Los Angeles, CA, 90013. Geosyntec Project No. SW0186.

State Climatologists. n.d. Climate of California. National Climatic Data Center. Available at http://www.wrcc.dri.edu/narratives/CALIFORNIA.htm. Accessed 19 July 2017.

Stebbins, R. C. 1985. A Field Guide to Western Reptiles And Amphibians. McGraw Hill.

Stebbins, R.C. 1985. A Field Guide to Western Reptiles and Amphibians. 2nd ed. Houghton Mifflin.

Stewart, G.R. 1988. The Rubber Boa (*Charina bottae*) in California, with Particular Reference to the Subspecies, C. b. umbratica. In Proceedings of the Conference on California Herpetology. Southwestern Herpetologists' Society Special Publication No. 4.

Stiles, F. G., and A. F. Skutch. 1989. A Guide to the Birds of Costa Rica. Cornell University Press.

Storer, T.I. 1925. A Synopsis of the Amphibia of California. University of California Publications in Zoology 27: 1–342.

Sweet, S.S. 1993. Second Report on the Biology of the Arroyo Toad (Bufo microscaphus californicus) on the Los Padres National Forest of Southern California. Contract Report to U.S. Department of Agriculture, Forest Service, Los Padres National Forest.

Tetra Tech. 7 September 2010. Santa Maria Valley Watershed Characterization for Hydromodification Management within the City of Santa Maria.

Trombulak, S.C., and C.A. Frissel. February 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14 (1): 18–30.

U.S. Air Force. n.d. Los Angeles Air Force Base. Available at: http://www.losangeles.af.mil/. Accessed 22 June 2017.

U.S. Army Corps of Engineers. 12 January 2015. Regional Compensatory Mitigation and Monitoring Guidelines for South Pacific Division Final. Available at: http://www.spd.usace.army.mil/Portals/13/docs/regulatory/mitigation/MitMon.pdf

U.S. Department of Agriculture. n.d. PLANTS Database Plant Profile for SAMA3. Available at: https://plants.usda.gov/core/profile?symbol=SAMA3. Accessed 11 July 2017.

U.S. Department of Agriculture Forest Service 2006. Species Accounts: Animals. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm. Accessed 27 July 2017.

U.S. Department of Agriculture Forest Service. 2006. Species Accounts: California Tiger Salamander. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm. Accessed 27 July 2017.

U.S. Department of Agriculture, Soil Conservation Service. 1970. Soil Survey of Ventura Area, California.

U.S. Department of Commerce, NOAA/National Weather Service, U.S. Tsunami Warning Center. n.d. Tsunami Frequently Asked Questions, Question 5. Available at: http://www.tsunami.gov/?page=tsunamiFAQ. Accessed 4 September 2017.

U.S. Department of Defense. 2007. Relocatable In-Flight Interceptor Communications System Data Terminal #2 at Vandenberg Air Force Base.

U.S. Department of the Interior, Office of the Solicitor. 22 December 2017. The Migratory Bird Treaty Act Does Not Prohibit Incidental Take. Available at: https://www.doi.gov/sites/doi.gov/files/uploads/m-37050.pdf

U.S. Environmental Protection Agency. n.d. Tribal Lands in Region 9. Available at: https://www.epa.gov/sites/production/files/2015-07/r9tribes.gif. Accessed 22 June 2017.

U.S. Fish and Wildlife Service. 1980. Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for the Endangered Unarmored Threespine Stickleback. Proposed Rule. Federal Register 223: 76012–15.

U.S. Fish and Wildlife Service. 1980. Revised California Least Tern Recovery Plan.

U.S. Fish and Wildlife Service. 1983. San Joaquin Kit Fox Recovery Plan.

U.S. Fish and Wildlife Service. 1987. Endangered Status for Eriastrum divesifolium ssp. sanctorum (Santa Ana River Woolly Star) and Centrostegia leptoceras (Slender-Horned Spineflower). Final Rule. Federal Register 52: 36265–70.

U.S. Fish and Wildlife Service. 1988. Endangered and Threatened Wildlife and Plants: Determination of Endangered Status for the Stephens' Kangaroo Rat. Final Rule. Federal Register 38465–70.

U.S. Fish and Wildlife Service. 1991. Endangered and Threatened Wildlife Plants; Proposed Rule for Five Plants and Morro Shoulderband Snail from Western San Luis Obispo County. Proposed Rule. Federal Register 246:66400–8.

U.S. Fish and Wildlife Service. 1994. Endangered or Threatened Status for Five Plants and the Morro Shoulderband Snail from Western San Luis Obispo County, California. Federal Register 59: 64613–23.

U.S. Fish and Wildlife Service. 23 September 1996. Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants. Available at: https://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines/Documents/Listed_plant_survey_guidelines.PDF

U.S. Fish and Wildlife Service. December 1996. Interim General Survey Guidelines for the Delhi Sands Flower-loving Fly. Carlsbad, CA. Available at:

https://www.fws.gov/cno/es/Recovery_Permitting/insects/delhi_sands_flower_loving_fly/2-DelhiSandsFlower-lovingFly_SurveyGuidelines_19961230.pdf

U.S. Fish and Wildlife Service. 28 July 1997. Coastal California Gnatcatcher (*Polioptila californica californica*) Presence/Absence Survey Protocol. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/coastal_calif_gnatcatcher/CoastalCaliforniaGnatcatcher_SurveyGuidelines_19970728.pdf

U.S. Fish and Wildlife Service. 1997. Delhi Sands Flower-loving Fly (Rhaphiomidas terminatus abdominalis) Recovery Plan.

U.S. Fish and Wildlife Service. 1997. Draft Recovery Plan for the Stephen's Kangaroo Rat.

U.S. Fish and Wildlife Service. 1997. Final Determination of Critical Habitat for the Southwestern Willow Flycatcher. Federal Register 62: 39129–47.

U.S. Fish and Wildlife Service. 1997. Threatened Species Status for Dudleya abramsii ssp. Parva (Conejo Dudleya). Federal Register 62 (19), 50 CFR part 17, RIN 1018-AB88.

U.S. Fish and Wildlife Service. 1998. Draft Recovery Plan for the Least Bell's Vireo.

U.S. Fish and Wildlife Service. 1998. Endangered and Threatened Wildlife and Plants; Final Rule to List San Bernardino Kangaroo Rat as Endangered. Federal Register 63: 51005–17.

U.S. Fish and Wildlife Service. 1998. Recovery Plan for the El Segundo Blue Butterfly (Euphilotes battoides allyni).

U.S. Fish and Wildlife Service. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California.

U.S. Fish and Wildlife. 1999. Morro Bay Kangaroo Rat (Dipodomys heermanni morroensis) Draft Revised Recovery Plant.

U.S. Fish and Wildlife Service. 1999. Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin.

U.S. Fish and Wildlife Service. May 1999. Survey Protocol for the Arroyo Toad.

U.S. Fish and Wildlife Service. June 1999. San Joaquin Kit Fox Survey Protocol for the Northern Range.

U.S. Fish and Wildlife Service. 19 May 1999. Survey Protocol for the Arroyo Toad. Ventura, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/amphibians/arroyo_toad/ArroyoToad_Protocol_19990519.pdf

U.S. Fish and Wildlife Service. June 1999. U.S. Fish and Wildlife Service San Joaquin Kit Fox Survey Protocol for the Northern Range. Sacramento, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/mammals/san_joaquin_kit_fox/SanJoaquinKitFox_SurveyProtocol_199906.pdf

U.S. Fish and Wildlife Service. 2000. Biological Opinion on the Effects of Ongoing National Forest Activities That May Affect Listed Riparian Species on the Cleveland National Forest, the Los Padres National Forest, the San Bernardino National Forest and Angeles National Forest in Southern California (1-6-99-F-21).

U.S. Fish and Wildlife Service. 2000. Draft Recovery Plan for the California Red-Legged Frog (Rana aurora draytonii).

U.S. Fish and Wildlife Service. 2000. Endangered and Threatened Wildlife and Plants; Final Rule for Endangered Status for Four Plants from South Central Coast California. Federal Register 65: 14888–97.

U.S. Fish and Wildlife Service. 2000. Southwestern Willow Flycatcher Protocol Revision.

U.S. Fish and Wildlife Service. 2001. Biological and Conference Opinions on the Continued Implementation of Land and Resource Management Plans for the Four Southern California National Forests, as Modified by New Interim Management Direction and Conservation Measures (1-6-00-F-773.2).

U.S. Fish and Wildlife Service. 2001. Endangered and Threatened Wildlife And Plants; Final Rule for Endangered Status for Astragulus pycnostachyus var. lanosissimus (Ventura Marsh Milkvetch). Federal Register 66: 27901–8.

U.S. Fish and Wildlife Service. 19 January 2001. Least Bell's Vireo Survey Guidelines. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/least_bells_vireo/LeastBellsVireo_SurveyGuidelines_20010119.pdf

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Eriodictyon capitatum (Lompac Yerba Santa) and Deinandra increscens ssp. villosa (Gaviota Tarplant). Final Rule. Federal Register 67: 67968–68000.

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Southern California Distinct Vertebrate Population Segment of the Mountain Yellow-Legged Frog (Rana muscosa). Final Rule. Federal Register 67: 44382–92.

U.S. Fish and Wildlife Service. 2002. Recovery Plan for the California Red-legged Frog (Rana aurora draytonii).

U.S. Fish and Wildlife Service. 2002. Service Proposes Critical Habitat for Endangered San Bernardino Kangaroo Rat.

U.S. Fish and Wildlife Service. October 2003. Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander. Sacramento, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/amphibians/california_tiger_salamander/CaliforniaTigerSalamander_Protocol_2003.pdf

U.S. Fish and Wildlife Service. December 2003. NEPA Reference Handbook. Available at: https://www.fws.gov/r9esnepa/NEPA%20Handbook%20TOC.pdf. Accessed 10 October 2017.

U.S. Fish and Wildlife Service. June 2003. Protocol Survey Guidelines for the Morro Shoulderband Snail (*Helminthoglypta walkeriana*). Ventura, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/snail/morro_bay_shoulderband/MorroShoulderbandSnail_ProtocolSurveyGuidelines_200306.pdf

U.S. Fish and Wildlife Service. 30 April 2004. Changes to the Delhi Sands Flower-Loving Fly Recommended Survey Guidelines. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/insects/delhi_sands_flower_loving_fly/3-DelhiSandsFlower-LovingFly_GuidelineRevisionLtr_20040430.pdf

U.S. Fish and Wildlife Service. 30 June 2004. Guidelines for Conducting Presence/Absence Surveys for the Delhi Sands Flower-Loving Fly. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/insects/delhi_sands_flower_loving_fly/4-DelhiSandsFlower-LovingFly_GuidelineRevisionLtr_20040630.pdf

U.S. Fish and Wildlife Service. August 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog. Ventura, CA. Available at: https://www.fws.gov/cno/es/pdf%20files/Permit_Minimum_Qualifications/CA_Red-legged_Frog/CRLFMinQuals7-2017.pdf

U.S. Fish and Wildlife Service. 2006. California least tern (Sternula antillarum browni) 5-Year Review Summary and Evaluation.

U.S. Fish and Wildlife Service. 2006. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Astragalus brauntonii and Pentachaeta lyonii. Federal Register 71, 50 CFR part 17, RIN 1018-AU51.

U.S. Fish and Wildlife Service. 2006. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Southern California Distinct Population Segment of the Mountain Yellow-Legged Frog (Rana muscosa); Final Rule. Federal Register 71: 54344–86.

U.S. Fish and Wildlife Service. 2006. Least Bell's Vireo 5 Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc781.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2006. Post-Delisting Monitoring Results for the American Peregrin Falcon (Falco peregrinus anatum), 2003. Federal Register 71: 60561–63.

U.S. Fish and Wildlife Service. 2007. Endangered and Threatened Wildlife and Plants; Reopening of Public Comment Periods for the Proposed Designations of Critical Habitat for the Coastal California Gnatcatcher and the San Diego Fairy Shrimp. Proposed Rules: Reopening of Public Comment Periods. Federal Register 72: 15857–59.

U.S. Fish and Wildlife Service. 2008. Lyon's pentachaeta (Pentachaeta lyonii) 5-Year Review. Available at: http://ecos.fws.gov/docs/five_year_review/doc1994.pdf. Accessed27 July 2017.

U.S. Fish and Wildlife Service. 2009. Berberis nevinii (Nevin's Barberry) 5-Year Review: Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc2557.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2009. Braunton's Milk-Vetch 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc2381.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2009. Clarkia speciose subsp. Immaculate (Pismo Clarkia) 5-Year Review: Summary and Evaluation.

U.S. Fish and Wildlife Service. 2009. Dudleya cymosa ssp. marcescens (Marcescent Dudleya) 5-Year Review: Summary and Evaluation.

U.S. Fish and Wildlife Service. 2009. Dudleya verityi (Verity's Dudleya) 5-Year Review: Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc2554.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. November 2009. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities.

U.S. Fish and Wildlife Services. 2009. Unarmored Threespine Stickleback (Gasterosteus aculeatus williamsoni) 5-Year Review: Summary and Evaluation.

U.S. Fish and Wildlife Service. 2010. Coastal California Gnatcatcher 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3571.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2010. Eriastrum densifolium subsp. sanctorum (Santa Ana River Woolly-Star) 5-Year Review: Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc3780.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2010. Slender-Horned Spineflower 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3622.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2010. Species Profile for San Bernardino Maerriam's Kangaroo Rat (*Dipodomys merriami parvus*). Available at: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A0G8. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2010. Ventura Marsh Milk-Vetch 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3554.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2011. Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Arroyo Toad; Final Rule. Federal Register 76: 7246–67.

U.S. Fish and Wildlife Service. 2011. Gambel's Water Cress 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3949.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2011. Gaviota Tarplant 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3884.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2011. Morro Bay Kangaroo Rat (Dipodomys heermanni morroensis) 5-Year Review: Summary and Evaluation.

U.S. Fish and Wildlife Service. January 2011. U.S. Fish and Wildlife Service Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance. Sacramento, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/mammals/san_joaquin_kit_fox/SanJoaquinKitFox_GroundDisturbanceProtection_201101.pdf

U.S. Fish and Wildlife Service. 13 July 2012. Mountain Yellow-Legged Frog (*Rana muscosa*) Southern California Distinct Population Segment, 5-Year Review: Summary and Evaluation.

U.S. Fish and Wildfire Service. 2013. Acrotostaphylos morroensis (Morro Manzanita) 5-Year Review.

U.S. Fish and Wildlife Service. 2013. California Condor 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc4163.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Southwestern Willow Flycatcher. Final Rule. Federal Register 78: 50542–629.

U.S. Fish and Wildlife Service. March 2013. Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats. Sacramento, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/mammals/tipton-fresno_kanagroo_rats/TiptonKRat&FresnoKRat_Trapping%20Protocol_201303.pdf

U.S. Fish and Wildlife Service. 2014. Arroyo Toad (Anaxyrus californicus) Species Report. Available at: https://www.fws.gov/ventura/docs/species/at/Arroyo%20Toad%20Final%20Species%20Report.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2014. Endangered and Threatened Wildlife and Plants; Endangered Status for Vandenberg Monkeyflower. 16 U.S.C. 1361-1407; 1531-1544; 4201-4245, unless otherwise noted. Available at: https://www.federalregister.gov/documents/2014/08/26/2014-20054/endangered-and-threatened-wildlife-and-plants-endangered-status-for-vandenberg-monkeyflower.

U.S. Fish and Wildlife Service. 2014. Southwestern Willow Flycatcher 5-Year Review. Arizona Ecological Services. Available at: https://ecos.fws.gov/docs/five_year_review/doc4437.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2015. Birds of Conservation Concern. Available at: https://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2016. California Condor Recovery Program, 2016 Annual Population Status. Available at: https://www.fws.gov/cno/es/CalCondor/PDF_files/2016-CA-condor-population-status.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. December 2016. Habitat Conservation Planning and Incidental Take Permit Processing Handbook.

U.S. Fish and Wildlife Service. 2016. Species Profile for Coastal California gnatcatcher (*Polioptila californica californica*). Available at: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B08X#recovery. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2016. Threatened Species Status for Chorizanthe parryi var Fernandina (San Fernando Spineflower). Proposed Rule. Federal Register 81: 63453–66.

U.S. Fish and Wildlife Service. 2017. California Condor Recovery Program. Available at: https://www.fws.gov/cno/es/CalCondor/Condor.cfm. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2017. Environmental Conservation Online System: Species Profile for Chorro Creek Bog Thistle (Cirsium fontinale var. obispoense). Available at: http://ecos.fws.gov/ecp0/profile/speciesProfile?sId=5991#status. Accessed 12 June 2017.

U.S. Fish and Wildlife Service. 11 July 2017. Minimum Qualifications for Obtaining a Section 10(a)(1)(A) Recovery Permit for Conducting Intensive Surveys for the California red-legged frog. Available at: https://www.fws.gov/cno/es/pdf%20files/Permit_Minimum_Qualifications/CA_Red-legged_Frog/CRLFMinQuals7-2017.pdf

U.S. Fish and Wildlife Service. 2017. Recovery Plan for the Santa Ana Sucker.

U.S. Fish and Wildlife Service. Updated 19 December 2017. Recovery "10(a)(1)(A)" Permits Program. Available at: https://www.fws.gov/endangered/permits/recovery_permits.html

U.S. Fish and Wildlife Service. 2018. Strategic Conservation Plan for the California Red-Legged Frog.

U.S. Fish and Wildlife Service, Pacific Southwest Region. 9 January 2018. Minimum Qualifications, Acquiring Experience, Practical Exams and Protocols. Available at: https://www.fws.gov/cno/es/minqual.html

U.S. Fish and Wildlife Service, 11 April 2018. Guidance on the Recent M-Opinion Affecting the Migratory Bird Treaty Act. Available at: http://src.bna.com/ynP

U.S. Fish and Wildlife Service. 26 April 2018. Guidance on Trigger for an Incidental Take Permit Under Section 10(a)(1)(B) of the Endangered Species Act. Available at: https://www.fws.gov/endangered/esa-library/pdf/Guidance-on-When-to-Seek-an-Incidental-Take-Permit.pdf

U.S. Fish and Wildlife Service. 2019. Delhi Sands Flower Loving Fly (Rhaphiomidas terminatus abdominalis) (Delhi Sands Flower Loving Fly Recovery Plan (1997).

U.S. Fish and Wildlife Service. January 27, 2020. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 66 Species in California and Nevada. Federal Register 85 (17): 4692–94. https://www.fws.gov/policy/library/2020/2020-01323.html

U.S. Fish and Wildlife Service. February 27, 2020. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-Billed Cuckoo. Available at: https://www.federalregister.gov/documents/2020/02/27/2020-02642/endangered-and-threatened-wildlife-and-plants-revised-designation-of-critical-habitat-for-the. Accessed May 1, 2020.

U.S. Fish and Wildlife Service. n.d. Coastal California Gnatcatcher Minimum Qualifications. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/coastal_calif_gnatcatcher/CoastalCaliforniaGnatcatcher_MinQuals_199707.pdf

U.S. Fish and Wildlife Service. n.d. Delhi Sands Flower-loving Fly Minimum Qualifications. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/insects/delhi_sands_flower_loving_fly/1-DelhiSandsFlower-LovingFly_MinQuals_NotDated.pdf

U.S. Fish and Wildlife Service. n.d. Habitat Conservation Plan Handbook. Available at: https://www.fws.gov/midwest/endangered/permits/hcp/hcphandbook.html. Accessed September 2017.

U.S. Fish and Wildlife Service. n.d. HCP Template. Available at: https://www.fws.gov/cno/docs/hcptemplate.doc. Accessed September 2017.

U.S. Fish and Wildlife Service. n.d. Least Bell's Vireo Minimum Qualifications. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/least_bells_vireo/LeastBellsVireo_MinQuals_20010119.pdf

U.S. Fish and Wildlife Service. n.d. Least Bell's Vireo Survey Guidelines.

U.S. Fish and Wildlife Service. n.d. Minimum Qualification Guidelines Western Distinct Population Segment of the Yellow-billed Cuckoo. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/yellow_billed_cuckoo/Yellow-billedCuckoo_MinQuals_20150512.pdf

U.S. Fish and Wildlife Service. n.d. Southwestern Willow Flycatcher Minimum Qualifications. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/southwest_willow_flycatcher/SouthwesternWillowFlycatcher_MinQuals_NotDated.pdf

U.S. Fish and Wildlife Service. n.d. Stephens' Kangaroo Rat, San Bernardino Kangaroo Rat, and Pacific Pocket Mouse Minimum Qualifications. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/mammals/san_bernardino_kangaroo_rat/SanBernardinoKRat_MinimumQuals_201207.pdf

U.S. Fish and Wildlife Service. n.d. Strategic Habitat Conservation. Available at: https://www.fws.gov/landscape-conservation/shc.html. Accessed 7 September 2017.

U.S. Fish and Wildlife Service. n.d. SoCal Urban Wildlife Refuge Project Summary; San Diego, CA. Available at: https://www.fws.gov/urban/refugePDFs/SoCalUrbanWildlifeRefugeProjectSummary.pdf.

U.S. Fish and Wildlife Service, Pacific Southwest Region. n.d. Arroyo toad Minimum Qualifications. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/amphibians/arroyo_toad/ArroyoToad_MinQuals_NotDated.pdf

U.S. Forest Service. April 2006. Record of Decision Angeles National Forest Land Management Plan.

U.S. Forest Service. April 2006. Record of Decision San Bernardino National Forest Land Management Plan.

U.S. Forest Service. September 2005. Final Environmental Impact Statement, Volume 1 Land Management Plans.

U.S. Forest Service. September 2005. Part 1 Southern California National Forests Vision.

U.S. Forest Service. September 2005. Part 2 Angeles National Forest Strategy

U.S. Forest Service. September 2005. Part 2 Los Padres National Forest Strategy.

U.S. Forest Service. September 2005. Part 2 San Bernardino National Forest Strategy.

U.S. Forest Service. September 2005. Part 3 Design Criteria for Southern California National Forests.

U.S. Forest Service. September 2005. Record of Decision Los Padres National Forest Land Management Plan.

U.S. Geological Survey. 9 December 2016. The USGS Water Science School, Floods: Recurrence Intervals and 100-Year Floods. Available at: https://water.usgs.gov/edu/100yearflood.html. Accessed 4 September 2017.

U.S. Geological Survey. n.d. Land Use and Water Use in the Antelope Valley, California. Available at: https://pubs.er.usgs.gov/publication/wri944208. Accessed 23 June 2017.

U.S. Geological Survey. n.d. Magnitude/Intensity Comparison. Available at: https://earthquake.usgs.gov/learn/topics/mag_vs_int.php. Accessed 8 September 2017.

U.S. Geological Survey. n.d. The Modified Mercalli Intensity Scale. Available at: https://earthquake.usgs.gov/learn/topics/mercalli.php. Accessed 8 September 2017.

U.S. Geological Survey. n.d. Topography, Surface Features, and Flooding of Rogers Lake Playa, California. Available at: https://pubs.er.usgs.gov/publication/wri984093. Accessed 23 June 2017.

U.S. Geological Survey, California Water Science Center. 31 May 2017. California Drought: Drought Defined. Available at: https://ca.water.usgs.gov/data/drought/. Accessed 4 September 2017.

Ventura County Air Pollution Control District. 2016. 2016 Ventura County Air Quality Management Plan.

Wade McCabe, Stephen. 2017. Dudleya cymosa subsp. ovatifolia. Jepson eFlora. Available at: http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=50238. Accessed 30 August 2017.

Walgren, Michael, Park Ecologist, California Department of Parks and Recreation, Morro Bay, CA. 2006. Email sent by Michael Walgren to Valary Bloom.

Wang, Y.; Allan, M.L.; and C.C. Wilmers. October 2015. Mesopredator spatial and temporal responses to large predators and human development in the Santa Cruz Mountains of California. Biologican Conservation 190: 23-33.

White, Clayton M., Nancy J. Clum, Tom J. Cade, and W. Grainger Hunt. 2002. Peregrine Falcon (Falco peregrinus). In The Birds of North America Online, ed. A. Poole. Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu/bna/species/660. Accessed 27 July 2017.

Wilken D., and T. Wardlaw. 2001. Ecological and Life History Characteristics of Ventura Marsh Milkvetch (Astragalus pycnostachyus var. lanosissimus) and Their Implications for 24 Recovery. Prepared for California Department of Fish and Game, South Coast Region. U.S. Fish and Wildlife Service Section 6 Program.

Yang, Dou, U.S. Fish and Wildlife Service. 25 October 2017. Personal communication to SoCalGas, Sapphos Environmental, Inc., and Rincon Consultants.

Zeiner, D.C., W.F. Laudenslayer Jr., K.E. Mayer, and M. White, eds. 1990. California's Wildlife, vol. II, Birds. California Department of Fish and Game.

Zembal, R., K.J. Kramer, and M.J. Elpers. 1987. A Survey of Belding's Savannah Sparrows in California, 1986. A Report to the U.S. Navy, Natural Resources Management Branch.

Zembal, R., S.M. Hoffman, and R.T. Patton. 2015. A Survey of the Belding's Savannah Sparrow (Passerculus sandwichensis beldingi) in California, 2015. Nongame Wildlife Program Report, 2015-02. California Department of Fish and Wildlife, Wildlife Branch.

Zweifel, R.G. 1955. Ecology, Distribution, and Systematics of Frogs of the Rana boylei Group. University of California Publications in Zoology 54 (4): 207–92.

Appendix A
DATA MANAGEMENT PLAN

The purpose of the Data Management Plan is to provide a compilation of GIS biological and physical resource spatial data gathered during the CRCP MSHCP effort, and to document the methods for geodatabase (GBD) and predictive species distribution model (PSDM) development. This document provides an overview of information used to describe the biological and physical spatial data resources in the CRCP Plan Area. It also identifies sources and methods used to assemble these spatial data and information and expands on the analytical approaches used in developing the various maps and predictive species distribution models for the MSHCP.

GIS is a desktop (data management) mapping software that is installed onto a personal computer and allows users to display, query, update, and analyze spatial data about geographic locations and the information linked to those locations. The software is ArcGIS and the international supplier is ESRI.[545] This is the primary software utilized to process the data described in this document.

The Data Management Plan is organized into three sections: (1) Comprehensive Baseline Data; (2) Predicted Species Distribution Ranges for Covered Species; and (3) Additional Resource Data. Each section contains a series of blue-shaded tables that include general descriptions of the data developed that will be managed throughout the permit term of the MSHCP. Each data layer created is stored in a GIS GDB as a "Feature Class." A Feature Class is "a collection of geographic features with the same geometry type (such as point, line, or polygon), the same attributes, and the same spatial reference. Feature classes can be stored in geodatabases, shapefiles, coverages, or other data formats. Feature classes allow homogeneous features to be grouped into a single unit for data storage purposes. For example, highways, primary roads, and secondary roads can be grouped into a line feature class named "roads." In a geodatabase, feature classes can also store annotation and dimensions."[546]

The Lead Points of Contact for data defined in this document are SoCalGas, Sempra Utilities, Sapphos Environmental, Inc., and Amec Foster Wheeler.

I. Comprehensive Baseline Data

A total of nine datasets were characterized as comprehensive baseline data for use in the CRCP MSHCP. The data categories include the CRCP Plan Area, SoCalGas facilities, and Land-Use/Cover (Table A-1). Each of these categories had one or more GIS GBD Feature Classes that were either provided by SoCalGas or developed by GIS experts with SoCalGas guidance.

[545] Desktop GIS. Esri. n.d. Available at: https://support.esri.com/en/other-resources/gis-dictionary/term/desktop%20gis. Accessed February 2018.

[546] Feature class. Esri. n.d. Available at: https://support.esri.com/en/other-resources/gis-dictionary/term/feature%20class. Accessed February 2018.

TABLE A-1
DATASETS USED TO CHARACTERIZE BASELINE DATA IN CRCP PLAN AREA

Data Type	GBD Feature Class
CRCP Plan Area	CRCP Plan Area Boundary
SoCalGas Facilities	High-Pressure Gas Pipelines Stations Storage Fields Facilities Area Non-Facilities Area
Land-Use/Cover	Land-Use/Cover Baseline Land-Use/ Cover within Facilities Area Baseline Land-Use/Cover within Non-Facilities Area

CRCP Plan Area Boundary (1 Feature Classes)	
Description:	CRCP MSHCP project boundary encompassing portions of five counties in Southern California (Los Angeles, San Bernardino, Ventura, Santa Barbara and San Luis Obispo Counties). Total acres of plan area: 6,797,884.3.
Source:	Southern California Gas Company (SoCalGas).
Format:	One (1) Vector GIS Shapefile; polygon.
Date Retrieved:	March 2016
Date Last Modified and Quality Checks:	July 17, 2017 (CRCPBoundary_20170717) – Plan Area Boundary revised to remove overlaps and gaps from other California NCCP (Natural Community Conservation Plans) and HCP boundaries.
Restrictions:	Potentially sensitive/ restricted data when project is in planning stages. Data will be made publicly available upon approval.
Source Link:	Not available per SoCalGas discretion.

High Pressure Gas Pipelines, Stations and Storage Fields (3 Feature Classes)	
Description:	SoCalGas High Pressure Gas Pipelines within the Plan Area; approximately 2,437.8 linear miles. There are 28 SoCalGas stations in the Plan Area, totaling approximately 32.4 acres. SoCalGas has five Storage Fields within the Plan Area (Aliso Canyon, Montebello, Playa Del Rey, Honor Rancho, and Goleta), totaling approximately 4,263.3 acres.
Source:	Southern California Gas Company (SoCalGas).
Format:	Three (3) Vector GIS Shapefiles: 1) Pipelines: line format; 2) Stations and 3) Storage Fields: polygons.
Date Retrieved	March 2016
Date Last Modified and Quality Checks:	July 26, 2017 (GasPipeLines_Within_CRCP_20170726) – Gas pipelines clipped to revised Plan Area boundary. October 23, 2017 (SCG_Stations_Within_CRCP_20171023) – SoCalGas stations layer updated. Initially data layer showed 29 stations, 1 of which was outside the Plan Area. Updated Stations layer totals 28 stations. November 29, 2017 (SCG_StorageFields_Within_CRCP_20171129)
Restrictions:	Data is proprietary and will not be made publicly available for security reasons.
Source Link:	Not available per SoCalGas discretion.

Facilities Area and Non-Facilities Area (2 Feature Classes)	
Description:	The "Facilities Area" refers to the range where 95% of SoCalGas O&M activities will potentially occur. A buffer distance was given to each facility type based on SoCalGas O&M personnel feedback. (Appendix D, Table D-3, *Development of Baseline Facilities Area)*. The remaining 5 percent of SoCalGas O&M activities have the potential to occur outside the facilities area. The "Non-Facilities Area" refers to the range outside of the facilities area, where no SoCalGas facilities currently exist (Table D-4, *Characterization of Baseline Conditions for Non-Facilities Area*).
Source:	Southern California Gas Company (SoCalGas), Sapphos Environmental, Inc.
Format:	Two (2) Vector GIS Shapefiles; polygons.
Date Retrieved:	March 2016
Date Last Modified and Quality Checks:	November 6, 2017 (FINAL_FacilitiesArea_20171106) – Facilities Area was developed using all SoCalGas facility data and O&M personnel feedback to distinguish buffer distances. A single output layer was created by dissolving the previously mentioned process. November 6, 2017 (FINAL_Non_FacilitiesArea_20171106) – Non-Facilities Area was developed by creating a copy of the CRCP Plan Area Boundary shapefile and erasing the Facilities Area from that copy.
Restrictions:	Data is proprietary and will not be made publicly available for security reasons.
Source Link:	Not available per SoCalGas discretion.

Land Use/ Cover (1 Feature Class)	
Description:	The Land Use/Cover type data was developed by using 2002 Fire and Resource Assessment Program (FRAP) land cover data as an initial base and updated using data from 2016 Urbanized Areas Boundaries, 2016 Farmland Mapping and Monitoring Program (FMMP), various CDFW datasets containing significant ecological features, and ESRI geospatial roads data. Thorough research was performed on types of roadways and their corresponding lane widths based on Caltrans Highway Performance Monitoring System (HPMS) and U.S. Department of Transportation Federal Highway Administration data. Roadway features were classified as urban, whereas the agriculture and ecological features were classified as open space.
Source:	Various publicly-sourced datasets, refer to Appendix D, Table D-2, *Data Sources Used to Characterize Plan Area Baseline Conditions,* for list of sources.
Format:	(1) Vector GIS Shapefile; polygon.
Date Retrieved	Various publicly-sourced datasets, refer to Appendix D refer to Appendix D, Table D-2, *Data Sources Used to Characterize Plan Area Baseline Conditions,* for upload dates.
Date Last Modified and Quality Checks:	November 8, 2017 (FINAL_Baseline_Landcover_in_CRCP_Area_20171108)
Restrictions:	None.
Source Link:	Not available per SoCalGas discretion.

Baseline Land-Use/ Cover within Facilities Area and Baseline Land-Use/ Cover within Non-Facilities Area (2 Feature Classes)	
Description:	The Baseline Land-Use/Cover within Facilities Area and Baseline Land-Use/ Cover within Non-Facilities Area was developed by combining the Land-Use/Cover data layer and the Facilities Area and Non-Facilities Area layers. In doing so, land-use data was captured within the Facilities and Non-Facilities Area for verification of areas where urban and open space exist. These layers were used for processing against predictive species distribution models to decipher where suitable habitat was found among open space areas in the facilities and non-facilities areas.
Source:	Various publicly-sourced datasets, refer to Appendix D, Table D-2, *Data Sources Used to Characterize Plan Area Baseline Conditions,* for list of sources.
Format:	(2) Vector GIS Shapefiles; polygon.
Date Retrieved	Various publicly-sourced datasets, refer to Appendix D refer to Appendix D, Table D-2, *Data Sources Used to Characterize Plan Area Baseline Conditions,* for upload dates.
Date Last Modified and Quality Checks:	November 21, 2017 (FINAL_LANDCOVER_in_SERVICE_Area_20171121) November 21, 2017 (FINAL_LANDCOVER_in_OUTSIDE_Area_20171121)
Restrictions:	Data is proprietary and will not be made publicly available for security reasons.
Source Link:	Not available per SoCalGas discretion.

II. Predicted Species Distribution Ranges for Covered Species (Inputs and Outputs)

The effects analysis (as illustrated in Appendix D) was calculated using two baseline area datasets (*Baseline Land-Use/Cover within Facilities Area* and *Baseline Land-Use/Cover within Non-Facilities Area*) and 41 PSDMs. A PSDM was created for each Covered Species (41) and Fully Protected Species (7) and refined using one of four modeling approaches: Matrix Modeling, Range Refinement of Matrix Modeling, Restricted Range Modeling, and Expert Modeling (Table A-2, *Modeling Approach for 41 Covered Species and 7 Fully Protected Species Predicted Species Distribution Models [PSDM]*). A PSDM for Fully Protected Species[547] was created for range modeling purposes only and did not require further analysis.

The GIS feature classes are listed below, and their details are described in the tables. For a list of data sources used to characterize PSDMs, see Appendix D, Table D-5, *Biological Resource Data Used to Define Predicted Species Distribution Models*.

[547] SoCalGas has defined avoidance measures for Fully Protected species; an effects analysis calculating the basis of take is irrelevant.

TABLE A-2
MODELING APPROACH FOR 41 COVERED SPECIES AND 7 FULLY PROTECTED SPECIES PREDICTED SPECIES DISTRIBUTION MODELS (PSDM)

Modeling Approach				
Species Class	**Matrix Modeling**	**Range Refinement of Matrix Modeling**	**Restricted Range Modeling**	**Expert Modeling**
Invertebrates	• Delhi sands flower-loving fly • El Segundo Blue Butterfly	• Morro shoulderband (banded dune) snail		
Fish	• Unarmored threespine stickleback*			• Santa Ana sucker
Amphibians	• Mountain yellow-legged frog			• Arroyo toad • California red-legged frog • California tiger salamander
Reptiles	• Southern rubber boa			• Western Pond turtle
Birds	• Burrowing owl • Coastal California gnatcatcher • Southwestern willow flycatcher	• Belding's savannah sparrow • Western yellow-billed cuckoo • American peregrine falcon* • California condor* • California least tern* • Golden eagle* • White-tailed kite*		• Least Bell's vireo
Mammals	• San Bernardino kangaroo rat • San Joaquin kit fox	• Stephens' kangaroo rat		

TABLE A-2
MODELING APPROACH FOR 41 COVERED SPECIES AND 7 FULLY PROTECTED SPECIES PREDICTED SPECIES DISTRIBUTION MODELS (PSDM)

Modeling Approach				
Species Class	**Matrix Modeling**	**Range Refinement of Matrix Modeling**	**Restricted Range Modeling**	**Expert Modeling**
	• Morro Bay kangaroo rat*			
Plants	• Conejo dudleya • Lyon's pentachaeta • Slender-horned spineflower • Vandenberg Monkey flower	• Seaside Bird's Beak	• Braunton's milk-vetch • California seablite • Chorro Creek bog thistle • Gambel's water cress • Gaviota tarplant • Indian Knob mountainbalm • Lompoc yerba santa* • Marcescent dudleya • Morro manzanita* • Nevin's barberry • Nipomo Mesa lupine • Pismo clarkia • San Fernando Valley spineflower • Santa Ana River woollystar • Santa Monica Mountains dudleya • Ventura Marsh milk-vetch • Verity's dudleya	

NOTE: * This is a Fully Protected species for which SoCalGas has defined avoidance measures.

Covered Species

Every PSDM for each of the 41 Covered Species served as the input data layer that underwent geoprocessing by intersecting it with each of the two baseline areas. The outputs resulted in 82 GIS GBD Feature Classes (41 PSDM intersections with *Baseline Land-Use/Cover within Facilities Area*; and 41 PSDM intersections with *Baseline Land-Use/Cover within Non-Facilities Area*). These outputs are the basis of the effects analysis calculations, as they predict the areas where suitable habitat exists

for each Covered Species in the CRCP Plan Area.

Model Version: Matrix Modeling

Burrowing owl *(Athene cunicularia)*	
File Name	BurrowingOwl_final3
Date Model Last Modified	September 08, 2017
Model Input(s)	- Vegetation communities layer (Basin Sagebrush, Coastal Scrub, Desert Buckwheat, Desert Scrub, Desert Wash, Joshua Tree, Joshua Tree (conifer = Singleleaf Pinyon Pine), Mixed Desert Shrub, Perennial Grassland, Urban/Developed, White Bursage) - Ecological regions layer (High Desert Plains and Hills, Los Angeles Plain, Los Angeles Plain, Fontana Plain-Calimesa Terraces, Sierra Pelona-Mint Canyon, High Desert Plains and Hills, Lucerne-Johnson Valleys and Hills, Fontana Plain-Calimesa Terraces, Little San Bernardino-Bighorn Mountains, Perris Valley and Hills, Santa Maria Valley, Caliente Range-Cuyama Valley, Santa Ynez Valleys and Hills, Caliente Range-Cuyama Valley, Caliente Range-Cuyama Valley, Sierra Pelona-Mint Canyon) - Elevation/DEM data (0-4,000 ft) - Slope/DEM data (<10 percent)
Calibration Details	Changed vegetation selection to include suggested veg categories from MTR. BESTAVAI_1 IN ('Agriculture', 'Annual Grass/Forbs', 'Annual Grassland', 'Barren', 'Basin Sagebrush', 'Buckwheat (White Sage)', 'Coastal Scrub', 'Desert Buckwheat', 'Desert Scrub', 'Desert Wash', 'Joshua Tree', 'Joshua Tree (conifer = Singleleaf Pinyon Pine)', 'Mixed Desert Shrub', 'Perennial Grassland', 'Soft Scrub-Chaparral', 'White Bursage') Expanded the Ecoregion selection to include any Ecoregions where CNDDB or FWS observations have occurred (see BurrowingOwl_eco2).
Name of Final Outputs generated after intersection with Baseline Areas	BurrowingOwl_SUITHAB_SERVICE_Area_20171121 BurrowingOwl_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

Coastal California gnatcatcher *(Polioptila californica californica)*	
File Name	CalifGnatcatcher_final2
Date Model Last Modified	August 21, 2017
Model Input(s)	- Vegetation communities layer (Buckwheat (White Sage), Chamise, Coastal Scrub, Mixed Chaparral, Sagebrush, Scalebroom, Soft Scrub-Chaparral) - Ecological regions layer (Los Angeles Plain, Simi Valley-Santa Susana Mountains, Fontana Plain-Calimesa Terraces, San Gabriel Mountains, Santa Ana Mountains) - Elevation/DEM data (0-2,000 ft) - Slope/DEM data (<40 percent)
Calibration Details	Both CNDDB Polys and CritHab occurred outside the original Ecoregions. Used Select by Location to identify additional Ecoregions. Excluded Slope from model, due to overly constrained results (did not model areas with known occurrences). Did not change Elevation range for the same reason. Final intersect included new Ecoregions, old Veg, and old Elevation.

Coastal California gnatcatcher *(Polioptila californica californica)*	
Name of Final Outputs generated after intersection with Baseline Areas	CalifGnatCatcher_SUITHAB_SERVICE_Area_20171121 CalifGnatcatcher_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

Conejo dudleya (*Dudleya abramsii spp. parva)*	
File Name	ConejoDudleya_final
Date Model Last Modified	8/31/2017
Model Input(s)	- Vegetation communities layer (Coastal Scrub, Valley Oak Woodland) - Soil data layer (volcanic or sandstone rock outcrops) - Elevation/DEM data (197-1,575 ft)
Calibration Details	
Name of Final Outputs generated after intersection with Baseline Areas	ConejoDudleya_SUITHAB_SERVICE_Area_20171121 ConejoDudleya_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

Delhi sands flower-loving fly (*Rhaphiomidas terminatus abdominalis)*	
File Name	DelhiSandsFly_final2
Date Model Last Modified	August 21, 2017
Model Input(s)	- Vegetation communities layer (Annual Grass/Forbs, Annual Grassland, Buckwheat (White Sage), Barren, Coastal Scrub, Disturbed, Perennial Grassland, Soft Scrub-Chaparral) - Ecological regions layer (Fontana Plain-Calimesa Terraces) - Soil data layer (Delhi Fine Sands - Specific soil type code Db or DaD2) - Elevation/DEM data (600-1,800) - Slope/DEM data (>70 percent?) - Canopy Density/FRAP data (sparse cover)
Calibration Details	Basing species range solely on soils designation. Fits well within CNDDB and USFWS observations. No changes made from original model.
Name of Final Outputs generated after intersection with Baseline Areas	DelhiSandsfly_SUITHAB_SERVICE_Area_20171121 DelhiSandsFly_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

El Segundo blue butterfly (*Euphilotes battoides allyni)*	
File Name	ElSegundoBlueButterfly_final2
Date Model Last Modified	August 18, 2017
Model Input(s)	- Vegetation communities layer (Coastal Scrub, Perennial Grassland) - Soil data layer (beach sand, sandstone; not hydric)
Calibration Details	Original model was not showing range where recent CNDDB/USFWS species observations occurred, partially due to "No Data" in Soils dataset. New model used Select by Location to identify soils and veg

El Segundo blue butterfly (*Euphilotes battoides allyni)*	
	communities that intersect with CNDDB/USFWS occurrences, then an intersect was run between selected soils and veg to determine final range. Areas of "Urban" veg were excluded to fine-tune the range.
Name of Final Outputs generated after intersection with Baseline Areas	ElSegundoBlueButterfly_SUITHAB_SERVICE_Area_20171121 ElSegundoBlueButterfly_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

Lyon's pentachaeta (*Pentachaeta lyonii)*	
File Name	LyonsPentachaeta_final2
Date Model Last Modified	August 21, 2017
Model Input(s)	- Vegetation communities layer (Grassland, Mixed Chaparral, Coastal sage brush) - Ecological regions layer (Santa Monica Mountains) - Elevation/DEM data (230-1,805 ft) - Soil data layer (rocky clays of volcanic origin)
Calibration Details	CNDDB polys were occurring outside the original Ecoregion selection, so Select by Location was used to select additional Ecoregions overlapping with non-extirpated CNDDB polys. Also used Select by Location to fine-tune the veg communities. Intersect included new Veg, new Ecoregions and original Elevation Range. USFWS CritHab was unioned in in the final step.
Name of Final Outputs generated after intersection with Baseline Areas	LyonsPentachaeta_SUITHAB_SERVICE_Area_20171121 LyonsPentachaeta_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 22, 2017

Mountain yellow-legged frog (*Rana muscosa)*	
File Name	MtnYellowLeggedFrog_final2
Date Model Last Modified	August 29, 2017
Model Input(s)	- Vegetation communities layer (Baccharis (riparian), Desert Riparian, Fremont Cottonwood, Jeffrey Pine, Lodgepole Pine, Mixed Riparian Hardwoods, Montane Hardwood-Conifer, Montane Riparian, Ponderosa Pine, Riparian Forest, Riparian Scrub, Sierran Mixed Conifer, Stream and River, Subalpine Conifer, Valley Foothill Riparian, White Fir, Willow) - Ecological Regions layer (San Gabriel Mountains, Upper San Gabriel Mountains, San Gorgonio Mountains, Upper San Gorgonio Mountains) - Elevation/DEM data (1,200-7,500 ft) - Hydrologic Features layer (perennial streams)
Calibration Details	Rebuffered by 215 feet, CNDDB added Urban and Urban/Developed areas erased from range.
Name of Final Outputs generated after intersection with Baseline Areas	MtnYellowLeggedFrog_SUITHAB_SERVICE_Area_20171121 MtnYellowLeggedFrog_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

San Bernardino Merriam's kangaroo rat (*Dipodomys merriami parvus)*	
File Name	SanBernadinoKangarooRat_final3
Date Model Last Modified	September 8, 2017
Model Input(s)	- Vegetation communities layer (Buckwheat (White Sage), California Juniper, Coastal Scrub, Chamise, Desert Wash, Sagebrush, Scalebroom, Soft Scrub-Chaparral, Stream and River) - Ecological Regions layer (Fontana Plain-Calimesa Terraces, Perris Valley and Hills) - Elevation/DEM data (0-2,300) - Slope/DEM data (<10%)
Calibration Details	Selected Veg and Soils where they intersected CNDBB/USFWS/CritHab, Intersected Veg and Soils, added the entire Critical Habitat.
Name of Final Outputs generated after intersection with Baseline Areas	SanBernardinoKangarooRat_SUITHAB_SERVICE_Area_20171121 SanBernardinoKangarooRat_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

San Fernando Valley spineflower (*Chorizanthe parryi var. fernandina)*	
File Name	SanFernandoValleySpineflower_final2
Date Model Last Modified	August 19, 2017
Model Input(s)	- Vegetation communities layer (Alpine-Dwarf Shrub, Baccharis (riparian), Canyon Live Oak, Canyon Live Oak (conifer = Singleleaf Pinyon Pine), Desert Scrub, Montane Chaparral, White Fir) - Ecological Regions layer (Santa Monica Mountains, Santa Ynez-Sulphur Mountains) - Elevation/DEM data (1,040-1,290 ft) - Slope/DEM data (south-facing and north/facing) - Soil data layer (alluvium derived from calcareous sedimentary rock/colluvium and residuum derived from sedimentary rock and other mixed sources)
Calibration Details	The Ecoregions in the original model did not cover same area as CNDDB. New ecoregions selected. Veg had same issue. Used Select by Location to export only veg communities that intersect with CNDDB polys. Urban and Urban/Developed were excluded from export. Soils also did not overlap CNDDB, so Select by Location was used to create new Soils layer.
Name of Final Outputs generated after intersection with Baseline Areas	SanFernandoValleySpinedflower_SUITHAB_SERVICE_Area_20171121 SanFernandoValleySpineflower_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

San Joaquin kit fox (*Vulpes macrotis mutica)*	
File Name	SanJoaquinKitFox_final2
Date Model Last Modified	September 19, 2017
Source/Link:	CDFWS (CNDDB)
Model Input(s)	- Vegetation communities layer (Annual Grass/Forbs, Annual Grassland) - Ecological Regions layer (Caliente Range-Cuyama Valley, Eastern Hills, Gabilan Range, Paso Robles Hills and Valleys)

San Joaquin kit fox (*Vulpes macrotis mutica*)	
	- Canopy Density/FRAP data (low-moderate cover)
Calibration Details	Use CNDDB data and only occurrences from SLO and Santa Barbara counties.
Name of Final Outputs generated after intersection with Baseline Areas	SanJoaquinKitFox_SUITHAB_SERVICE_Area_20171121 SanJoaquinKitFox_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Slender-horned spineflower (*Dodecahema leptoceras*)	
File Name	SlenderHornedSpineflower_final2
Date Model Last Modified	August 28, 2017
Model Input(s)	- Vegetation communities layer (Chaparral, Cismontane woodland, Scalebroom, California juniper, Desert wash, Coastal Scrub, Coastal Oak Woodland) - Elevation/DEM data (200-760 m) - Soil data (sedimentary soils)
Calibration Details	No Ecoregions provided in original criteria. Selected Ecoregions that intersect CNDDB (extant and possible extant only) and USFWS observations. Same method used for Soils and Veg (Urban excluded). New Ecoregions, Soils, and Veg were intersected for final result.
Name of Final Outputs generated after intersection with Baseline Areas	SlenderhornedSpineflower_SUITHAB_SERVICE_Area_20171121 SlenderHornedSpineflower_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Southern rubber boa (*Charina umbratica*)	
File Name	SouthernRubberBoa_final2
Date Model Last Modified	8/24/2017
Model Input(s)	- Vegetation communities layer (Eastside Pine, Jeffrey Pine, Lodgepole Pine, Montane Hardwood-Conifer, Ponderosa Pine, Sierran Mixed Conifer, Subalpine Conifer, Unknown Conifer Type, White Fir) - Elevation/DEM data (5,000-8,200 ft) - Ecological regions layer (San Gorgonio Mountains, Upper San Gorgonio Mountains)
Calibration Details	
Name of Final Outputs generated after intersection with Baseline Areas	SouthernRubberBoa_SUITHAB_SERVICE_Area_20171121 SouthernRubberBoa_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Southwestern willow flycatcher (*Empidonax traillii extimus*)	
File Name	SouthwesternWillowFlycatcher_final2
Date Model Last Modified	August 23, 2017
Model Input(s)	- Vegetation communities layer (Coastal Oak Woodland, Desert Riparian, Fremont Cottonwood, Mixed Riparian Hardwoods, Montane Riparian, Riparian Forest, Riparian Scrub, Valley Foothill Riparian, Willow) - Elevation/DEM data (0-7,500) - Slope/DEM data (<10%) - Ecological regions layer (Fontana Plain-Calimesa Terraces, High Desert Plains and Hills, Los Angeles Plain, Oxnard Plain-Santa Paula Valley, Perris Valley and Hills, San Gabriel Mountains, San Gorgonio Mountains, Santa Ana Mountains, Santa Monica Mountains, Santa Ynez Valleys and Hills, Sierra Pelona-Mint Canyon, Simi Valley-Santa Susana Mountains, Upper San Gabriel Mountains, Upper San Gorgonio Mountains)
Calibration Details	CNDDB and USFWS occurrences and CritHab appearing outside original selection for Ecoregions. Used Select by Location for both CNDDB and CritHab to re-select Ecoregions. Slope layer excluded from the model due to non-contiguous result. Followed MTR's suggestion to select veg communities that intersect CNDDB/CritHab/USFWS, then limited the veg communities to riparian categories (see definition query below). Then unioned the CritHab with the selected veg.
Name of Final Outputs generated after intersection with Baseline Areas	SouthwesternWillowFlyCatcher_SUITHAB_SERVICE_Area_20171121 SouthernWillowflyCatcher_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Vandenberg monkeyflower (*Diplacusis vandenbergensis*)	
File Name	VandenbergMonkeyFlower_final
Date Model Last Modified	November 29, 2017
Model Input(s)	- Vegetation communities layer (Chamise, Chamise-Redshank Chaparral, Coastal Oak Woodland, Coastal Scrub, Mixed Chaparral) - Ecological regions layer (Endemic to eastern portion of Burton Mesa in Santa Barbara Co. (Santa Ynez Valleys and Hills, Santa Ynez-Sulphur Mountains)) - Elevation/DEM data (197-394 ft) - Slope/DEM data (bottom slope of Santa Lucia Canyon) - Canopy density/FRAP data (In sandy openings (canopy gaps), canopy openings) - Soil data layer (loose sandy soils)
Calibration Details	Designated critical habitat may provide the model we need of currently suitable lands. Recently completed (2015) and peer reviewed by resource experts etc. The USFWS Critical Habitat fell within suitable veg and near recent CNDDB observations, so the CritHab was used for the species range. Note that elevation range did not cover crithab.

Vandenberg monkeyflower (*Diplacusis vandenbergensis*)	
Name of Final Outputs generated after intersection with Baseline Areas	VandenbergMonkeyflower_SUITHAB_SERVICE_Area_20171201 VandenbergMonkeyflower_SUITHAB_OUTSIDE_Area_20171201
Dates of Final Outputs	December 1, 2017 December 1, 2017

Model Version: Range Refinement of Matrix Modeling

Belding's savannah sparrow *(Passerculus sandwichensis beldingi)*	
File Name	BeldingsSavannahSparrow_final3
Date Model Last Modified	September 8, 2017
Model Input(s)	- Vegetation communities layer (annual grass/forbs, annual grassland, baccharis (riparian), desert riparian, desert wash, Fremont cottonwood, Mixed Riparian Hardwoods, montane riparian, riparian forest, riparian scrub, stream and river, valley foothill riparian, water, willow) - Ecological regions layer (South Costal Santa Lucia Range, Santa Ynez Valleys and Hills, Interior Santa Lucia Range, Northern Transverse Ranges, San Rafael-Topatopa Mountains, Santa Ynez-Sulphur Mountains, Northern Transverse Ranges, San Rafael-Topatopa Mountains, Sierra Pelona-Mint Canyon) - Elevation/DEM data (0-4,600 ft) - Soil layer (Coarse sand, instream) - Hydrological features layer (Intermittent Streams at least 3rd order) - Watersheds layer (Santa Maria, Santa Ynez, Santa Clara, Los Angeles, Santa Ana)
Calibration Details	NHD Flowlines: FCode = 46003, buffered by 1km and clipped to WBDHU10_10mileBndryClip: Name IN('Santa Maria River' , 'Upper Santa Clara River', 'Upper Santa Ana River', 'Lower Santa Clara River' , 'Lower Santa Ana River', 'Lower Los Angeles River', 'Upper Los Angeles River', 'Zaca Creek-Santa Ynez River', 'Redrock Canyon-Santa Ynez River', 'Salsipuedes Creek-Santa Ynez River', 'Middle Santa Ana River', 'Middle Santa Clara River', 'Headwaters Santa Ynez River', 'Headwaters Santa Clara River', 'Headwaters Santa Ana River', 'Alamo Pintado Creek-Santa Ynez River') Selected Watersheds that intersect with CritHab. Selected NHD stream lines (excluding ephemeral) that intersect with CritHab and buffer by 1 km. Clipped results to watersheds. Unioned CritHab with results.
Name of Final Outputs generated after intersection with Baseline Areas	BeldingsSavannahSparrow_SUITHAB_SERVICE_Area_20171121 BeldingsSavannahSparrow__SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

Morro shoulderband (= banded dune) snail (*Helminthoglypta walkeriana*)	
File Name	MoroShoulderbandSnail_final3
Date Model Last Modified	August 30, 2017
Model Input(s)	- Vegetation communities layer (Coastal Scrub) - Ecological Regions layer (South Costal Santa Lucia Range) - Elevation/DEM data (0-300m) - Soil data layer (sand; fine sand) - Canopy Density data (moderate-dense)

Morro shoulderband (= banded dune) snail (*Helminthoglypta walkeriana*)	
Calibration Details	Soils were producing an empty dataset after intersecting layers, so Soils was excluded. Also FRAP was producing a small result compared to CNDDB and CritHab, so FRAP was excluded as well. Habitat was produced by intersecting CNDDB, CritHab, Ecoregion, Veg, and Elevation Some of the areas of CNDDB are excluded because the original model intersected CNDDB, CritHab, Ecoregion, Veg, and Elevation, which resulted in areas where all four criteria overlapped. Most of the excluded CNDDB is located in urban areas.
Name of Final Outputs generated after intersection with Baseline Areas	MorroShoulderbandSnail_SUITHAB_SERVICE_Area_20171121 MorroShoulderbandSnail_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Seaside bird's beak (*Cordylanthus rigidus ssp. littoralis*)	
File Name	SeasideBirdsBeak_final
Date Model Last Modified	November 27, 2017
Model Input(s)	- Vegetation communities layer (Closed-Cone Pine-Cypress (Forest), Coastal Oak Woodland, Coastal Scrub, Mixed Chaparral, Northern Mixed Chaparral) - Ecological Regions layer (Endemic to south and central coastal regions of CA (Santa Maria Valley, South Costal Santa Lucia Range, Santa Ynez Valleys and Hills, Santa Ynez-Sulphur Mountains, Caliente Range-Cuyama Valley, Interior Santa Lucia Range)) - Elevation/DEM data (0-1,690 ft) - Soil data layer (vernally mesic soils (clayey marine sediments, marine deposits))
Calibration Details	Used the following query on veg BESTAVAI_1 IN ('Closed-Cone Pine-Cypress', 'Coastal Oak Woodland', 'Coastal Scrub', 'Mixed Chaparral', 'Northern Mixed Chaparral'), veg then clipped to Santa Barbara County. Soils were queried by "PARENT" IN ('clayey marine sediments', 'marine deposits'). The species range was defined by intersecting the two layers to find the overlap.
Name of Final Outputs generated after intersection with Baseline Areas	SeasideBirdsBeak_SUITHAB_SERVICE_Area_20171201 SeasideBirdsBeak_SUITHAB_OUTSIDE_Area_20171201
Dates of Final Outputs	December 1, 2017 December 1, 2017

Stephens' kangaroo rat (*Dipodomys stephensi*)	
File Name	StephensKangarooRat_final3
Date Model Last Modified	September 8, 2017
Model Input(s)	- Vegetation communities layer (Annual Grass/Forbs, Annual Grassland, Barren, Chamise, Coastal Scrub, Desert Wash, Juniper, Mixed Chaparral, Perennial Grassland, Sagebrush, Scalebroom, Soft Scrub-Chaparral) - Slope/DEM data (<30%) - Soil data layer (sandy and sandy loam soils with little clay and gravel content on slopes less than 30 percent) - Ecological regions layer (Fontana Plain-Calimesa Terraces, Perris Valley and Hills)

Stephens' kangaroo rat (*Dipodomys stephensi*)	
Calibration Details	Original model yielded range far from known habitats. Selected Ecoregions that intersect with the CWHR range (https://catalog.data.gov/dataset/stephens-kangaroo-rat-range-cwhr-m108-ds1895). Reselected soils and veg per suggestions from specialists. Old observations occur in the same area of San Bernardino County as new range. Buffered CNDDB polys by 2 miles and clipped the previous result (final2) to the buffer.
Name of Final Outputs generated after intersection with Baseline Areas	StephensKangarooRat_SUITHAB_SERVICE_Area_20171121 StephensKangrooRat_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	
File Name	WesternYellowBilledCuckoo_final2
Date Model Last Modified	August 22, 2017
Model Input(s)	- Vegetation communities layer (Desert Riparian, Fremont Cottonwood, Riparian Forest, Stream and River, Willow) - Ecological regions layer (High Desert Plains and Hills, Los Angeles Plain, Oxnard Plain-Santa Paula Valley, Santa Ynez Valleys and Hills, Sierra Pelona-Mint Canyon, Simi Valley-Santa Susana Mountains) - Elevation/DEM data (0-2,500) - Slope/DEM data (<10%)
Calibration Details	Original model result did not include CNDDB and CritHab. CNDDB polys are Extirpated or Possibly Extirpated, so CritHab used for final species range.
Name of Final Outputs generated after intersection with Baseline Areas	WesternYellowBilledCuckoo_SUITHAB_SERVICE_Area_20171121 WesternYellowbilledCockoo_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Model Version: Restricted Range Modeling

Braunton's milk-vetch *(Astragalus brauntonii)*	
File Name	BrauntonsMilkVetch_final2
Date Model Last Modified	August 20, 2017
Model Input(s)	- Vegetation communities layer (Coastal Scrub, Mixed Chaparral) - Ecological regions layer (Santa Monica Mountains) - Elevation/DEM data (490-2,430 ft) - Slope/DEM data (0-2 percent) - Soil layer (calcium carbonate soils derived from marine substrates)
Calibration Details	Extirpated and Possible Extirpated CNDDB Occurrences excluded. Select by Location used to identify veg communities intersecting CNDDB and USFWS CritHab (Urban veg communities excluded). Ecoregions also adjusted to include all regions where CNDDB/USFWS CritHab exist. Final intersect

Braunton's milk-vetch *(Astragalus brauntonii)*	
	included revised Veg, revised Ecoregions, and Elevation (Slope was too small a range).
Name of Final Outputs generated after intersection with Baseline Areas	BrauntonsMilkVetch_SUITHAB_SERVICE_Area_20171121 BrauntonsMilkVetch__SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

California seablite (*Suaeda californica*)	
File Name	CalifSeablite_final2
Date Model Last Modified	August 18, 2017
Model Input(s)	- Vegetation communities layer (Estuarine, Intertidal Mudflat, Saline Emergent Wetland) - Ecological regions layer (South Costal Santa Lucia Range) - Soil data layer (hydric soils, no rock outcrops) - Elevation/DEM data (<15 m) - Hydrologic features layer (Margins of coastal salt marshes (buffered by 100 ft))
Calibration Details	Original model by itself was not covering several recent CNDDB observations. A Select by Location was employed to determine soils and veg intersecting with CNDDB occurrences. A few more categories were added to the Soils criteria, including Baywood fine sand, 2 to 9 percent slopes, Baywood fine sand, 9 to 15 percent slopes, Concepcion loam, 2 to 5 percent slopes, Cropley clay, 2 to 9 percent slopes, Diablo and Cibo clays, 9 to 15 percent slopes, Dune land, No Data, Psamments and Fluvents, occasionally flooded, Salinas loam, 0 to 2 percent slopes, and Still gravelly sandy clay loam, 2 to 9 percent slopes. After remodeling with the additional Soils categories, model included all areas where CNDDB observations occurred.
Name of Final Outputs generated after intersection with Baseline Areas	CalifSeablite_SUITHAB_SERVICE_Area_20171121 CalifSeaBlite_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

Chorro Creek bog thistle (*Cirsium fontinale var. obispoense*)	
File Name	ChorroCreekBogThistle_final2
Date Model Last Modified	August 18, 2017
Model Input(s)	- Vegetation communities layer (Baccharis (riparian), Coastal Oak Woodland, Coastal Scrub, Freshwater Emergent Wetland, Lacustrine, Lakes and Ponds, Riparian Forest, Riparian Scrub, Valley Foothill Riparian, Valley Oak Woodland, Wet Meadow, Willow) - Ecological regions layer (South Costal Santa Lucia Range) - Soil data layer (residuum weathered from serpentinite, hydric soils, no rock outcrops) - Elevation/DEM data (35-385 m) - Hydrologic features layer (wetlands) -

Chorro Creek bog thistle (*Cirsium fontinale var. obispoense*)	
Calibration Details	Original model by itself was not covering several recent CNDDB observations. A Select by Location was employed to determine NWI categories intersecting with CNDDB occurrences. An additional category was added to the Hydro criteria: Riverine. After remodeling with the additional Hydro category, model included all areas where CNDDB observations occurred.
Name of Final Outputs generated after intersection with Baseline Areas	ChorroCreekBigThistle_SUITHAB_SERVICE_Area_20171121 ChorroCreekBogThistle_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

Gambel's water cress (*Nasturtium gambelii*)	
File Name	GambelsWaterCress_final2
Date Model Last Modified	August 19, 2017
Model Input(s)	- Vegetation communities layer (Estuarine) - Elevation/DEM data (52-1,082 ft) - Hydrologic features layer (freshwater marshes, brackish marshes)
Calibration Details	Original model was over-predicting. Used the one CNDDB polygon where PRESENCE = "Presumed Extant" (the rest were Extirpated), and the Select by Location tool to select veg communities ('Montane Chaparral', 'Riparian Forest - detailed'), also used this method to only select Freshwater Forested/Shrub Wetland from NWI Wetland dataset (see above for previous definition query). Also added Ecoregions to the model where "Presumed Extant" and "Possibly Extirpated" CNDDB observations occurred (San Luis Obispo County - Santa Maria Valley and Santa Barbara County - Santa Ynez Valleys and Hills). The Intersect tool was used to find the overlap between Veg, Hydro, and Ecoregions. According to the Comments from Sapphos, Gambel's Watercress is known to exist in two specific spots (Nipomo Dunes and Vandenburg Air Force Base), so the Select by Location was used on the result of the Intersect tool to locate areas of overlap between the CNDDB and Veg/Hydro/Ecoregion Intersect.
Name of Final Outputs generated after intersection with Baseline Areas	GambelsWaterCress_SUITHAB_SERVICE_Area_20171121 GambelsWaterCress_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

Gaviota tarplant (*Deinandra increscens ssp. villosa*)	
File Name	GaviotaTarplant_final3
Date Model Last Modified	September 7, 2017
Model Input(s)	- Vegetation communities layer (Annual Grass/Forbs, Annual Grassland) - Elevation/DEM data (20-430 m)

Gaviota tarplant (*Deinandra increscens ssp. villosa*)	
	- Slope/DEM data (< 30%) - Hydrologic features layer (freshwater marshes, brackish marshes) - Canopy density/FRAP layer (low-moderate cover) - Soil data layer (Sandy soils associated with coastal terraces adjacent to the coast or uplifted marine sediments at interior sites up to 5.6 km (3.5 mi) inland from the coast)
Calibration Details	Intersect excludes slope due to bad topology. Intersect includes veg, soils, FRAP, and elevation, but does not coincide with CNDDB or Critical Habitat. Slope was excluded from the model because it made the final result non-contiguous and CritHab occurred outside the given range. Elevation was also excluded from the model because CritHab occurred outside the given range. Veg (excluding Urban), soils, and ecoregions intersecting CirtHab and CNDDB observations were selected and then intersected. CritHab was added back into range Soils polygons selected that intersect CNDDB polys and CritHab separately. Those two results merged for Soils layer. Veg polygons selected that intersect CNDDB polys and CritHab separately. Those two results merged for Veg layer. Overlapping areas of Veg and Soils selected. CritHab added to final result.
Name of Final Outputs generated after intersection with Baseline Areas	GaviotaTarplant_SUITHAB_SERVICE_Area_20171121 GaviotaTarplant_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

Indian Knob mountainbalm (*Eriodictyon altissimum*)	
File Name	IndianKnobMountainbalm_final2
Date Model Last Modified	August 19, 2017
Model Input(s)	- Vegetation communities layer (Chamise, Coastal Oak Woodland, Coastal Scrub, Manzanita Chaparral, Mixed Chaparral, Soft Scrub-Chaparral) - Elevation/DEM data (80-270 m) - Soil data layer (sandstone)
Calibration Details	Soils were excluded because "sandstone" produced a result mostly in Southern California, causing the intersect to be empty. Veg, elevation range, and CNDDB datasets were intersected to show results near San Luis Obispo. CNDDB included in model because all occurrences had a PRESENCE of Presumed Extant.
Name of Final Outputs generated after intersection with Baseline Areas	IndianKnobMountainbalm_SUITHAB_SERVICE_Area_20171121 IndianKnobMountainbalm_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

Lompoc yerba santa (*Eriodictyon capitatum*)	
File Name	LompocYerbaSanta_final2
Date Model Last Modified	August 29, 2017
Model Input(s)	- Vegetation communities layer (Chamise, Coastal Oak Woodland, Coastal Scrub, Manzanita Chaparral, Mixed Chaparral, Soft Scrub-Chaparral) - Elevation/DEM data (40-900 m) - Soil data layer (sand, fine sand)
Calibration Details	Buffered known occurrences by five miles. Clipped veg to five-mile buffer. Selected Soils within five-mile buffer and exported. Intersected Veg, Soils, and Elevations Range. Added CritHab (Union Tool).
Name of Final Outputs generated after intersection with Baseline Areas	LompocYerbaSanta_SUITHAB_SERVICE_Area_20171121 LompocYerbaSanta_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Marcescent dudleya (*Dudleya cymosa ssp. marcescens*)	
File Name	MarcescentDudleya_final2
Date Model Last Modified	August 19, 2017
Model Input(s)	- Vegetation communities layer (Desert Scrub, Montane Chaparral) - Ecological regions layer (Santa Monica Mountains) - Hydrologic features layer (adjacent to perennial streams) - Soil data layer (Volcanic rock)
Calibration Details	Original model was not showing species range near CNDDB occurrences. The Select by Location tool was used to identify pertinent categories for veg, hydro, ecoregions to fine-tune the model. The new model now covers select drainage areas in the Santa Monica Mountains where CNDDB observations have occurred.
Name of Final Outputs generated after intersection with Baseline Areas	MarcescentDudleya_SUITHAB_SERVICE_Area_20171121 MarcescentDudleya_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Morro manzanita (*Arctostaphylos morroensis*)	
File Name	MorroManzanita_final3
Date Model Last Modified	September 7, 2017
Model Input(s)	- Vegetation communities layer (Coastal Oak Woodland, Coastal Scrub, Manzanita Chaparral, Mixed Chaparral, Soft Scrub-Chaparral) - Elevation/DEM data (5-205m) - Soil data layer (sand; fine sand)
Calibration Details	Veg (excluding Urban) and soils intersecting CNDDB observations (excluded one older occurrence from 1936) were selected and then intersected. CritHab was added back into range . Urban and Urban/Developed categories included in Veg layer, due to CNDDB polys falling within those categories. CNDDB polys used to identify Soils polys that intersect CNDDB polys. Overlapping areas of Soils and Veg selected.
Name of Final Outputs generated after	MorroManzanita_SUITHAB_SERVICE_Area_20171121 MorroManzanita__SUITHAB_OUTSIDE_Area_20171127

Morro manzanita (*Arctostaphylos morroensis*)	
intersection with Baseline Areas	
Dates of Final Outputs	November 21, 2017 November 27, 2017

Nevin's barberry (*Berberis nevinii*)	
File Name	NevinsBarberry_final2
Date Model Last Modified	August 24, 2017
Model Input(s)	Vegetation communities layer (Alpine-Dwarf Shrub, Coastal Oak Woodland, Desert Scrub, Rabbitbrush, Scrub Oak) - Ecological Regions layer (San Gabriel Mountains) - Elevation/DEM data (984-2,162 ft) - Soil data layer (alluvium derived from metavolcanics and/or sedimentary rock) - Hydrologic features layer (low-gradient washes/ gravelly wash margins)
Calibration Details	Soils and Ecoregion datasets were creating an empty dataset after intersect, so they were excluded from the model. Large datasets were causing slow processing times, so intersect datasets were clipped to LA and San Bernardino counties. Intersect was based on aspect, elevation, hydrology, slope, and vegetation. Data was then unioned with CNDDB and FWS observations Used Select by Location tool to ID ecoregions intersecting with CMNDD/FWS, same method used for Soils and Veg. Elevation and new veg\soils\ecoregions intersected for final result.
Name of Final Outputs generated after intersection with Baseline Areas	NevinsBarberry_SUITHAB_SERVICE_Area_20171121 NevinsBarberry_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Nipomo Mesa lupine (*Lupinus nipomensis*)	
File Name	NipomoMesaLupine_final2
Date Model Last Modified	August 19, 2017
Model Input(s)	- Vegetation communities layer (Annual Grassland, Coastal Scrub) - Elevation/DEM data (10-50 m) - Hydrologic Features layer (perennial streams) - Canopy Density/FRAP data (low) - Soil data layer (sand; fine sand)
Calibration Details	CNDDB observations occur in a specific area near Nipomo and model showed a much larger area. Added Ecoregion to limit results, removed FRAP from the model (restricting model too much), and did a Select by Location with CNDDB and veg to limit results. Veg is based on raster data in this area, so range is pixelated, so the Smooth Polygon tool was used to round out results.
Name of Final Outputs generated after intersection with Baseline Areas	NipomoMesaLupine_SUITHAB_SERVICE_Area_20171121 NipomoMesaLupine_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Pismo clarkia (*Clarkia speciosa ssp. immaculata*)	
File Name	PismoClarkia_final3
Date Model Last Modified	September 7, 2017
Model Input(s)	- Vegetation communities layer (Annual Grass/Forbs, Annual Grassland, Coastal Oak Woodland, Coastal Scrub, Manzanita Chaparral, Mixed Chaparral) - Elevation/DEM data (25-185 m) - Canopy Density/FRAP data (low-moderate cover) - Soil data layer (sand; fine sand)
Calibration Details	FRAP was excluded because the results were pixelated and noisy instead of a continuous range. Elevation was excluded because CNDDB observation occurred outside of elevation range. Veg and soils were selected that intersected CNDDB (extirpated polygons excluded) and overlapping veg and soils were exported. The result was pixelated with jagged edges due to veg being based on raster data in this area. The final polygons were smoothed (Smooth Polygon Tool) with a tolerance of 200 meters, which matches the pixel size of the original veg data. Ran buffer on CNDDB polys, including "Possibly Extirpated" to include No. 25 CNDDB poly. "Extirpated" was excluded. Used the original Veg categories, and selected Soil categories that intersect with CNDDB polygons. Selected overlapping areas of Soils and Veg,and clipped to the five-mile CNDDB buffer. The result was pixelated with jagged edges due to veg being based on raster data in this area. The final polygons were smoothed with a tolerance of 200 meters, which matches the pixel size of the original veg data.
Name of Final Outputs generated after intersection with Baseline Areas	PismoClarkia_SUITHAB_SERVICE_Area_20171121 PismoClarkia_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Santa Ana River woollystar (*Eriastrum densifolium ssp. sanctorum*)	
File Name	SantaAnaRiverWoollystar_final3
Date Model Last Modified	September 8, 2017
Model Input(s)	- Vegetation communities layer (Scalebroom, California juniper, and desert wash) - Ecological Regions layer (San Gabriel Mountains, San Gorgonio Mountains) - Watershed layer (only found in San Bernardino County in Plan Area. Limit to Santa Ana River, Mill Creek, City Creek, Cajon Creek, and Lytle Creek.) - Elevation/DEM data (500-2,000) - Slope/DEM data (<5%) - Soil data layer (sandy soils of river flood plains/ terraced alluvial deposits) - Hydrologic features layer (Santa Ana River drainage-flood plains Zone A FEMA flood zones for San Bernardino County)
Calibration Details	Soils problem, veg problem, use watersheds rather than ecoregion, Excluded Slope and Elevation because the range was already limited by flood zones, veg and watershed. Calculated Watershed to include Lytle Creek, Middle Santa Ana River, San Timoteo Wash, Upper Santa Ana River based on Select by Location with CNDDB and FWS observations. Veg limited to Scalebroom, California juniper, and desert wash per specialist's comments.

Santa Ana River woollystar (*Eriastrum densifolium ssp. sanctorum*)	
	Added CNDDB polygons to species range.
Name of Final Outputs generated after intersection with Baseline Areas	SantaAnaRiverWoollystar_SUITHAB_SERVICE_Area_20171121 SantaAnaRiverWoollystar_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Santa Monica Mountains dudleya (*Dudleya cymosa ssp. ovatifolia*)	
File Name	SantaMonicaMtnsDudleya_final2
Date Model Last Modified	August 20, 2017
Model Input(s)	- Vegetation communities layer (Coastal sage, Montane Chaparral, Desert Scrub) - Ecological regions layer (Santa Monica Mountains) - Elevation/DEM data (500-5,500 ft) - Slope/DEM data (south-facing slope) - Soil data (conglomerates of sedimentary rock) - Hydrologic features layer (drainages (100ft buffer))
Calibration Details	Suspected problem in Vegetation selection (Desert scrub(?) and Montane Chaparral), and also soils. Soils/veg associated with CNDDB observations have been attached. Update with more manageable hydro selection. Veg selection made using list from occurrences, Soil selection using soils from occurrences containing "sandstone" occurring within Santa Monica Mountains ecoregion, 100ft buffer of hydro clipped to Santa Monica Mountains ecoregion. Used Select by Location to ID veg communities intersecting with CNDDB polys, used same method with soils, then intersected veg, soils, and ecoregion for final species range.
Name of Final Outputs generated after intersection with Baseline Areas	SantaMonicaMtnsDudleya_SUITHAB_SERVICE_Area_20171121 SantaMonicaMtnsDudleya_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Ventura Marsh milk-vetch (*Astragalus pycnostachyus var. lanosissimus*)	
File Name	VenturaMarshMilkVetch_final2
Date Model Last Modified	August 19, 2017
Model Input(s)	- Vegetation communities layer (Occurs almost always under natural conditions in wetlands) - Elevation/DEM data (approx. 10 meters (30 ft); low-elevation coastal dune-wale areas where freshwater levels are high enough to reach the roots) - Soil data layer (saturated soils) - Hydrologic features layer (Coastal Salt Marsh, wetland-riparian) - Ecological regions layer (salt-marsh, coastal. Mandalay State Beach, located at the northwest intersection of Harbor Boulevard and West 5th Street in Oxnard; McGrath State Beach in Oxnard; and Ormond Beach, between Port Hueneme and Point Mugu)
Calibration Details	Trimmed Ecoregions to four areas where CNDDB and CritHab occur. Ran a Select by Location for veg and soils that intersect with CNDDB to create new soils and veg layers. Urban veg community was excluded. Intersect tool used

Ventura Marsh milk-vetch (*Astragalus pycnostachyus var. lanosissimus*)	
	to find overlap of new Ecoregions, veg, and soils, result was unioned with CritHab to ensure that critical habitat would be included in the species range.
Name of Final Outputs generated after intersection with Baseline Areas	VenturaMarsMilkVetch_SUITHAB_SERVICE_Area_20171121 VenturaMarshMilkVetch_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Verity's dudleya (*Dudleya verityi*)	
File Name	VeritysDudleya_final2
Date Model Last Modified	August 30, 2017
Model Input(s)	- Vegetation communities layer (Foothill Woodland, Coastal Sage Scrub, Soft Scrub-Chaparral) - Ecological regions layer (Los Angeles Plain, Santa Monica Mountains, Santa Ynez Valleys and Hills, Santa Ynez-Sulphur Mountains, Simi Valley-Santa Susana Mountains) - Soil data layer (volcanic outcrops)
Calibration Details	Original modeled areas not showing up in areas of CNDDB occurrences, in particular ecoregions. Select by Location used to locate veg communities and ecoregions where CNDDB observations occurred. Urban areas excluded from veg.
Name of Final Outputs generated after intersection with Baseline Areas	VeritysDudley_SUITHAB_SERVICE_Area_20171121 VeritysDudleya_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Model Version: Expert Modeling

Arroyo Toad (*Bufo californicus*)	
File Name	ArroyoToad_final2
Date Model Last Modified	August 24, 2017
Model Input(s)	- Vegetation communities layer (annual grass/forbs, annual grassland, baccharis (riparian), desert riparian, desert wash, Fremont cottonwood, Mixed Riparian Hardwoods, montane riparian, riparian forest, riparian scrub, stream and river, valley foothill riparian, water, willow) - Ecological regions layer (South Costal Santa Lucia Range, Santa Ynez Valleys and Hills, Interior Santa Lucia Range, Northern Transverse Ranges, San Rafael-Topatopa Mountains, Santa Ynez-Sulphur Mountains, Northern Transverse Ranges, San Rafael-Topatopa Mountains, Sierra Pelona-Mint Canyon) - Elevation/DEM data (0-4,600 ft) - Soil layer (Coarse sand, instream) - Hydrological features layer (Intermittent Streams at least 3rd order) - Watersheds layer (Santa Maria, Santa Ynez, Santa Clara, Los Angeles, Santa Ana)

Arroyo Toad *(Bufo californicus)*	
Calibration Details	NHD Flowlines: Perennial and Intermittent streams, buffered by 1km and clipped to WBDHU10_10mileBndryClip: Name IN('Santa Maria River' , 'Upper Santa Clara River', 'Upper Santa Ana River', 'Lower Santa Clara River' , 'Lower Santa Ana River', 'Lower Los Angeles River', 'Upper Los Angeles River', 'Zaca Creek-Santa Ynez River', 'Redrock Canyon-Santa Ynez River', 'Salsipuedes Creek-Santa Ynez River', 'Middle Santa Ana River', 'Middle Santa Clara River', 'Headwaters Santa Ynez River', 'Headwaters Santa Clara River', 'Headwaters Santa Ana River', 'Alamo Pintado Creek-Santa Ynez River') Selected Watersheds that intersect with CritHab. Selected NHD stream lines (excluding ephemeral) that intersect with CritHab and buffer by 1 km. Clipped results to watersheds. Unioned CritHab with results.
Name of Final Outputs generated after intersection with Baseline Areas	ArroyoToad_SUITHAB_SERVICE_Area_20171121 ArroyoToad_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

California red-legged frog (*Rana aurora draytonii*)	
File Name	CalifRedLeggedFrog_final8
Date Model Last Modified	November 2017
Model Input(s)	- Vegetation communities layer (Fremont Cottonwood, Montane Riparian, Riparian Forest, Riparian Scrub, Stream and River, Valley Foothill Riparian, Wet Meadow, Willow) - Ecological regions layer (Northern Transverse Ranges, Sierra Pelona-Mint Canyon, Fontana Plain-Calimesa Terraces, Little San Bernardino-Bighorn Mountains, Perris Valley and Hills, San Gabriel Mountains, San Gorgonio Mountains, Santa Ana Mountains, Upper San Gabriel Mountains, Upper San Gorgonio Mountains, Santa Maria Valley, South Costal Santa Lucia Range, Caliente Range-Cuyama Valley, Eastern Hills, Gabilan Range, Interior Santa Lucia Range, Paso Robles Hills and Valleys, Santa Ynez Valleys and Hills, Santa Ynez-Sulphur Mountains, Caliente Range-Cuyama Valley, Interior Santa Lucia Range, San Rafael-Topatopa Mountains, Oxnard Plain-Santa Paula Valley, Santa Monica Mountains, Santa Ynez-Sulphur Mountains, Simi Valley-Santa Susana Mountains) - Elevation/DEM data (0-5,200 ft) - Hydrologic features layer (Perennial streams (buffered by 1 mile)) - Watershed layer (San Francisquito (Los Angeles County)
Calibration Details	NHD Streams Selected for Stream/River, Perennial, and Intermittent. Additional streams identified by USFWS added. All streams within designated CH added. All NHD Waterbodies identified as Lake/Pond - Perennial added. All Lake/Pond features within CH added. NHD selections for streams and waterbodies buffered by 100m (breeding habitat) and 2800m (dispersal habitat). Any areas of designated CH not covered included as Dispersal habitat. USFWS and CNDDB occurrences outside of resulting buffer identified, and used to select additional drainages for inclusion. New drainages buffered by 100m and 2800m.
Name of Final Outputs generated after intersection with Baseline Areas	CalifRedLeggedFrog_SUITHAB_SERVICE_Area_20180110 CalifRedLeggedFrog_SUITHAB_OUTSIDE_Area_final8_20180111
Dates of Final Outputs	January 10, 2018

California red-legged frog (*Rana aurora draytonii*)	
	January 11, 2018

California tiger salamander (*Ambystoma californiense*)	
File Name	CalifTigerSalamander_final2
Date Model Last Modified	August 29, 2017
Model Input(s)	- Ecological regions layer (Santa Maria Valley, South Costal Santa Lucia Range, Santa Ynez Valleys and Hills, Interior Santa Lucia Range, Caliente Range-Cuyama Valley, Eastern Hills, Gabilan Range, Paso Robles Hills and Valleys) - Elevation/DEM data (0-1,500 ft) - Hydrologic features layer (Seasonal Pools) - Watershed layer (Specific breeding pools as shown in Recovery Plan)
Calibration Details	Breeding Pools buffered by 2km, and then CritHab added.Urban and Urban/Developed areas erased from species range.
Name of Final Outputs generated after intersection with Baseline Areas	CalifTigerSalamander_SUITHAB_SERVICE_Area_20171121 CalifTigerSalamander_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

Least Bell's vireo (*Vireo bellii pusillus*)	
File Name	LBV_final3
Date Model Last Modified	September 12, 2017
Model Input(s)	- Vegetation communities layer (Chamise, Coastal Oak Woodland, Coastal Scrub, Manzanita Chaparral, Mixed Chaparral, Soft Scrub-Chaparral, Valley Foothill Riparian, Willow) - Ecological regions layer (High Desert Plains and Hills, Los Angeles Plain, Santa Monica Mountains, Simi Valley-Santa Susana Mountains, Fontana Plain-Calimesa Terraces, San Gabriel Mountains, Santa Ana Mountains, Sierra Pelona-Mint Canyon, Perris Valley and Hills, San Gorgonio Mountains, Santa Maria Valley, Santa Ynez Valleys and Hills, Oxnard Plain-Santa Paula Valley) - Elevation/DEM data (0-4,100 ft) - Slope/DEM data (<10%)
Calibration Details	CNDDB not covered by original Ecoregions, a few more Ecoregions added with Select by Location tool (see LBV_eco2). Veg communities adjust per MTR's notes (BESTAVAI_1 IN ('Baccharis (riparian)', 'Fremont Cottonwood', 'Mixed Riparian Hardwoods', 'Montane Riparian', 'Riparian Forest - detailed', 'Riparian Scrub - detailed', 'Valley Foothill Riparian')). Changed Elevation per MTR's suggestion to 4,100 feet. Slope excluded from model. Intersect included new Ecoregion, new Elevation, and new Veg. Intersected result was unioned with CritHab. Created 100 ft buffer of CNDDB Centroids, merged with CNDDB polygons that were not based on a radius. Veg and Elevation intersected (Ecoregion excluded). Buffered result by 100 feet. Added CNDDB, FWS, and Crithab. Very large dataset. After review by specialist, LBVI species range from last round is underpredicting. Added additional area by merging Southwestern Willow Flycatcher CritHab (as these areas represent suitable LBVI area as well), NWI Wetlands category Forested/Shrub Wetland, and NWI Riparian category Forested/Shrub Riparian. The result was then clipped to the Elevation polygon (< 4,100ft.) and added to the final2 species range.

Least Bell's vireo (*Vireo bellii pusillus*)	
	Clipped results to Ecoregions within a 5-mile buffer of CNDDB, FWS, and CritHab per conversation with MTR.
Name of Final Outputs generated after intersection with Baseline Areas	LBV_SUITHAB_SERVICE_Area_20171121 LBV_SUITHAB_OUTSIDE_Area_20171122
Dates of Final Outputs	November 21, 2017 November 22, 2017

Santa Ana sucker (*Catostomus santaanae*)	
File Name	SantaAnaSucker_final3_20180129
Date Model Last Modified	January 29, 2018
Source/Link:	USGS (NHD flowlines)
Model Input(s)	- Vegetation communities layer (Water) - Hydrologic features layer (Santa Ana River, San Gabriel River, Big Tujunga Creek)
Calibration Details	Combination of: 1. 25-foot buffer on NHD Flowlines within critical habitat. 2. Selected NHD waterbodies and areas. 3. NHD Areas within critical habitat. 4. CNDDB occurrences. Original model very close to suggested areas in Comments from Sapphos. Clipped the output to Ventura, Los Angeles, and Ventura Counties..
Name of Final Outputs generated after intersection with Baseline Areas	SantaAnaSucker_SUITHAB_SERVICE_Area_20180129 SantaAnaSucker_SUITHAB_OUTSIDE_Area_20180129
Dates of Final Outputs	January 29, 2018 January 29, 2018

Western pond turtle (*Actinemys marmorata pallida*)	
File Name	WesternPondTurtle_final5
Date Model Last Modified	September 18, 2017
Model Input(s)	- Vegetation communities layer (Barren/Rock, Estuarine, Freshwater Emergent Wetland, Lakes and Ponds, Montane Riparian, Riparian Forest, Riparian Scrub, Stream and River, Valley Foothill Riparian, Water) - Ecological regions layer (Los Angeles Plain, Santa Monica Mountains, San Gabriel Mountains) - Elevation/DEM data (4,690 ft) - Soil data layer (muddy, sandy banks) - Hydrologic features layer (Water bodies, lakes, streams, rivers, freshwater riparian areas, river tributaries)
Calibration Details	NHD Perennial, all waterbodies, NWI Lake, Freshwater Pond, Riverine NHD = FCode = 46006 Buffered 3 meters, NWI = WETLAND_TY IN ('Freshwater Pond' , 'Lake' , 'Riverine') Ecoregions removed from model, as this was limiting the range. Buffered NHDFlowlines by 100 meters. Buffered NHD Waterbodies by 100 meters. Queried NWI to include ponds, lakes, rivers: WETLAND_TY IN ('Freshwater Pond' , 'Lake' , 'Riverine'). Buffered this result by 100 meters. Combined the buffered NHDFlowlines, NHD Waterbodies, and NWI (Merge Tool). Selected bodies of water that intersect known occurrences. Buffered known occurrences by 5 miles, and clipped Hydro features to 5-mile buffer.

Western pond turtle (*Actinemys marmorata pallida*)	
	NHD Flowlines queried by named streams and buffered by 100 meters. Selected buffered flowlines that intersect with CNDDB occurrences. Queried NWI to include ponds, lakes, rivers: WETLAND_TY IN ('Freshwater Pond', 'Lake', 'Riverine'). Buffered this result by 100 meters. Using example of Carneros Lake, the "perennial" bodies of water were excluded from NHD Waterbodies dataset. The remaining NHD waterbodies which intersected with CNDDB occurrences were buffered by 100 meters. NHD Flowlines, NWI Wetlands, and NHD Waterbodies were merged. Urban, Urban/Developed, and Agriculture from Veg were excluded (Erase Tool). Urban, Urban/Developed, and Agriculture were all added back based on specialist feedback. Andrea Clark Bird Refuge and 79 other bodies of water added into the model from NHD Waterbodies, by querying Perennial Lakes and Ponds bigger than 75,000 square feet (Shape_Area > 75000 AND FCode = 39004). This excluded many small speckles of perennial waters but included larger lakes and ponds including the Andrea Clark Bird Refuge. Laguna Channel and Mission Lagoon in the center of the City of Santa Barbara did not appear as a polygon in any of our hydrology datasets (NHD Flowlines, NWI Wetlands, and NHD Waterbodies), so they have not been added to the model. Same methodology for hydrology was used in this round. The queried NHD Waterbodies dataset was merged with the hydrology for final result.
Name of Final Outputs generated after intersection with Baseline Areas	WesternPondTurtle_SUITHAB_SERVICE_Area_20171121 WesternPondTurtle_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Fully Protected Species

A PSDM for Fully Protected Species[548] was created for range modeling purposes only and did not require further analysis.

Model Version: Matrix Modeling

Unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*)	
File Name	UnarmoredThreespineStickleback_CDWR_final2
Date Model Last Modified	September 14, 2017
Model Input(s)	- Vegetation communities layer (Water) - Hydrologic features layer (Santa Ana River, San Gabriel watershed, Big Tujunga Creek)
Calibration Details	Combination of: 1. CNDDB occurrences 2. 25-foot buffer on selected NHD flowlines. 3. Selected NHD waterbodies and areas Used the CDWR Range. NHD Named streams + SG Watershed GNIS_Name IN ('Big Tujunga Creek', 'Santa Ana River') Buffered 5 meters, merged with SG watershed

[548] SoCalGas has defined avoidance measures for Fully Protected species; an effects analysis calculating the basis of take is irrelevant.

Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*)	
File Name	MorroBayKangarooRat_final
Date Model Last Modified	September 14, 2017
Model Input(s)	- Vegetation communities layer - Soil data layer
Calibration Details	Localized to Morro Bay. Selected Veg (excluding "Urban") and Soils that intersect CNDDB occurrences (excluding "Extirpated"). Then overlapping areas of Soils and Veg were selected.
Name of Final Outputs generated after intersection with Baseline Areas	MorroBayKangarooRat_SUITHAB_SERVICE_Area_20171121 MorroBayKangarooRat_SUITHAB_OUTSIDE_Area_20171127
Dates of Final Outputs	November 21, 2017 November 27, 2017

Model Version: Range Refinement of Matrix Modeling based on CWHR

American peregrine falcon *(Falco peregrinus anatum)*	
California condor *(Gymnogyps californianus)*	
California least tern *(Sterna antillarum browni)*	
Golden Eagle (*Aquila chrysaetos)*	
White-tailed kite (*Elanus leucurus)*	
Source/Link:	Data.gov
Model Input(s)	CDWR Range layer clipped to the CRCP boundary layer
Calibration Details	Using the CDWR Range as downloaded from Data.gov clipped to CRCP Boundary.

III. Additional Resource Data

Chapter 4 of the MSHCP contains a series of map figures that detail environmental setting characteristics in the CRCP Plan Area.

Chapter 4.0 Figures

Figure 4.1.1-1 Precipitation

Precipitation (1 Feature Class)	
Description:	30-Year Normal Annual precipitation covering the period 1981-2010 in the plan area
Source:	PRISM Climate Group
Format:	One (1) Raster layer
Date Retrieved	July 2017
Date Last Modified and Quality Checks:	July 19, 2017 – raster dataset extracted by the CRCP plan area boundary
Source Link:	http://prism.oregonstate.edu/normals/

Figure 4.1.1-2 Temperature

Temperature (1 Feature Class)	
Description:	30-Year Normal Maximum Annual temperature covering the period 1981-2010 in the plan area
Source:	PRISM Climate Group
Format:	One (1) Raster layer
Date Retrieved	July 2017
Date Last Modified and Quality Checks:	July 19, 2017 – raster dataset extracted by the CRCP plan area boundary
Source Link:	http://prism.oregonstate.edu/normals/

Figure 4.1.2.1-1 CRCP Geology

Geology (1 Feature Class)	
Description:	Geologic rock type layer
Source:	U.S. Geological Survey, California Geological Survey
Format:	One (1) Vector layer
Date Retrieved	May 31, 2017
Date Last Modified and Quality Checks:	July 10, 2017
Source Link:	https://mrdata.usgs.gov/geology/state/state.php?state=CA

Figure 4.1.2.1-2 Elevation Range

Elevation (1 Feature Class)	
Description:	Digital elevation model (DEM) extracted by the CRCP Plan Area layer
Source:	U.S. Geological Survey
Format:	One (1) Raster layer
Date Retrieved	July 19, 2017
Date Last Modified and Quality Checks:	July 19, 2017
Source Link:	https://earthexplorer.usgs.gov/

Figure 4.1.2.3-1 General Soil Types

Soil (1 Feature Class)	
Description:	Generalized layer of soil data in the CRCP Plan Area
Source:	NRCS SSURGO
Format:	One (1) Vector layer
Date Retrieved	April 10, 2017
Date Last Modified and Quality Checks:	July 19, 2017
Source Link:	https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_053627

Figure 4.1.3-1 Regional Water Quality Control Boards

(1 Feature Class)	
Description:	Boundaries of the Regional Water Quality Control Boards in California
Source:	Regional Water Quality Control Board
Format:	One (1) Vector layer
Date Retrieved	2017
Date Last Modified and Quality Checks:	July 19, 2017
Source Link:	https://www.waterboards.ca.gov/data_maps/index.html

Figure 4.1.3-2 Hydrologic Regions

Hydrologic Regions (1 Feature Class)	
Description:	Boundaries of Hydrologic Regions in California
Source:	California Department of Water Resources
Format:	One (1) Vector layer
Date Retrieved	July 19, 2017
Date Last Modified and Quality Checks:	July 19, 2017
Source Link:	https://gis.water.ca.gov/app/boundaries/

Figure 4.1.3-3 Watersheds, Lakes and Reservoirs

Watershed Boundaries (1 Feature Class)	
Description:	Layer of watershed boundaries in the CRCP Plan Area that is based on USGS Hydrologic Units
Source:	USGS Geographic Information Retrieval and Analysis System (GIRAS), USGS National Hydrography Dataset (NHD)
Format:	One (1) Vector layer
Date Retrieved	July 17, 2014
Date Last Modified and Quality Checks:	July 19, 2017
Source Link:	https://nhd.usgs.gov/

Lakes and reservoirs (1 Feature Class)	
Description:	Layer of lakes and reservoirs in the CRCP Plan Area that is based on USGS National Hydrography Dataset (NHD)
Source:	USGS Geographic Information Retrieval and Analysis System (GIRAS), USGS National Hydrography Dataset (NHD)
Format:	One (1) Vector layer
Date Retrieved	February 10, 2017
Date Last Modified and Quality Checks:	July 19, 2017
Source Link:	https://nhd.usgs.gov/

Figure 4.1.3-4 Groundwater Basins

Groundwater Basins (1 Feature Class)	
Description:	Groundwater Basin Boundaries layer in CRCP Plan Area
Source:	California Department of Water Resources
Format:	One (1) Vector layer
Date Retrieved	February 10, 2017
Date Last Modified and Quality Checks:	July 19, 2017
Source Link:	https://gis.water.ca.gov/app/bbat/

Figure 4.1.3.5-1 100-year Flood Plains

100-year Flood Plains (1 Feature Class)	
Description:	100-year Flood Plain Boundaries layer in CRCP Plan Area
Source:	Federal Emergency Management Agency (FEMA)
Format:	One (1) Vector layer
Date Retrieved	February 10, 2017
Date Last Modified and Quality Checks:	July 19, 2017
Source Link:	https://www.fema.gov/faq-details/GIS-Data

Figure 4.1.4.2-1 Streams and Impaired Water Bodies

Streams and Rivers (1 Feature Class)	
Description:	Streams and rivers (bluelines) line layer in CRCP Plan Area
Source:	USGS National Hydrography Dataset (NHD)
Format:	One (1) Vector layer
Date Retrieved	February 10, 2017
Date Last Modified and Quality Checks:	July 19, 2017
Source Link:	https://nhd.usgs.gov/

303(d) Listed Impaired Waters (1 Feature Class)	
Description:	303(d) Impaired Waters polyline layer in CRCP Plan Area
Source:	Environmental Protection Agency (EPA)
Format:	One (1) Vector layer
Date Retrieved	June 21, 2017
Date Last Modified and Quality Checks:	July 19, 2017
Source Link:	https://www.epa.gov/waterdata/waters-geospatial-data-downloads#303dListedImpairedWaters

Figure 4.1.5-1 CRCP Plan Area Land Cover by County

Land Use/ Cover (1 Feature Class)	
Description:	The Land Use/Cover type data was developed by using 2002 Fire and Resource Assessment Program (FRAP) land cover data as an initial base and updated using data from 2016 Urbanized Areas Boundaries, 2016 Farmland Mapping and Monitoring Program (FMMP), various CDFW datasets containing significant ecological features, and ESRI geospatial roads data. Thorough research was performed on types of roadways and their corresponding lane widths based on Caltrans Highway Performance Monitoring System (HPMS) and U.S. Department of Transportation Federal Highway Administration data. Roadway features were classified as urban, whereas the agriculture and ecological features were classified as open space.
Source:	Various publicly-sourced datasets, refer to Appendix D, Table D-2, *Data Sources Used to Characterize Plan Area Baseline Conditions,* for list of sources.
Format:	(1) Vector GIS Shapefile; polygon.
Date Retrieved	Various publicly-sourced datasets, refer to Appendix D refer to Appendix D, Table D-2, *Data Sources Used to Characterize Plan Area Baseline Conditions,* for upload dates.
Date Last Modified and Quality Checks:	November 8, 2017 (FINAL_Baseline_Landcover_in_CRCP_Area_20171108)
Source Link:	Not available per SoCalGas discretion.

Figure 4.1.5-2 CRCP Plan Area Land Ownership by County

Land ownership (1 Feature Class)	
Description:	California land ownership polygon layer in CRCP Plan Area
Source:	California Fire and Resource Assessment Program (FRAP)
Format:	One (1) Vector layer
Date Retrieved	February 10, 2017
Date Last Modified and Quality Checks:	July 27, 2017
Source Link:	http://frap.fire.ca.gov/data/frapgisdata-sw-ownership13_2_download

Figure 4.1.5-3 CRCP Coastal Zone Area by County

Coastal zone (1 Feature Class)	
Description:	Coastal zone polygon layer in CRCP Plan Area
Source:	California Coastal Commission
Format:	One (1) Vector layer
Date Retrieved	February 10, 2017
Date Last Modified and Quality Checks:	July 27, 2017
Source Link:	https://gis.cnra.ca.gov/arcgis/rest/services/Boundaries/Coastal_Conservancy/MapServer/

Appendix B
SPECIES ACCOUNTS AND RANGE MAPS

Wildlife Species

Invertebrates

Delhi Sands Flower-Loving Fly (*Rhaphiomidas terminatus abdominalis*)
Status: Federal Endangered

General Biology

DSFF is a large fly in the family Mydidae with a tubular tongue for drinking nectar from flowers. Adults can grow to a length of one inch, with a long orange and brown abdomen, large compound eyes, and orange legs. Adults begin flying as early as July, but can be observed until late September in the heat of the day. Larvae hatch in fine sandy soils and remain underground until the flight season (USFWS 2008).

Critical Habitat and Recovery Plans

No critical habitat has been designated for the species. A recovery plan has been prepared (USFWS 1997) and since amended (USFWS 2019), which describes three recovery units: Jurupa Recovery Unit, Colton Recovery Unit, and Ontario Recovery Unit. The Ontario Recovery Unit is not expected to sustain the species over the long term (USFWS 2008).

Distribution

DSFF is only known from Riverside and San Bernardino Counties where the Colton Dune system occurs. As of 2008, USFWS estimates that approximately 2,826 acres of potential DSFF habitat remains, with approximately 900 acres known to be occupied across 12 sites within the three recovery units.

Habitat

DSFF occurs in areas that contain suitable soil conditions for the subterranean larval stages; adult nectar sources; and adult feeding, breeding, and perching areas. Suitable habitat for DSFF contains soils mapped by the USDA as the "Delhi" series, which are characterized by loose, open, sandy soils that are subject to Aeolian influence (USFWS 1997). Occupied habitat tends to have sparse cover of perennial shrubs and other vegetation, usually in the range of 10 to 20 percent but sometimes approaching 50 percent. Three native plant species are primarily associated with occupied sites: buckwheat (*Eriogonum fasciculatum*), telegraph weed (*Heterotheca grandiflora*), and croton (*Croton californicus*) (USFWS 1997). However, DSFF can be tolerant of disturbances due to previous land uses, such as abandoned vineyards or grazing lands (USFWS 2008).

Oviposition occurs in the late summer months, and may be more common in close proximity to telegraph weed and/or native ant nests. Little is known about the larval phase of the fly because development occurs completely underground. However, based on observations of similar species,

they may be more commonly found within relatively moist soils located several feet below the surface where they are opportunistic subterranean predators. In addition, it is believed that the underground larval/pupal stage may persist for several years, depending upon various environmental factors such as annual rainfall, food availability, and weather conditions during the flight season. DSFF emerge as adults from July through September during their flight season when they extract nectar from flowering shrubs and forbs.

Protocol-level surveys to determine presence/absence of DSFF have been developed and are currently accepted by USFWS. The survey methodology is described in the Interim General Survey Guidelines for the DSFF (USFWS 1996).

Threats

The primary threats to the species have been identified as loss of habitat and fragmentation of the remaining habitat. At the time of listing, it was estimated that 97 percent of the original Colton Dunes area had been developed, with much of the remaining habitat in degraded condition. The remaining patches are not well connected, making dispersal difficult in many cases (USFWS 2008).

Literature Cited:

U.S. Fish and Wildlife Service. 1996. Interim General Survey Guidelines for the Delhi Sands Flower-Loving Fly. Available at: https://www.fws.gov/carlsbad/TEspecies/Recovery/SurveyMontInfo/DSFLF/Survey%20Guidelines%20Dec_30_1996.pdf

U.S. Fish and Wildlife Service. 1997. Delhi Sands Flower-Loving Fly (*Rhaphiomidas terminatus abdominalis*) Recovery Plan.

U.S. Fish and Wildlife Service. 2008. Delhi Sands Flower Loving Fly (*Rhaphiomidas terminatus abdominalis*) 5-Year Review—Summary and Evaluation. Available at: http://ecos.fws.gov/docs/five_year_review/doc1898.pdf. Accessed 21 December 2015.

U.S. Fish and Wildlife Service. 2019. Delhi Sands Flower Loving Fly (*Rhaphiomidas terminatus abdominalis*) Recovery Plan Amendment. Available at: https://ecos.fws.gov/docs/recovery_plan/Amendment%20for%20DSFF.pdf

El Segundo Blue Butterfly (*Euphilotes battoides allyni*)
Status: Federal Endangered, State Species of Special Concern

General Biology

ESBB is in the Lycaenidae family. ESBB undergoes complete metamorphosis (egg, larva, pupa, and adult). The lifespan of this animal is about one year. Some pupae may remain in diapause for two or more years. The adults are active from mid-June to early September, the exact timing depending on the weather. The onset of flight is closely synchronized to the beginning of the flowering cycle of coast buckwheat, the food plant (Pratt and Ballmer 1993).

Upon emerging from their pupae, the females fly to the flower heads of the food plant where they mate with males that constantly move from flowerhead to flowerhead. The females then immediately begin laying eggs. Laboratory data indicate females produce 15 to 20 eggs per day, but must

continuously feed on nectar and pollen to maintain egg production (Mattoni 1992). Eggs hatch within three to five days.

The larvae undergo four instars before they pupate, a process that takes 18 to 25 days. The larvae maintain a symbiotic relationship with ants. The larvae are tended by various species of ants that may protect the caterpillars from parasites and/or small predators. Mature larvae vary in color from almost pure white or pure dull yellow to a dull red-to-maroon background with yellow or white dashes or chevrons. Larvae remain concealed within the flowerhead when feeding, their color pattern allowing them to remain concealed. One larva requires two to three flowerheads (400 to 500 flowers) to complete development. By late September, the flowerheads have generally senesced, and the larvae have pupated underground or in the leaf litter at the base of the food plants. The egg population of ESBB is chiefly regulated by a parasitic wasp (*Trichogramma* near *minutum*).

Adult ESBB are sedentary animals that spend the bulk of their time perching and searching for mating opportunities (males) and ovipositing and feeding (females). According to Arnold (1986), a few individuals moved distances equivalent to the farthest reaches of the habitat. These data indicate dispersal and/or distant food plant locating ability across distances do occur but are not common events.

Critical Habitat and Recovery Plans

Critical habitat for the species has not been designated; however, a recovery plan was established in 1998.

Distribution

Historically, ESBB resided in El Segundo sand dunes, an area that historically covered approximately 4.5 square miles, including interrupted extensions to the north into what is known as Ocean Park and to the south to Malaga Cove in Palo Verdes. ESBB is now restricted to three locations in what is left of those dunes, including the Los Angeles International Airport dunes, the Chevron refinery dunes, and Malaga Cove (Arnold 1983; Orsak 1977). Current distribution for ESBB has been restricted to eight sites within these three distinct locations: two sites at the Los Angeles International Airport location, two sites at the Chevron Preserve, and four sites near or north of Malaga Cove (USFWS 2008). These areas consist of approximately 220 acres of occupied habitat.

ESBB has been reported to occur in the Palos Verdes Peninsula in Los Angeles County and Vandenberg Air Force Base in Santa Barbara County; however, it is not clear if these occurrences are ESBB or morphological similar species. Based on surveys conducted in 2007 at Vandenberg Air Force Base, approximately 17,470 acres of potentially ESBB occupied habitat were recorded (U.S. Department of Defense 2007).

The population seems relatively stable, but the limited number of host plants means that the butterfly population can never increase substantially within this restricted range (USFWS 1998).

Habitat

ESBB is only known from the El Segundo sand dunes. This habitat is a biologically sensitive and unique environment, and is inhabited by a number of plant and animal species of special concern. The El Segundo sand dunes are the largest coastal sand dune system between the mouth of the Santa Maria River in Santa Barbara County and Ensenada in Mexico. The vegetation has been defined as

the Sand verbena-beach bursage series in Sawyer and Keeler-Wolf. Native plants on the El Segundo sand dunes include coast buckwheat (*Eriogonum latifolium*), dunes golden bush (*Isocoma menziesii* var. *vernonioides*), dunes wall flower (*Erysimum insulare*), dunes sun-cup (*Camissoniopsis cheiranthifolia*), dunes burr-bush (*Ambrosia chamissonis*), and California croton (*Croton californicus*) (USFWS 1998).

ESBB has an exclusive host relationship with wild buckwheat (*Eriogonum parvifolium*), whose flowers provide a food source for the larvae and nectar for the adults. Habitat requirements for *E. parvifolium* include shifting, wind-blown sand dunes. Plants supporting the highest concentration of larvae and adult butterflies are found in swales and on wind-protected dune crests, which indicates that the slope and nature of the dunes are key environmental factors for the butterfly (USFWS 1998).

Threats

The primary threat to ESBB is habitat degradation. The Los Angeles International Airport dunes, the largest block of remaining natural habitat for the butterfly and other native species, was significantly reduced in quality and quantity between 1938 (Pierce 1939–1940) and the present day (Mattoni 1992). The habitat degradation resulted in extinction or extirpation of many native species and the invasion of the site by exotic plants and animals.

The situation with native plants is even more serious because plants are the base of most food chains and ecosystems. Of the 73 native plant species recorded on the Airport Dunes by Pierce (1939–1940) , 22 (or 30 percent) were not found during a 1989 survey (Mattoni 1990), and 19 of the 51 extant species occur as fewer than 100 individuals and face imminent loss. In addition, exotic plants including acacia (*Acacia* sp.), pampas grass (*Cortaderia selloana*), myoporum (*Myoporum* sp.), iceplant (*Carprobrotus* sp.), storksbill (*Erodium cicutarium*), and non-native grasses are also eliminating habitat for native plants, as is encroachment by common buckwheat (*Eriogonum fasciculatum*).

Collecting of a number of butterfly species that exist in small colonies, or repeated handling and marking of even widespread species (particularly of females and in years of low abundance), can seriously damage populations through loss of individuals and genetic variability (Gall 1984; Murphy 1989; Singer and Wedlake 1981). Collection of females dispersing from a colony also can reduce the probability that new colonies will be founded. Although collecting or handling generally does not adversely affect healthy, well-dispersed populations of most butterfly species, a number of rare species, such as ESBB, are vulnerable to extirpation or extinction from these activities.

Literature Cited:

Arnold, R.A. 1983. Ecological Studies of Six Endangered Butterflies (Lepidoptera: Lycaenidae); Island Biogeography, Patch Dynamics, and the Design of Habitat Preserves. Univ. California Pub. Ent. 99:1–161.

Arnold, R. A. 1986. Private and Government Funded Conservation Programs for Endangered Insects in California. Nat. Areas Jour. 5:28–39.

Gall, L. F. 1984. The Effects of Capturing and Marking on Subsequent Activity in *Boloria acrocnema* (Lepidoptera: Nymphalidae), with a Comparison of Different Numerical Models That Estimate Population Size. Biol. Cons. 28:139–54.

Mattoni, R. H. T. 1990. Unnatural Acts: Succession on the El Segundo Sand Dunes in California. Proc. Soc. Ecol. Rest. and Man. 581–93.

Mattoni, R. H. T. 1992. The Endangered El Segundo Blue Butterfly. J. Res. Lep. 29:277–304.

Murphy, D. D. 1989. Are We Studying Our Endangered Butterflies to Death? J. Res. Lep. 26:236–39.

Pratt, G. F., and G. Ballmer. 1993. Correlations of Diapause Intensity of *Euphilotes* Species and *Philotiella speciosa* (Lepidoptera: Lycaenidae) with Host Bloom Period and Elevation. Ann. Ent. Soc. 86:265–72.

Singer, M.C., and P. Wedlake. 1981. Capture does affect probability of recapture in a butterfly species. Fol. Ent. 6:215–16.

U.S. Department of Defense. 2007. Relocatable In-Flight Interceptor Communications System Data Terminal #2 at Vandenberg Air Force Base.

U.S. Fish and Wildlife Service. 1998. Recovery Plan for the El Segundo Blue Butterfly (*Euphilotes battoides allyni*).

U.S. Fish and Wildlife Service. 2008. El Segundo blue butterfly (*Euphilotes battoides allyni*) 5-Year Review—Summary and Evaluation. Available at: https://ecos.fws.gov/docs/five_year_review/doc1896.pdf. Accessed 6 September 2017.

Morro Shoulderband Snail (*Helminthoglypta walkeriana*)
Status: Federal Endangered; State Species of Special Concern

General Biology

MSS is in the Helminthoglyptidae family and was first described as *Helix walkeriana* by Hemphill (1911) based on collections made "near Morro, California."

Its shell has five to six whorls and can be distinguished from that of the Big Sur shoulderband snail (*Helminthoglypta umbilicata*), another native snail in the same area, by its more globose (globe-shaped) shell shape and presence of incised (deeply cut) spiral grooves (Roth 1985). MSS has spiral striae (longitudinal ridges) as well as transverse striae, giving it a "checkerboard" appearance. It also has raised papillae (bumps) at the intersections of some of the striae. MSS spire is low-domed, and half or more of the umbilicus (the cavity in the center of the base of a spiral shell that is surrounded by the whorls) is covered by the apertural (small opening) lip (Roth 1985). It has one narrow dark brown spiral band on the shoulder.

Sarcophagid flies (*Sarcophagidae*) have been observed to parasitize MSS. Hill (1974) and Roth (1985) suggested that immature snail death from infestations of larvae of this parasitoid fly often occurs. Seasonal drought and/or heat may contribute to the snail's egg mortality (Roth 1985). Based on shell examination, Roth (1985) also suggested that rodents may prey on the snail.

Critical Habitat and Recovery Plans

A recovery plan for this species was established in 1998. Critical habitat for MSS was most recently designated in 2001, and the designation encompasses 2,566 acres located in San Luis Obispo County, California. Critical habitat has been designated at the following locations (USFWS 2001):

- **San Luis Obispo County:**
  - **Unit 1: Morro Split and West Pecho**
    - Encompasses areas managed by Montana de Oro State Park (Dunes Natural Preserve) and the City of Morro Bay (north end of spit), including the length of the spit and the foredune areas extending south toward Hazard Canyon.
  - **Unit 2: South Los Osos**
    - Is bounded on the north and east by residential development in the community of Los Osos and agricultural fields.
  - **Unit 3: Northeast Los Osos**
    - Includes undeveloped areas between Los Osos Creek and Baywood Park and is divided by South Bay Boulevard.

Distribution

MSS is found only in western San Luis Obispo County. Around the time the snail was listed as endangered, it was known to be distributed near Morro Bay. Its currently known range includes areas south of Morro Bay, west of Los Osos Creek, and north of Hazard Canyon. Historically, the species has also been reported near the city of San Luis Obispo (type locality for "morroensis") and south of Cayucos (Roth 1985).

Habitat

MSS occurs in coastal dune and scrub communities and maritime chaparral. It is restricted to sandy soils of coastal dune and scrub communities, maritime chaparral, and grasslands and swales with shrubs that provide canopy and leaf litter (USFWS 1991, 2003). However, this species has been occasionally observed in dense veldt grass (*Ehrharta* sp.) or on ice plants (*Drosanthemum floribundum*). MSS can be found under rocks, debris piles and woody debris.

Threats

MSS is threatened by habitat destruction due to increasing development. Habitat has also been degraded due to invasion of non-native plant species (e.g., veldt grass [*Ehrharta calycina*]), structural changes to its habitat due to maturing of dune vegetation, and recreational use (e.g., heavy off-highway activity). Another possible threat to the snail include resource competition with the non-native brown garden snail; the small and isolated nature of the remaining populations; the use of pesticides (including snail and slug baits); and the introduction of non-native predatory snails, such as *Oxycheilus* sp. (USFWS 1998).

MSS have been killed as a result of controlled burning of coastal scrub. Drought and/or heat may have also contributed to egg mortality.

Literature Cited:

Hemphill, H. 1911. Descriptions of Some Varieties of Shells, with Short Notes on the Geographical Range and Means of Distribution of Land Shells. Transactions of the San Diego Society of Natural History 1:99–108.

Hill, D. L. 1974. *Helminthoglypta walkeriana*: A Rare and Endangered Land Mollusk. Unpublished senior thesis, Calif. Polytechnic State Univ., San Luis Obispo.

Roth, B. 1985. Status Survey of the Banded Dune Snail, *Helminthoglypta walkeriana*. Prepared for the U.S. Fish and Wildlife Service, Sacramento Endangered Species Office.

U.S. Fish and Wildlife Service. 1991. Endangered and Threatened Wildlife Plants; Proposed Rule for Five Plants and Morro Shoulderband Snail from Western San Luis Obispo County. Proposed Rule. Federal Register 246:66400–408.

U.S. Fish and Wildlife Service. 1998. Recovery Plan for the Morro Shoulderband Snail and Four Plants from Western San Luis Obispo County, California.

U.S. Fish and Wildlife Service. 2001. Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for the Morro Shoulderband Snail (*Helminthoglypta walkeriana*). Final Rule. Federal Register 66 (26): 9233–46.

U.S. Fish and Wildlife Service. 2003. Protocol Survey Guidelines for the Morro Shoulderband Snail (*Helminthoglypta walkeriana*).

Fish

Santa Ana Sucker (*Catostomus santaanae*)
Status: Federal Threatened; State Species of Special Concern

General Biology

SAS is in the Catostomidae family. It is a ray-finned, freshwater fish that is endemic to California. Its dorsal coloring is dark grey, while its ventral coloring is silver. The maximum length of an adult can be around 10 inches, although most adults are usually smaller in size. The diet of SAS consists of algae, detritus of shallow streams, and diatoms.

Spawning primarily occurs between mid-March to early July, with peak activity usually in April (Moyle 2002, 183). The quality of habitat and overall fish condition may determine maximum age, but it can vary among different watersheds. Further investigation of age structure is necessary to fully understand the age, growth, and size relationship of SAS across its range.

Critical Habitat and Recovery Plans

A recovery plan for this species was finalized in February 2017. Critical habitat for this species was originally established in 2004 and revised in 2010. Critical habitat is divided into three units encompassing a total 9,331 acres over four counties (Los Angeles, San Bernardino, Riverside, and Orange Counties). Approximately 45,702 acres of critical habitat lies within the Plan Area. A detailed description of the PCEs and the function of critical habitat for the species can be found within the 2010 final rule designating critical habitat (USFWS 2010, 77969).

- ***Unit 1: Santa Ana River (San Bernardino, Riverside, and Orange Counties)***
  - Consists of three subunits totaling 7,097 acres of Federal (USACE and USFS), local government, and private land.
    - *Subunit 1A: Upper Santa Ana River*
      - Is located near the Cities of Highland, Mentone, and Redlands in San Bernardino County, California. This subunit includes: 7 miles of City Creek (measured from its confluence with the Santa Ana River), 12 miles of Mill Creek (measured from its confluence with the Santa Ana River), and 10 miles of the Santa Ana River from below the Seven Oaks Dam to near Tippecanoe Avenue.
    - *Subunit 1B: Santa Ana River*
      - Is located near the Cities of Colton and Rialto in San Bernardino County and the cities of Riverside, Norco, and Corona in Riverside County, California.
    - *Subunit 1C: Lower Santa Ana River*
      - Is located near the City of Corona in Riverside County and the Cities of Anaheim and Yorba Linda in Orange County, California.
- ***Unit 2: San Gabriel River (Los Angeles County)***
  - Consists of the West, North, and East Forks of the San Gabriel River upstream of the San Gabriel Reservoir, in Los Angeles County, California. This unit includes 9.3 miles of the West Fork downstream of Cogswell Dam to the San Gabriel Reservoir, 3.2 miles of the North Fork upstream from the confluence with the West Fork, and 10.4 miles of the East Fork downstream of the Bridge-of-No-Return to the San Gabriel Reservoir.

- ***Unit 3: Big Tujunga Creek (Los Angeles County)***
    - Includes a total of 1,233 acres of land and consists of two subunits located in Los Angeles County, California.

Distribution

Information about the historical distribution of SAS within its historical range is incomplete; however, it is likely that the species' distribution within each of the watersheds varied over time, depending on habitat suitability and access (for example, physical barriers or water availability). Distribution of the species within each watershed expanded and contracted or otherwise changed seasonally, from year to year, and over short to medium timeframes (years to decades), depending on changes in local conditions based primarily on variations in water flows over those times (such as annual wet season–dry season cycles and interannual flood-drought cycles) and the associated physical changes in the riverbed (such as channel size and available substrate). This nonstatic distribution was further accentuated by the species' life history trait of "boom and bust" population fluctuations, where a population can quickly grow or crash depending on the prevailing habitat conditions. Connectivity between the main river channel (mainstem) and its tributaries probably occurred at least with some regularity if not continuously, allowing the species to move within the watersheds by vacating and recolonizing areas in response to habitat suitability.

Also historically, there may have been opportunities for SAS to move between watersheds before the rivers were channelized or otherwise altered by flood control measures. Such opportunities allowed for natural population augmentation and genetic exchange, improving genetic representation and population resiliency. However, there are no physical connections between watersheds currently. Further, because of alterations changes to the rivers (channelization, dams, and other flood control measures), future natural contact between populations at the watershed level is unlikely without reintroduction efforts from conservation groups and/or regulatory agencies.

The current range of SAS is much smaller than the historical range. Today, the continuous and permanent upstream limit of SAS movement in the Santa Ana, San Gabriel (West Fork), and Los Angeles Rivers is generally defined by artificial barriers to their movement, such as constructed dams or grade-control structures. Thus, the current range of the species in these watersheds is restricted or curtailed compared to what it was historically.

Habitat

In general, SAS prefers cool, (<86 degrees Fahrenheit), shallow, well-oxygenated streams with good water quality, moderate gradient, and velocity of approximately one foot per second, shallow depths (<3.3 feet), and streamside riparian vegetation that can provide refuge during seasonal floods and repopulation after flooding. Occupied streams may have flows from natural origins, or from wastewater discharge, and they can occur in channelized streams if the bottom is unlined. An investigation is in progress to determine whether the SAS can tolerate warm water temperatures and low dissolved oxygen levels, which are often found in diminishing pools of water. Prime substrates consist of a mosaic of sand, gravel, cobble, and boulder in a series of riffles, runs, and pools, with shallow sandy stream margins (Saiki 2007; Feeney and Swift 2008; Santa Ana Watershed Association [SAWA] 2014).

Threats

Currently, the threats to SAS habitat are primarily attributed to past and ongoing urbanization and the continuing repercussions of human population growth in Los Angeles, Orange, Riverside, and San Bernardino Counties. Modification, fragmentation, and loss of habitat have been the primary reasons for the decline in SAS populations throughout its range compared to its historic status and distribution, and they continue to be significant threats to the recovery of the species in portions of its range.

Literature Cited:

Feeney, R.F., and C.C. Swift. 2008. Description and Ecology of Larvae and Juveniles of Three Native Cypriniforms of Coastal Southern California. Ichthyological Research 55:65–77.

Moyle, P.B. 2002. Inland Fishes of California: Revised and Expanded. University of California Press.

Saiki, M.K., B.A. Martin, G.W. Knowles, and P.W. Tennant. 2007. Life History and Ecological Characteristics of the Santa Ana Sucker, *Castostomus santaanae*. California Fish and Game 93 (2): 87–101.

SAWA (Santa Ana Watershed Association). 2014. Habitat Variability and Distribution of the Santa Ana Sucker, *Catostomus santaanae*, in the Santa Ana River from the Confluence of the Rialto Channel to the Prado Basin. Prepared for Santa Ana Watershed Project Authority, Riverside, CA.

U.S. Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for Santa Ana Sucker (*Catostomus santaanae*). Final Rule. Federal Register 75:77962–78027.

Amphibians

Arroyo Toad (*Anaxyrus californicus*)
Status: Federal Endangered; State Species of Special Concern.

General Biology

The arroyo toad is in the Bufonidae family. It is uniformly warty and stocky, measuring two to 3.25 inches with a light-colored stripe across the head, including eyelids, oval paratoid (neck) glands and greenish gray buff brow above (Stebbins 1985).

The breeding period for arroyo toad occurs from late January or February to early July depending on climatic conditions. Although males may breed with several females in a season, females release their entire clutch of eggs in a single breeding effort and probably do not produce a second clutch during the season. Eggs are deposited and larvae develop in shallow pools with minimal current, little or no emergent vegetation, and sand or pea gravel substrate. Embryos usually hatch in four to six days; the larval period lasts approximately 65 to 85 days. After metamorphosis from June to August, the juveniles remain on the bordering gravel bars until the pool no longer persists. Sexual maturity is reached in one to two years. Little is known about movements or other behavior in the nonbreeding season (USFWS 2000).

Arroyo toads experience aestivation, which is a type of hibernation involving inactivity and a lowered metabolic rate in response to high temperatures and arid conditions. These toads aestivate in suitable upland habitat including riparian scrub, riparian woodland, floodplain scrub, and ruderal plant communities, and have been observed at least 676 feet perpendicular to the stream channel, and parallel to the watercourse up to 2,640 feet (Cadre Environmental 2003a, 2003b). Juvenile arroyo toads spend more time exposed on terraces during the daytime than do adults, and are thus vulnerable to diurnal predators. Juveniles become nocturnal when of sufficient size to dig burrows. All age classes of post-metamorphic individuals tend to be active on rainy nights with moderate temperatures (above 45° F). Adults excavate shallow burrows for shelter during the day when the surface is damp or for longer intervals in the dry season (USFWS 2000).

Critical Habitat and Recovery Plans

A recovery plan was published for this species in 1999. Critical habitat was designated in 2005, and the designation was revised in 2011 (USFWS 2011). The current designation includes 98,366 acres ranging from northern Santa Barbara County to San Diego County.

Distribution

The arroyo toad is endemic to the coastal plains, mountains, and desert slopes of central and Southern California and northwestern Baja California, where it occurs between sea level and 8,000 feet elevation. It has been extirpated from approximately 65 to 75 percent of its former range and is now restricted to about 75 to 100 miles of streams in Central and Southern California (Sweet 1991). Although the arroyo toad occurs mostly along coastal drainages, it has also been recorded at several locations on the desert slopes of the Transverse Ranges: the Mojave River, Little Rock Creek, San Felipe Creek, Vallecito Creek, and Pinto Canyon (Jennings and Hayes 1994; USFWS 2014).

Based on a recent report on the species, Arroyo toad occurrence areas include the upper reaches of the Sisquoc River and Santa Ynez River watersheds in Santa Barbara County, the Sespe Creek and Piru Creek watersheds in Ventura County, the upper reaches of the Santa Clara River, Los Angeles River, and Santa Ana River watersheds in Los Angeles County (USFWS 2014).

Habitat

Arroyo toads inhabit both perennial and intermittent rivers and streams with shallow, sandy to gravelly pools adjacent to sand or fine gravel terraces. Arroyo toads have evolved in a system that is inherently dynamic, with marked seasonal and annual fluctuations in rainfall and flooding (USFS 2006). These toads require shallow slow-moving stream and riparian habitats that are naturally disturbed on a regular basis, primarily by flooding (USFWS 2000).

Primary constituent habitat elements for this species include rivers or streams with hydrologic regimes that supply water to provide space, food, and cover needed to sustain eggs and tadpoles, and adjacent upland habitats that allow for movement to breeding pools, foraging areas, overwintering sites, upstream and downstream dispersal, and connectivity to areas that contain suitable habitat (USFWS 2011).

Threats

Arroyo toad populations are localized and face a variety of threats including modification of hydraulic regimes by dams (Sweet 1991, 1993) and the drawdown of surface water from wells (Stephenson and Calcarone 1999). Predatory non-native species such as bullfrogs and crayfish have been observed to eat juvenile and adult arroyo toads (Sweet 1993, 1991; Cadre Environmental 2003a, 2003b). Invasive non-native plants are also a problem in some areas. Tamarisk (*Tamarix ramosissima*) and giant reed (*Arundo donax*) colonize newly created flood terraces and can form dense masses of vegetation that eliminate toad habitat by withdrawing surface water and altering channel morphology (Stephenson and Calcarone 1999). Other causes of decline include livestock grazing in arroyo toad habitat that can cause trampling of toads and their egg masses, off-road vehicle use, excessive human use (campgrounds), and placer mining (especially by suction dredges). The expansion of feral pig populations has also been identified as threats to this species, particularly in San Diego County.

The arroyo toad has disappeared from 65 to 75 percent of its historic range in the California, largely due to anthropogenic changes in hydrology, flow rates, and habitat along breeding streams (Sweet 1991, 1993). Populations have disappeared entirely from the northern, central, and eastern parts of its range. The extreme habitat specialization of arroyo toads coupled with the fact that most factors that undoubtedly contributed to the extirpation of most populations still impact or threaten the few (fewer than 25) remaining populations probably make this taxon the most vulnerable in California (Sweet 1991, 1993). However, these populations are generally in headwater areas that are remote from development, and SoCalGas facilities are not situated near most of these areas. Arroyo toad populations in the Santa Clara River and Mojave River watersheds (Los Angeles and San Bernardino Counties, respectively) are in the closest proximity to SoCalGas facilities.

Literature Cited:

Cadre Environmental. 2003a. Arroyo Toad (*Bufo californicus*) Radio Telemetry Study, San Juan Creek, Orange County, California-Final Report. Prepared for Rancho Mission Viejo, LLC, San Juan Capistrano, CA.

Cadre Environmental. 2003b. Arroyo Toad (*Bufo californicus*) Hydrogeomorphic Habitat Baseline Analysis/Radio Telemetry Study – Rancho Las Flores, San Bernardino County, California-Final Report. Prepared for Ranch Las Flores Ltd. Partnership, Dana Point, CA.

Jennings, M. R., and M. P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final report submitted to California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California, under Contract 8023.

Stebbins, R. C. 1985. A Field Guide to Western Reptiles and Amphibians. McGraw Hill.

Stephenson, J.R., and G.M. Calcarone. 1999. Southern California Mountains and Foothills Assessment: Habitat and Species Conservation Issues. General Technical Report PSW-GTR-172. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.

Sweet, S.S. 1991. Ecology and Status of the Arroyo Toad (*Bufo microscaphus californicus*) on the Los Padres National Forest of Southern California. Contract report to Los Padres National Forest.

Sweet, S.S. 1993. Second Report on the Biology of the Arroyo Toad (*Bufo microscaphus californicus*) on the Los Padres National Forest of Southern California. Contract report to United States Department of Agriculture, Forest Service, Los Padres National Forest, Goleta, CA.

U.S. Fish and Wildlife Service. 2000. Biological Opinion on the Effects of Ongoing National Forest Activities That May Affect Listed Riparian Species on the Cleveland National Forest, the Los Padres National Forest, the San Bernardino National Forest and Angeles National Forest in Southern California (1-6-99-F-21).

U.S. Fish and Wildlife Service. 2011. Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Arroyo Toad; Final Rule. Federal Register 76: 7246–67.

U.S. Fish and Wildlife Service. 2014. Arroyo Toad (*Anaxyrus californicus*) Species Report. Available at: https://www.fws.gov/ventura/docs/species/at/Arroyo%20Toad%20Final%20Species%20Report.pdf.

California Red-Legged Frog (*Rana draytonii*)
Status: Federal threatened; State Species of Special Concern

General Biology

CRLF is in the Ranidae family. It ranges in size from 1.75 to 5.24 inches in length, and is characterized by red on the lower abdomen and underside of the hind legs, and a dark mask bordered by a whitish jaw stripe. The back has many small black flecks and irregular dark blotches with a brown gray olive or reddish ground color.

CRLF breeds from November through March, although earlier breeding has been recorded in southern localities (Storer 1925). Females deposit egg masses of 2,000 to 5,000 moderate-sized (0.08 to 0.11 inch in diameter), dark reddish brown eggs that float on surface vegetation (Hayes and Miyamoto 1984). Eggs hatch in six to 14 days (Storer 1925). Larvae undergo metamorphosis 3.5 to seven months after hatching (Jennings and Hayes 1990; Storer 1925; Wright and Wright 1949). Males attain sexual maturity by two years of age; females are sexually mature by three years (Jennings and Hayes 1985). Juveniles and adults may disperse from breeding sites at any time of the year. Dispersal sites include boulders or rocks downed trees or logs, industrial debris, agricultural drains, and other constructed habitats (USFWS 2000a). CRLFs also use small mammal burrow, moist leaf litter (Jennings and Hayes 1994), and incised stream channels more than 18 inches deep (USFWS 1996). Dispersal is dependent on year-to-year variations in climate (USFWS 2000a). During periods of wet weather, starting with the first rains of fall, some individuals may make overland excursions through upland habitats. CRLFs have been encountered more than 1.8 miles from the breeding site, and up to 100 feet from water in adjacent dense riparian vegetation for up to 77 days (Rathbun et al. 1993).

Temporally, juvenile frogs are active both diurnally and nocturnally, whereas adult frogs are mostly nocturnal (Hayes and Tennant 1985). Coastal populations with more constant temperatures are rarely inactive (Storer 1925), whereas inland sites populations may become inactive for long intervals (Jennings et al. 1992).

Critical Habitat and Recovery Plans

A recovery plan was published in 2002 (USFWS 2002). Critical habitat for this species was designated in 2006, and the designation was updated in 2010 (USFWS 2010). Approximately 1,636,609 acres of critical habitat have been designated throughout California.

Distribution

CRLF ranges from near sea level to about 5,000 feet in elevation. The historic range extended from Point Reyes National Seashore in Marin County inland to Redding, and south to northwestern Baja California (Hayes and Krempels 1986; Jennings and Hayes 1985; Storer 1925). CRLF has been documented in 46 counties in California but now remain in only 26 counties (USFWS 2000b). The greatest numbers occur in Monterey (32 occurrences), San Luis Obispo (36 occurrences), and Santa Barbara Counties (36 occurrences). Remaining populations occur in small streams along the coastline. Only three known populations exist south and east of Ventura County: at the Santa Rosa Plateau on the southeastern flank of the Santa Ana Mountains (near the Cleveland National Forest), in the Castaic Ranges in Los Angeles County, and on Amargosa and San Francisquito Creeks in Los Angeles County. The Amargosa Creek population is on private land (Stephenson and Calcarone 1999). The CRLF has sustained a 70 percent reduction in its geographic range as a result of several factors acting singly or in combination (Jennings et al. 1992). Habitat loss and alteration,

overexploitation, and introduction of exotic predators were significant factors in the species' decline in the early to mid-1900s.

Habitat

CRLF larvae, juveniles, and adults have been collected from streams, creeks, ponds, marshes, sag ponds, stock ponds, deep pools and backwaters within streams and creeks, dune ponds, lagoons, and estuaries. Breeding adults are often associated with habitat characterized by shrubby riparian vegetation such as arroyo willow (*Salix lasiolepis*), cattails (*Typha* sp.), and bulrushes (*Scirpus* sp.), and associated with deep (> 27 inches) still or slow-moving water (Hayes and Jennings 1988). Adults may occur in ephemeral or permanent streams or ponds, populations probably cannot be maintained in ephemeral streams in which surface water is not persistent. Juvenile frogs seem to favor open, shallow aquatic habitats with dense submergent vegetation.

The primary constituent elements include standing bodies of fresh water both natural and constructed, plunge pools, seeps, springs, quiet water refugia during high flows, and upland areas adjacent to or surrounding breeding and nonbreeding aquatic and riparian habitat up to a distance of one mile depending on surrounding landscape and dispersal barriers.

Threats

Predatory, invasive non-native crustaceans, fish and amphibians are serious threats to CRLF populations, as are impacts from campgrounds, roads, and aquatic recreation. Livestock grazing that destroys riparian habitat can also be detrimental to species. Water diversions, groundwater extraction, and stock pond and small reservoir developments can degrade or eliminate habitat (Stephenson and Calcarone 1999). Surveys and work in streams that support CRLF using equipment contaminated with chytrid fungus from other locations may also threaten this species (USFS 2006). Bulger et al. (2002) concluded that the potential for detrimental impacts to CRLF populations from land use practices is greatest during the early winter months when frogs move into upland sites hundreds or thousands of feet from aquatic habitats.

Literature Cited:

Bulger, J., N. Scott, and R. Seymour. 2002. Terrestrial Activity and Conservation of Adult California Red-Legged Frogs (*Rana aurora draytonii*) in Coastal Forests and Grasslands. Biol. Conserv. 20: 193–98.

Hayes, M.P., and D.M. Krempels. 1986. Vocal Sac Variation among Frogs of the Genus Rana from Western North America. Copeia 1986 (4): 927–36.

Hayes, M.P., and M.M. Miyamoto. 1984. Biochemical, Behavioral and Body Size Differences between *Rana aurora aurora* and *R. a. draytonii*. Copeia 1984 (4): 1018–22.

Hayes, M.P., and M.R. Jennings. 1988. Habitat Correlates of Distribution of the California Red-Legged Frog (*Rana aurora draytonii*) and the Foothill Yellow-Legged Frog (*Rana boylii*): Implications for Management. In R.C. Szaro, K.E. Severson, and D.R. Patton (Tech. Coords.), Management of Amphibians, Reptiles and Small Mammals in North America, 144–158. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-166.

Hayes, M.P., and M.R. Tennant. 1985. Diet and Feeding Behavior of the California Red-Legged Frog, *Rana aurora draytonii* (Ranidae). Southwestern Naturalist 30 (4): 601–5.

Jennings, M.R., and M.P. Hayes. 1990. Status of the California Red-Legged Frog *Rana aurora draytonii* in the Pescadero Marsh Natural Preserve. Report prepared for the California Department of Parks and Recreation.

Jennings, M.R., and M.P. Hayes. 1985. Pre-1900 Overharvest of California Red-Legged Frogs (*Rana aurora draytonii*): The Inducement for Bullfrog (*Rana catesbeiana*) Introduction. Herpetologica 41 (1): 94–103.

Jennings, M.R., M.P. Hayes, and D.C. Holland. 1992. Petition to the U.S. Fish and Wildlife Service to Place the California Red-Legged Frog (*Rana aurora draytonii*) and the Western Pond Turtle (*Clemmys marmorata*) on the List of Endangered and Threatened Wildlife and Plants.

Rathbun, G. B., M. R. Jennings, T. G. Murphey, and N. R. Siepel. 1993. Status and Ecology of Sensitive Aquatic Vertebrates in Lower San Simeon and Pica Creeks, San Luis Obispo County, California. Unpublished Report, National Ecology Research Center, Piedras Blancas Research Station, San Simeon, CA, under Cooperative Agreement (14-16-0009-91-1909).

Stephenson, J.R., and G.M. Calcarone. 1999. Southern California Mountains and Foothills Assessment: Habitat and Species Conservation Issues. General Technical Report PSW-GTR-172. Albany, CA: Pacific Southwest Research Station, USDA Forest Service.

Storer, T.I. 1925. A Synopsis of the Amphibia of California. University of California Publications in Zoology 27: 1–342.

U.S. Department of Agriculture Forest Service. 2006. Species Accounts: Animals. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm

U.S. Fish and Wildlife Service. 1996. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the California Red- Legged Frog. Final Rule. Federal Register 61: 25813–33.

U.S. Fish and Wildlife Service. 2000a. Draft Recovery Plan for the California Red-Legged Frog (*Rana aurora draytonii).*

U.S. Fish and Wildlife Service. 2000b. Biological Opinion on the Effects of Ongoing Forest Activities That May Affect Listed Riparian Species on the Cleveland National Forest, the Los Padres National Forest, the San Bernardino National Forest, and Angeles National Forest in Southern California (1-6-99-F-21).

U.S. Fish and Wildlife Service. 2002. Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*).

U.S. Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the California Red- Legged Frog. Final Rule. Federal Register 75:12816–959.

Wright, A.H., and A.A. Wright. 1949. Handbook of Frogs and Toads of the United States and Canada. Comstock Publishing Company, Inc.

California Tiger Salamander (*Ambystoma californiense*), Santa Barbara County DPS
Status: Federal Endangered and Threatened; State Species of Special Concern

General Biology

CTS is in the Ambystomatidae family. It is large and stocky with small eyes, a broad, rounded snout, and tubercles on the underside of the front and hind feet. CTS is differentiated by its color: black above with large pale yellow spots that may be absent along the middle of the back. It ranges from three to 6.6 inches in length (Stebbins 1985).

After warm winter and spring rains, adult CTS move from subterranean burrow sites to breeding pools during November–February (Jennings and Hayes 1994). This species of salamander has been known to engage in nocturnal breeding migrations over distances of 6,500 feet (Hunt 1998), but radio-tracking studies found that most adults move within 2,500 feet of the breeding pool (Trenham et al. 2001). Male salamanders may arrive at breeding sites sooner than females (Loredo and Van Vuren 1996; Twitty 1941). Eggs are probably laid in January–February at the height of the rainy season (Storer 1925). Eggs are deposited in shallow water attached to underwater vegetation (Storer 1925; Twitty 1941). Development from laying through metamorphosis requires nine to 12 weeks (Anderson 1968; Feaver 1971). Over-summering CTS larvae have been observed (Jennings and Hayes 1994), and overwintering larvae have been observed in numerous stock ponds at the Los Vaqueros watershed near Livermore, California (Alvarez 2003).

During winter, CTS take refuge in damp places near the surface of the ground during the day and emerge at night to forage (Storer 1925). During dry weather, they take refuge in ground squirrel burrows, other burrows, or in crevices in the soil (Loredo et al. 1996). Once established in underground burrows, these salamanders may move short distances within burrows or overland to other burrows, generally during wet weather (USFWS 2002).

Native predators of CTS adults and larvae include great blue heron (*Ardea herodias*), egret (*Casmerodius albus*), common garter snake (*Thamnophis sirtalis*), and larger western spadefoot (*Scaphiopus hammondii*) larvae (Barry and Shaffer 1994; USFWS 2002). Baldwin and Stanford (1986) observed a western pond turtle (*Clemmys marmorata*) pursuing a larval CTS and an adult red-legged frog (*Rana draytonii*) ingesting a larval CTS. Introduced predators include bullfrog (*Lithobates catesbeiana*), Louisiana red swamp crayfish (*Procambarus clarki*), mosquitofish (*Gambusia affinis*) and other introduced fishes (Anderson 1968; Jennings and Hayes 1994; USFWS 2002). CTS is known to prey on western spadefoot larvae and Pacific treefrog (*Hyla regilla*) larvae (Anderson 1968).

Critical Habitat and Recovery Plans

Critical habitat for the Santa Barbara County DPS of CTS was designated in 2004. The designated area includes known and potential breeding ponds in all six metapopulation areas, as well as the watersheds of these ponds (USFWS 2004). The Primary Constituent Elements of critical habitat for this DPS include standing bodies of fresh water, including natural and constructed (e.g., stock) ponds, vernal pools, and dune ponds, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a sufficient length of time (i.e., 12 weeks) necessary for the species to complete the aquatic portion of its life cycle, barrier-free uplands adjacent to

breeding ponds that contain small mammal burrows, and upland areas between breeding locations (USFWS 2004). A recovery plan for the Santa Barbara County DPS was issued in 2016.

Distribution

The USFWS recognizes three DPS of CTS: Sonoma County, California, Santa Barbara County, California, and Central California, of which only the Santa Barbara County DPS occurs within the CRCP Plan Area. Accordingly, the discussion below is focused on the Santa Barbara County DPS. The Santa Barbara County DPS of CTS is restricted to northern Santa Barbara County, generally between the cities of Santa Maria, Buellton, and Lompoc. All known occurrences of the salamander are within the Santa Maria Basin Geomorphic Province, generally between the interface of the Santa Ynez Mountains and the Coast Ranges (the San Luis Range and San Rafael Mountains). The Santa Barbara County DPS constitutes the southernmost range of the species (USFWS 2016).

The distribution of the Santa Barbara County CTS is somewhat discontinuous, with occurrences found in six "metapopulation" areas: (1) West Santa Maria/Orcutt, (2) East Santa Maria, (3) West Los Alamos, (4) East Los Alamos, (5) Purisima Hills, and (6) Santa Rita Valley (USFWS 2016). The USFWS defines the metapopulations as sets of local populations or breeding sites among which dispersal is possible, but not routine. As described in the USFWS (2016) recovery plan for the species, there are currently approximately 60 known extant CTS breeding ponds in Santa Barbara County, distributed across the six metapopulations.

Habitat

CTS is a lowland species restricted to grasslands and lowest foothill regions in Central and Northern California, where its breeding habitat (long-lasting rain pools) occurs (USFS 2006). An important habitat requirement for this species is the presence dry-season refuge sites within a reasonable distance of breeding sites (up to one mile: Austin and Shaffer 1992). This species is absent from sites with seemingly suitable breeding habitat where surrounding hardpan soils are lacking in small mammal burrows. Although CTS have shown some burrowing ability, they are commensal with burrowing rodents that construct and maintain the burrow systems they inhabit as subterranean refugia.

Threats

Due to agriculture and urban development, CTS has been eliminated from much of its former range (Stebbins 1985). Loss and degradation of complexes of vernal pools that are critical breeding habitat is a significant threat to CTS (USFS 2006). Other factors affecting CTS populations include the introduction of non-native predators (e.g., fish, bullfrogs, and crayfish), loss of dry-season refuge habitat resulting from land use changes, and poisoning of ground squirrels (Jennings and Hayes 1994). High mortality of CTS while crossing roads to reach breeding areas is also a concern (Barry and Shaffer 1994). This species is dependent on the integrity of large rain pool complexes (USFS 2006).

Literature Cited:

Alvarez, J.A. 2003. California Tiger Salamander Species Account. In Solano County Habitat Conservation Plan. Available at: http://www.scwa2.com/hcp/.

Anderson, P.R. 1968. The Reproductive and Developmental History of the California Tiger Salamander. MA thesis, Fresno State College.

Baldwin, K.S., and R.A. Stanford. 1987. Life History Notes: *Ambystoma tigrinum californiense* Predation. Herpetological Review 18 (2): 33.

Barry, S.J., and H.B. Shaffer. 1994. The Status of the California Tiger Salamander (*Ambystoma californiense*) at Lagunita: A 50-Year Update. Journal of Herpetology 24 (2): 159–64.

Feaver, P.E. 1971. Breeding Pool Selection and Larval Mortality of Three California Amphibians: *Ambystoma tigrinum californiense* Gray, *Hyla regilla* Baird and Girard, and *Scaphiopus hammondi hammondi* Girard. MA thesis, Fresno State College.

Hunt, L.E. 1998. Vernal Pool Amphibian Management Plan, Premier Partners III Mesa Vineyard Property, Los Alamos Valley, Santa Barbara County, California. Prepared for County of Santa Barbara Planning and Development Department.

Jennings, M.R., and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Inland Fisheries Division, California Department of Fish and Game.

Loredo, I., and D. Van Vuren. 1996. Reproductive Ecology of a Population of the California Tiger Salamander. Copeia 1996: 895–901.

Stebbins, R.C. 1985. A Field Guide to Western Reptiles and Amphibians. 2d ed. Houghton Mifflin.

Storer, T.I. 1925. A Synopsis of the Amphibia of California. University of California Publications in Zoology 27: 1–342.

Trenham, P.C., W.D. Koenig, and H.B. Shaffer. 2001. Spatially Autocorrelated Demography and Interpond Dispersal in the California Tiger Salamander, *Ambystoma californiense*. Ecology 82:3519–30.

Twitty, V.C. 1941. Data on the Life History of *Ambystoma tigrinum californiense Gray*. Copeia 1941: 1–4.

U.S. Department of Agriculture Forest Service. 2006. Species Accounts: California Tiger Salamander. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm

U.S. Fish and Wildlife Service. 2002. Final Rule to List the Santa Barbara County Distinct Population Segment of California Tiger Salamander as Endangered. Federal Register 65:57242.

U.S. Fish and Wildlife Service. 2004. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the California Tiger Salamander (*Ambystoma californiense*) in Santa Barbara County; Final Rule. Federal Register 69:68568–609.

U.S. Fish and Wildlife Service. 2016. Recovery Plan for the Santa Barbara County Distinct Population Segment of the California Tiger Salamander.

Mountain Yellow-Legged Frog (*Rana muscosa*), Southern DPS
Status: Federal Endangered and Threatened; State Species of Special Concern

General Biology

MYLF is in the Ranidae family. It is yellowish or reddish brown above with black or brown spots or lichen-like markings and dusky to tips. It is more opaque underneath than the foothill yellow-legged frog, with yellow extending to the forelimb. It ranges from two to 3.13 inches in length (Stebbins 1985).

In Southern California, MYLFs breed from March through June after high water (Stebbins 1985). Eggs are typically deposited in shallow water and may be attached to undercut banks or vegetation (Zweifel 1955). In streams in rocky canyons, the eggs may be attached to stones on the stream bottom (Zweifel 1955). Aquatic habitats that are used by the species for breeding purposes must maintain water during the entire tadpole growth phase, which can be up to two years' duration. Most activity occurs from mid-March to October; however, juveniles have been found in November and early January (Zweifel 1955).

Critical Habitat and Recovery Plans

Approximately 8,283 acres of critical habitat has been designated for the southern DPS including areas in the San Gabriel and San Bernardino Mountains in Los Angeles and San Bernardino Counties. There is no approved recovery plan for the Southern California DPS of MYLF.

Distribution

The southern population of MYLF occurs in the San Bernardino, San Gabriel, and San Jacinto Mountains of Southern California at elevations of 1,200 to 7,500 feet (Stebbins 1985). Currently, the southern MYLF is known from only seven locations, all of which are at least partially on National Forest System lands (USFWS 2001, 2002, 2012).

Jennings and Hayes (1994) suggested that MYLFs have been extirpated from 99 percent of their historic range in Southern California. Remaining populations are now so reduced that meta-population dynamics have been disrupted and dispersal links between local populations are tenuous at best (USFWS 2001).

Habitat

MYLF inhabits the perennial pools of steep-gradient mountain streams originating from springs and snowmelt (USFWS 2001, 2002). They are highly aquatic and stay within two or three jumps from water (Stebbins 1985). Where characteristics of mountain streams extend to lower elevations (e.g., Eaton Canyon, San Gabriel River), MYLFs have been recorded at elevations below 1,500 feet (USFWS 2001). They are generally absent from very small creeks, with insufficient depth for refuge and overwintering. They also occur along shorelines but prefer open stream and lake margins with a depth of two to three inches (Jennings and Hayes 1994).

Primary constituent elements of southern MYLF habitat include perennial waters between 1,214 to 7,546 feet in elevation including streams, rivers, creeks and pools, gravel banks fallen logs or branches, and/or rocks to provide cover from predators; riparian habitat and upland extending 262

feet from each side of the centerline of each identified stream and its tributaries, that provides areas for feeding and movement (USFWS 2006).

Threats

The primary anthropogenic threats to this species include non-native predatory fish and amphibians (i.e., trout and bullfrog), siltation and drying of breeding pools, and disturbance of individuals and egg masses by recreation and land use activities (USFWS 2001). The pathogenic chytrid fungus *Batrachochytrium dendrobatidis*, one of several diseases associated with the global amphibian population declines and extinctions, has been found to occur in all extant populations of the southern MYLF (USFWS 2012). The effects of this pathogen on the populations have been variable, and have included localized extinctions, populations persisting despite high infection rates, and populations persisting with low infection rates (USFWS 2012).

Literature Cited:

Jennings, M.R., and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. California Department of Fish and Game Inland Fisheries Division.

Stebbins, R.C. 1985. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin.

U.S. Fish and Wildlife Service. 2001. Biological and Conference Opinions on the Continued Implementation of Land and Resource Management Plans for the Four Southern California National Forests, as Modified by New Interim Management Direction and Conservation Measures (1-6-00-F-773.2).

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Southern California Distinct Vertebrate Population Segment of the Mountain Yellow-Legged Frog (*Rana muscosa*). Final Rule. Federal Register 67:44382–92.

U.S. Fish and Wildlife Service. 2006. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Southern California Distinct Population Segment of the Mountain Yellow-Legged Frog (*Rana muscosa*); Final Rule. Federal Register 71:54344–86.

U.S. Fish and Wildlife Service. 2012. Mountain Yellow-legged Frog (*Rana muscosa*) Southern California Distinct Population Segment 5-Year Review: Summary and Evaluation.

Zweifel, R.G. 1955. Ecology, Distribution, and Systematics of Frogs of the *Rana boylei* Group. University of California Publications in Zoology 54 (4): 207–92.

Reptiles

Southern Rubber Boa (*Charina bottae umbratica*)
Status: State Threatened

General Biology

SRB is in the Boidae family. It is a smooth, shiny snake with a short, blunt tail resembling the head, and small, smooth dorsal scales. It can be plain brown to olive green above, yellow to cream below, usually with no pattern. They range from 14 to 33 inches in length.

Females in reproductive condition usually emerge from hibernation in April (USFS 2006). Courtship begins immediately and lasts into mid-May (USFS 2006). Young are born alive, generally from late August through the first three weeks of September (USFS 2006). Young are born in loose, well-aerated soil, under surface objects, or within rotting logs (USFS 2006). Each female bears two to eight young (Stewart 1988; Zeiner et al. 1988; Hoyer and Stewart 2000).

Very little information exists on dispersal in SRB, but some evidence of site fidelity had been reported (Hoyer and Stewart 2000). Individuals may migrate annually between the ridges and canyon bottoms as they move from winter hibernacula to summer habitat (USFS 2006). An SRB has been recorded moving up to 300 yards over a period of one season (Loe 1985).

SRBs are active during evening hours or heavily overcast days with high humidity and air temperatures in the 60° to 70° F range (USFS 2006). Seasonal activity varies with the climate, but SRB probably hibernate from November through February or March (Loe 1985) under rocks, logs and other surface objects (USFS 2006). Food items include small mammals, nestlings, lizards and occasionally small snakes and salamanders (Stebbins 1954, 1985).

Critical Habitat and Recovery Plans

No critical habitat or recovery plan has been issued for this species.

Distribution

Four populations of SRB are known to occur south of the Sierra Nevada (USFS 2006). These populations are in the Tehachapi Mountains, Kern County; the Mt. Pinos area (including Mt. Abel and Alamo Mountain), straddling the Kern-Ventura County line; the San Bernardino Mountains in San Bernardino County; and the San Jacinto Mountains in Riverside County (Hoyer and Stewart 2000). SRB is found in the San Bernardino and San Jacinto Mountains at elevations of 5,050 to 8,070 feet (Stewart 1988).

Habitat

SRB is associated with moist woodlands and coniferous forests, which include Jeffrey pine (*Pinus jeffreyi*), sugar pine (*Pinus lambertiana*), white fir (*Abies concolor*), and black oak (*Quercus kelloggii*) (USFS 2006). It is associated with well-vegetated sites with deep, well-developed soils and a litter/duff layer for cover and moisture (USFS 2006). It is a burrower and commonly makes use of rock outcrops as hibernacula (USFS 2006). Soil moisture may be a limiting factor for rubber boas, as they are usually found during summer months in damp draws near springs, seeps, and streams (Loe 1985).

Threats

SRBs are vulnerable to habitat loss from development on private land, water diversion or extraction, and land use activities that destroy soil or surface cover (USFS 2006). The majority of known SRB locations are on private lands (USFS 2006). The lush, mesic forests that are prime habitat for this species tend to be highly interspersed with private lands (e.g., around Lake Arrowhead and Idyllwild). Where such forest conditions occur on public land, care should be taken to maintain mesic conditions, downed logs, and leaf cover (USFS 2006).

Literature Cited:

Hoyer, R.F., and G.R. Stewart. 2000. Biology of the Rubber Boa (*Charina bottae*), with Emphasis on *C. b. umbratica*. Part I: Capture, Size, Sexual Dimorphism, and Reproduction. Part II: Diet, Antagonists, and Predators. Journal of Herpetology 34 (3): 348–60.

Loe, Steve. 1985. Habitat Management Guide for Southern Rubber Boa (*Charina bottae umbratica*) on the San Bernardino National Forest. Prepared for the U.S. Department of Agriculture, San Bernardino National Forest.

Stebbins, R.C. 1954. Amphibians and Reptiles of Western North America. McGraw-Hill.

Stebbins, R.C. 1985. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin.

Stewart, G.R. 1988. The Rubber Boa (*Charina bottae*) in California, with Particular Reference to the Subspecies, *C. b. umbratica*. In Proceedings of the Conference on California Herpetology. Southwestern Herpetologists' Society Special Publication No. 4.

U.S. Department of Agriculture Forest Service. 2006. Species Accounts: Animals. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm

Zeiner, D.C., W.F. Laudenslayer, Jr., and K.E. Mayer, eds. 1988. California's Wildlife. Volume I: Amphibians and Reptiles. California Statewide Wildlife Habitat Relationships System, California Department of Fish and Game.

Southwestern Pond Turtle (*Actinemys pallida*)
Status: State Species of Special Concern

General Biology

SWPT is in the Emydidae family. It has a low carapace, and is olive, dark brown, or blackish color, often with a network of spots, lines, or dashes of brown or black that radiate from the growth centers of the shields. The limbs have prominent scales and are flecked and lined with black, and the head may have spots or a network of black. SWPTs range in size from 3.5 to 7.5 inches (Stebbins 1985).

Western (Pacific) pond turtles commonly forage during late afternoon or early evening (USFS 2006). They also bask intermittently throughout the day in order to maintain a body temperature of 75° to 90° F (USFS 2006). In general, western (Pacific) pond turtles typically become more active in water that consistently reaches 60° F (Jennings and Hayes 1994). Extreme heat is avoided by moving to cooler areas on the bottom of pools (USFS 2006). In some parts of its range the western (Pacific)

pond turtle is seasonally active, overwintering from October/November through March/April (USFS 2006). However, along the central and southern coast of California, SWPT may be active throughout the year (Holland 1991).

Critical Habitat and Recovery Plans

No critical habitat or recovery plan has been issued for this species.

Distribution

SWPT is found from south of San Francisco Bay to northern Baja California at elevations of around sea level to 6,500 feet (USFS 2006). This subspecies intergrades with northwestern pond turtles (*Clemmys marmorata marmorata*) over a large area in Central California (Bury 1970; Stebbins 1985). Historically, SWPTs occurred throughout most of the west coast of North America, primarily west of the Cascade-Sierra crest, from western British Columbia to northern Baja California (Ernst et al. 1994). Currently, there are records of isolated populations occurring in Afton Canyon in the Mojave Desert and in the Amargosa River in Los Angeles County (Lovitch 1999).

The species occurs throughout the Los Padres National Forest, with populations concentrated in Piru Creek, Sespe Creek, the Indian Creek/Mono Creek area, the Sisquoc River/Manzana Creek area, Alamo Creek, the Nacimiento River, and Arroyo Seco Creek. The species also occurs in most of the small coastal drainages of Santa Barbara and San Luis Obispo Counties.

Habitat

SWPTs inhabit a wide variety of aquatic habitats including rivers, streams, lakes, ponds, wetlands, reservoirs, and brackish estuarine waters (USFS 2006). They are also found less commonly in abandoned gravel pits, stock ponds, and sewage treatment plants; however, individuals occurring in such habitats are likely displaced individuals and do not represent viable populations (Holland 1994; Jennings and Hayes 1994). This species uses aquatic habitats primarily for foraging, thermoregulation, and avoidance of predators (USFS 2006). It requires emergent basking sites. Basking sites can include rocks, logs, or emergent vegetation, and are used by the turtles for thermoregulation (USFS 2006). SWPT can be found in waters with temperatures as low as 34º F, and rarely in water with temperatures exceeding 102º to 104º F (Holland 1994).

SWPTs overwinter in both aquatic and terrestrial habitats (USFS 2006). Aquatic refugia consist of rocks, logs, mud, submerged vegetation, and undercut areas along a bank (USFS 2006). Terrestrial overwintering habitat consists of burrows in leaf litter or soil (USFS 2006). The presence of a duff layer seems to be a general characteristic of its overwintering habitat (USFS 2006). Upland nesting sites must be dry and often have high clay or silt fraction (USFS 2006). Typically, SWPTs dig nests on unshaded slopes that are not steeper than 25 degrees and that may be at least in part south-facing (USFS 2006). Nesting has been reported to occur up to 660 feet from water (Jennings and Hayes 1994).

In late fall, SWPTs move up to approximately 1,600 feet from their aquatic habitat in search of terrestrial overwintering sites (Jennings and Hayes 1994). This dispersal is often in response to environmental stress, such as drought (USFS 2006). During the spring or early summer, females move overland for up to 325 feet to find suitable sites for egg-laying (USFS 2006). Other long-distance movements may be in response to drying of local bodies of water or other factors (USFS 2006). These turtles are capable of moving long distances (at least one mile overland) to find water (USFS 2006).

Hunt (1993) found that marked, relocated adult pond turtles moved up to three miles along a watercourse in Santa Barbara County and that most movements occurred when surface water in the river was continuous.

Threats

SWPT populations in Southern California have experienced precipitous declines in recent years (USFS 2006). Known localities decreased from 87 in 1960 to 57 in 1970. In 1987, of 255 sites that were surveyed, only 53 contained SWPTs and only 10 of these could support reproductively viable populations (USFS 2006). These 53 sites are located in Ventura, Los Angeles, San Diego, Orange, San Bernardino and Riverside Counties (Brattstrom 1988; Brattstrom and Messer 1988; Lovitch 1999).

The primary reason for population declines in SWPT is loss of suitable habitat (USFS 2006). The availability of persistent, pooled water along low-elevation streams has been greatly reduced as the result of habitat destruction associated with agricultural activities, urbanization, flood control, and water diversion projects (USFS 2006). This reduced availability of water increases SWPT vulnerability to extended droughts (Jennings et al. 1992). The high site fidelity shown by this species could be a risk factor that exposes relocated turtles to increased mortality as they attempt to return to their original capture sites (Hunt 1993). Other threats include introduced predatory fish, bullfrogs, and collecting (USFS 2006). Collecting of pond turtles is a significant problem in some easily accessible areas (USFS 2006). It is difficult to determine the severity of this impact because SWPT are long-lived animals and can persist in an area for many years, even without successful reproduction (USFS 2006). Nevertheless, several populations consist primarily of older adults and are considered to be at risk (Holland 1991). Jennings and Hayes (1994) identified agricultural or livestock activity as probable causes of the destruction of nesting habitat. Introduced non-native fish and bullfrogs that prey on young turtles may also cause decreases in recruitment (USFS 2006). Siltation caused by intense grazing, mining, off-highway vehicles, or the aftermath of fires, can eliminate amphibian and reptile populations that breed in streams, including southwestern pond turtles (USFS 2006).

Literature Cited:

Brattstrom, B.H. 1988. Habitat Destruction on California with Special Reference to *Clemmys marmorata:* A Perspective. In Proceedings of the Conference on California Herpetology, eds. H.F. DeLisle, P.R. Brown, B. Kaufman, and B.M. McGurty. Southwestern Herpetological Society.

Brattstrom, B.H., and D.F. Messer. 1988. Current Status of the Southwestern Pond Turtle, *Clemmys marmorata pallida*, in Southern California. Final Report for California Department of Fish and Game, Contract C-2044.

Bury, R.B. 1970. *Clemmys marmorata*. Catalogue of American Amphibians and Reptiles 100: 1–3.

Ernst, C.H., J.E. Lovich, and R.W. Barbour. 1994. Turtles of the United States and Canada. Smithsonian Institution Press.

Holland, D.C. 1991. A Synopsis of the Ecology and Status of the Western Pond Turtle (*Clemmys marmorata*) in 1991. Unpublished report prepared for the U.S. Fish and Wildlife Service.

Holland, D.C. 1994. The Western Pond Turtle: Habitat and History. U.S. Department of Energy, Bonneville Power Administration.

Hunt, L.E. 1993. Relocation and Movements of Southwestern Pond Turtles (*Clemmys marmorata pallida*), Upper Santa Ynez River, Santa Barbara County, California. Prepared for City of Santa Barbara Public Works Department and California Department of Fish and Game.

Jennings, M.R., and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. California Department of Fish and Game.

Jennings, M.R., M.P. Hayes, and D.C. Holland. 1992. A Petition to the U.S. Fish and Wildlife Service to Place the California Red-Legged Frog and the Western Pond Turtle on the List of Endangered Wildlife and Plants.

Lovitch, J.E. 1999. Western Pond Turtle *Clemmys marmorata*. University of California, Riverside.

Stebbins, R.C. 1985. A Field Guide to Western Reptiles and Amphibians. 2d ed. Houghton Mifflin.

U.S. Department of Agriculture Forest Service. 2006. Species Accounts: Animals. Available at: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm

Birds

Belding's Savannah Sparrow (*Passerculus sandwichensis beldingi*)
Status: State Endangered

General Biology

BSS is in the Emberizidae family. It is a sedentary resident and tends to occupy the same breeding area. Such strong philopatry has resulted in reproductive isolation and substantial geographic variation; 16 other subspecies of savannah sparrow are currently recognized. Nesting is semicolonial or locally concentrated within dense pickleweed habitat from late March through June. A total of approximately 3,700 pairs were documented in California in 2015, with approximately 3,100 pairs occurring in only 10 of the marshes, including Point Mugu, Seal Beach, Bolsa Chica, Upper Newport Bay, Santa Margarita Estuary, San Elijo Lagoon, Los Penasquitos Lagoon, Sweetwater Marsh, Western Salt Company Dikes, and Tijuana Marsh (Zembal et al. 2015).

Critical Habitat and Recovery Plans

No critical habitat or recovery plan has been issued for this species.

Distribution

BSS is a coastal salt marsh-endemic species that ranged historically from Goleta in Santa Barbara County south to el Rosario, Baja California, Mexico. Currently, 27 of the coastal salt marsh systems from Goleta Slough in Santa Barbara County in the north to Tijuana Slough National Wildlife Refuge on the Mexican border support breeding populations of BSS.

Habitat

BSS is closely associated with dense pickleweed, particularly *Salicornia virginica*, within which most nests are found. They occur in greatest numbers and densities in marshes with regular tidal flushing, and avoid areas that are flooded too frequently (Zembal et al. 1987). The species is not present in freshwater-influenced brackish marsh habitat. BSS may also be excluded from narrow bands (less than 32 feet wide) of salt marsh present along upland and freshwater marsh-interfaces due to competition with other species.

Threats

The primary threats to BSS are loss or alteration of habitat, increased fragmentation and isolation of occupied areas, and contamination of habitat. Historically, coastal habitats have been disproportionately developed for human use. Over 75 percent of historical coastal wetland habitats within its range had been lost by the late 1980s, with the remaining habitat suffering from fragmentation, degradation and increasing human impacts (Wiley and Zembal 1989).

Literature Cited:

Wiley, J.W., and R. Zembal. 1989. Concern Grows for Light-Footed Clapper Rail. Endangered Species Technical Bulletin 14 (3): 6–7.

Zembal, R., S. M. Hoffman, and R.T. Patton. 2015. A Survey of the Belding's Savannah Sparrow (*Passerculus sandwichensis beldingi*) in California, 2015. California Department of Fish and Wildlife, Wildlife Branch, Nongame Wildlife Program Report, 2015-02.

Zembal, R., K.J. Kramer, and M.J. Elpers. 1987. A Survey of Belding's Savannah Sparrows in California, 1986. A report to the U.S. Navy, Natural Resources Management Branch.

Burrowing Owl (*Athene cunicularia)*
Status: State Species of Special Concern

General Biology

Burrowing owls are in the Strigidae family. They are small, long-legged, and tuftless. They also have yellow eyes, a broad white chin, and distinctive white "eyebrows." The plumage on the body is spotted and barred with brown and white color.

Burrowing owls are chiefly active during the early morning and early evening hours, but may be observed during the day standing above a burrow entrance or on a low perch nearby. In general, burrowing owls primarily consume insects, amphibians, reptiles, and small mammals (Zarn 1974; Collins 1979). The breeding season for burrowing owls begins in the early spring and extends through late summer. Courtship is evident when males decorate burrow entrances with artifacts such as dung, feathers, bits of shiny things, and desiccated skins of various animals among others. In California, egg-laying may begin as early as March in some areas (Zarn 1974) but typically begins in late April and early May (Thomsen 1971); however, for regulatory purposes in California, agencies identify the breeding season as February 1 to August 31. Once eggs are laid, the female does the majority of incubating, which lasts approximately three to four weeks (Coulombe 1971).

Critical Habitat and Recovery Plans

No critical habitat or recovery plan has been issued for this species.

Distribution

In California, the western burrowing owl (*Athene cunicularia hypugaea*) occurs in the Central Valley, inner and outer Coastal region, portions of the San Francisco Bay Area, Southern California coast, from Southern California to the Mexico border, the Imperial Valley, and portions of the desert and high desert habitats in southeastern and northeastern California.

Habitat

Burrowing owls usually inhabit desert and grassland habitat and, in many cases, urban and agricultural landscapes. These habitats are flat, open areas characterized by dry vegetation that is typical of heavily grazed grasslands, low stature grasslands or desert vegetation that also include available burrows (Johnsgard 1988). As burrowing owls require underground burrows or artificial structures for shelter and nesting, they are associated with other burrowing animals such as prairie dogs, ground squirrels, badgers and some smaller canids. Burrows are used year-round and are an essential component to the life history of burrowing owls.

Threats

The western burrowing owl exhibits habitat loss and fragmentation, elimination of burrows from declining rodent populations, overgrazed habitat, loss of habitat through burning and loss of habitat from mowing. There are also threats to the burrowing owl wintering habitats, overutilization for commercial, recreational, scientific, or educational purposes, predation and disease, and inadequacy of existing and regulatory mechanisms.

Literature Cited:

Collins, C.T. 1979. The Ecology and Conservation of Burrowing Owls. In Owls of the West, Their Ecology and Conservation, eds. P.P. Schaeffer and S.M. Ehlers. Proceedings of the National Audubon Society Symposium.

Coulombe, H. 1971. Behavior and Population Ecology of the Burrowing Owl, Speotyto cunicularia, in the Imperial Valley of California. The Condor 73: 162–76.

Gervais, Jennifer A., Daniel K. Rosenberg, and Lyann A. Comrack. 2008. Burrowing Owl. In California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California, eds. W.D. Shuford and T. Gardali. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game.

Johnsgard, P. A. 1988. North American Owls Biology and Natural History. Smithsonian Institution.

Thomsen, L. 1971. The Behavior and Ecology of Burrowing Owls in the Oakland Municipal Airport. The Condor 73: 177–92.

Zarn, M. 1974. Burrowing Owl *Speotyto cunicularia hypugaea*. Habitat Management Series for Unique or Endangered Species. Report No. 11. Technical Note. Filing Code 6601. Bureau of Land Management.

Coastal California Gnatcatcher (*Polioptila californica californica*)
Status: Federal Threatened; State Species of Special Concern

General Biology

CAGN is a small, long-tailed member of the Polioptilidae family. Three subspecies are recognized based on subtle morphological differences (*californica, pontilis, margaritae*; Atwood and Bontrager 2001). CAGN is nonmigratory and maintains a permanent territory. Documented CAGN home ranges are approximately 6 to 45 acres (RECON Environmental [RECON] 1987; ERC Environmental and Energy Services [ERCE] 1990).

Breeding season for CAGN occurs between late February and July, but nest initiation occurs most often between mid-March and mid-May. Nests are small, cup-shaped baskets usually constructed using materials, such as grasses, bark strips, small leaves, spider webs, down, and other materials. Nests are typically constructed within California sagebrush approximately three feet above the ground. The CAGN is an insectivorous species that feeds on arthropods that most often are gleaned from California sagebrush and California buckwheat (USFWS 1991).

Critical Habitat and Recovery Plans

In October 2000, critical habitat was designated for this subspecies, comprising 13 defined geographic units (USFWS 2000). In 2003, following a legal challenge to the designated critical habitat, the USFWS proposed a revised critical habitat for the CAGN (USFWS 2003). Revised designation of critical habitat for the CAGN was finalized in 2007 and consists of approximately 197,303 acres distributed within six counties: Los Angeles, Orange, San Bernardino, San Diego, Riverside, and Ventura (USFWS 2007). No recovery plan has been published for this species.

Distribution

CAGN occurs on coastal slopes of Southern California, ranging from southern Ventura County southward to San Diego County and into Baja California, Mexico (to El Rosario at approximately 30 degrees North), including Riverside and San Bernardino Counties (Atwood 1991).

Habitat

CAGN occurs almost exclusively within the coastal sage scrub vegetation community. The southern limit of its range coincides with the distributional boundary of this distinctive vegetation community. On occasion, it can also be found in chaparral, grassland, or riparian communities adjacent to sage scrub habitat (USFWS 1997). Characteristic coastal sage scrub plant species include California sagebrush (*Artemisia californica*), various species of sage (*Salvia* spp.), California buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), California encelia (*Encelia californica*), coyote brush (*Baccharis pilularis*), cholla cactus (*Cylindropuntia* spp.), and goldenbush (*Isocoma menziesii*) (Oberbauer et al. 2008).

Threats

The primary cause of CAGN decline has been the cumulative loss of coastal sage scrub vegetation resulting from urban and agricultural development (Atwood et al. 1995) and the proliferation of the brown-headed cowbird (*Molothrus ater*), a parasitic species that has significantly increased its range due to its association with humans. Studies have suggested that CAGN is moderately sensitive to the effects of habitat fragmentation and human activity (Atwood 1990; ERCE 1990).

<u>Literature Cited:</u>

Atwood, J.L. 1990. Status Review of the Coastal California Gnatcatcher (*Polioptila californica*). Manomet Bird Observatory.

Atwood, J.L., J.C. Luttrell, T.J. Overbey, and C.H. Reynolds. 1995. California Gnatcatchers, Cactus Wrens, and Conservation of Coastal Sage Scrub on Palos Verde Peninsula: Progress Report No. 2. Prepared by Manomet Center for Conservation Sciences.

ERC Environmental and Energy Services Co. (ERCE). 1990. Phase 2 Report, Amber Ridge California Gnatcatcher Study. Prepared for Weingarten, Siegel, Fletcher Group, Inc.

Oberbauer, Thomas, Meghan Kelly, and Jeremy Buegge. March 2008. Draft Vegetation Communities of San Diego County. (Based on "Preliminary Descriptions of the Terrestrial Natural Communities of California," Robert F. Holland, October 1986).

RECON Environmental, Inc. (RECON). 1987. Home Range, Nest Site, and Territory Parameters of the Black-Tailed Gnatcatcher Population on the Rancho Santa Fe Highlands Study Area. Unpublished report submitted to County of San Diego.

U.S. Fish and Wildlife Service. 1991. Summary of the Proposed Rule to list the Coastal California Gnatcatcher (*Polioptila californica*) as Endangered in California and Baja, Mexico.

U.S. Fish and Wildlife Service. 2000. Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for Coastal California Gnatcatcher; Final Rule. Federal Register 65 (206) 63680–743.

U.S. Fish and Wildlife Service. 2003. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Coastal California Gnatcatcher (*Polioptila californica californica*) and Determination of Distinct Vertebrate Population Segment for the California Gnatcatcher (*Polioptila californica*); Proposed Rule. Federal Register 68 (79): 20228–312.

U.S. Fish and Wildlife Service. 2007. Endangered and Threatened Wildlife and Plants; Reopening of Public Comment Periods for the Proposed Designations of Critical Habitat for the Coastal California Gnatcatcher and the San Diego Fairy Shrimp. Proposed Rules: Re-opening of Public Comment Periods. Federal Register 72 (63): 15857–59.

Least Bell's Vireo (*Vireo bellii pusillus*)
Status: Federal Endangered; State Endangered

General Biology

LBV is in the Vireonidae family. It is small, reaching 4.75 inches in length, with a long tail and a stout bill. It is gray-olive on top with whitish under-parts and buffy yellow sides. The white eye ring is indistinct. Although there are two white wing bars, the lower one is more prominent, and often it is the only visible wing bar (Vanner 2003).

LBV arrives in Southern California in late March and early April and returns to its wintering ground in September. As many birds are banded, it has been noted they show high site tenacity (returning to the same successful location) and remaining within the same territory throughout the breeding season. There usually are two broods during the breeding season. Males will chase females, spreading their tail and fluttering their wings while continually singing (Alsop 2001).

Critical Habitat and Recovery Plans

In 1994, approximately 38,000 acres were designated critical habitat for this subspecies in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego Counties (USFWS 1994). A draft recovery plan for LBV was issued by USFWS in 1998.

Distribution

Historically, LBV was a common summer visitor to riparian habitat throughout much of California. Currently, this subspecies is found only in riparian woodlands in Southern California, with the majority of breeding pairs in San Diego, Santa Barbara, and Riverside Counties. Within San Bernardino County, the majority of territory occurs along the Santa Ana River and its tributaries. In Los Angeles and Ventura Counties, the largest population is within the Santa Clara River and its

tributaries. The largest population in Santa Barbara County occurs in the Santa Ynez River and its tributaries.

Habitat

LBV is typically associated with early successional (five to 10 years old) riparian scrub and woodlands that have a developed canopy layer and dense shrubs at three to six feet. Occupied riparian habitat is typically dominated by species such as mulefat (*Baccharis salicifolia*), willows (*Salix* sp.), cottonwood (*Populus* sp.), and Mexican elderberry (*Sambucus nigra* ssp. *caerulea*). The most critical structural component of nesting habitat in California is a dense shrub layer at two to 10 feet aboveground. If this understory element is present, they can be found using any age riparian habitat. LBV requires a structurally diverse canopy for foraging, with a preference for the 10- to 20-foot zone. LBV is known to recolonize restored riparian habitats (Unitt 2004).

Threats

LBV decline is due to loss, degradation, and fragmentation of riparian habitat combined with nest parasitism by the brown-headed cowbird (Unitt 2004). Populations have increased due to brown-headed cowbird trapping measures.

Literature Cited:

Alsop, Fred J., III. 2001. Birds of North America, in Association with the Smithsonian Institution. DK Publishing.

Unitt, P. 2004. San Diego County Bird Atlas. Ibis Publishing Company and San Diego Natural History Museum.

U.S. Fish and Wildlife Service. 1994. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Least Bell's Vireo. Final Rule. Federal Register 59: 4845–67.

Vanner, Michael. 2003. The Encyclopedia of North American Birds. Parragon Publishing.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)
Status: Federal Endangered; State Endangered

General Biology

SWF is a small bird belonging to the Tyrannidae family. Egg-laying by SWF occurs from the end of May through the end of June. Dense willow thickets are required for nesting, and nests are often near standing water (Zeiner et al. 1990). The nest is built low in crotch of bush or small tree near water, on outer edge of shrub and consists of an open cup woven of weed stems, plant fibers, pine needles, shredded bark, and grass; lined with feathers, hair, rootlets, and fine materials (Sedgwick 2000). SWF typically lays three to four eggs per clutch, laid at one-day intervals, and are incubated by the female for about 12 days. Young birds fledge 12 to 13 days after hatching. Typically, the species raises only one brood per year; however, some pairs will raise a second brood, or re-nest after a nest failure. SWF perch or move about within dense vegetation. They hunt for flying insects by perching and catching the prey in flight, returning to the perch.

Spring migration of SWF begins in early May and extends through June, during which two of the subspecies overlap (Unitt 1987). There is also period of overlapping occurrence in riparian habitats for Cascade Range and SWFs during spring and fall migration. Surveys are timed to detect all three species, which are present in late spring and early summer, and to separate out the southwestern subspecies, which remains nesting in the area in midsummer.

Critical Habitat and Recovery Plans

Critical habitat for this species was designated in 1997 and 2005, and revised in 2013 (USFWS 1997, 2005, 2013). Approximately 208,973 acres of critical habitat are designated within Arizona, California, Colorado, Nevada, New Mexico and Utah. In California alone, 378 stream miles encompassing an area of approximately 39,205 acres are designated within Inyo, Kern, Los Angeles, Riverside, Santa Barbara, San Bernardino, San Diego, and Ventura Counties (USFWS 2013).

A final recovery plan for SWF was published in 2002 (USFWS 2002).

Distribution

SWF is a summer breeding resident in riparian habitats in Southern California, Southern Nevada, Southern Utah, Arizona, New Mexico, Western Texas, southwestern Colorado, and northwestern Mexico (USFWS 1995). Surveys within Southern California have revealed breeding populations on the San Luis Rey River (San Diego County); Camp Pendleton (San Diego County); the Santa Margarita River; Pilgrim, De Luz, French, and Las Flores Creeks (Griffith Wildlife Biology 1995); and the Santa Ynez River (Santa Barbara County) (Holmgren and Collins 1995; USFWS 1997). This subspecies also persists in the Lower Colorado River Valley (Marshall 2000). Unlike LBV, SWF populations do not appear to have gained any significant benefit from habitat restoration and cowbird control efforts. Some creeks in the San Bernardino and San Gabriel Mountains may support this species, as well as the Santa Ynez River in Santa Barbara County and the Santa Clara River in Ventura County (USFWS 2014).

Habitat

SWF is restricted to dense riparian woodlands of willow, cottonwood, and other deciduous shrubs and trees. In general, the riparian habitat of this subspecies tends to be rare, isolated, small, and/or linear patches, separated by vast expanses of arid lands.

SWF habitat is typically characterized by larger drainage systems and their tributaries, supporting long stretches of riparian woodland or forest. While SWF is most often associated with willow or cottonwood dominated riparian communities, nesting has also been documented in oak riparian forest or even tamarisk scrub communities (primarily along the Colorado River) (USFWS 1995). Habitat not suitable for nesting may be used for migration and foraging.

Threats

Threats to SWF include extensive loss of riparian breeding habitat and brood parasitism by the brown-headed cowbird (USFWS 1995). In addition, introduction of non-native giant reed (*Arundo donax*) and tamarisk has displaced riparian woodland habitats. Drought conditions also have affected SWF populations (Unitt 2004).

Literature Cited:

Griffith Wildlife Biology. 1995. The Status of the Southwestern Willow Flycatcher at the Upper San Luis Rey River, San Diego County, California, in 1994. Report for USDA Forest Service, Palomar Ranger District, Ramona, CA.

Holmgren, M.A., and P.W. Collins, eds. 1995. Interim Report on the Distribution, Breeding Status, and Habitat Associations of Seven Federal Special-Status Bird Species and Brown-Headed Cowbirds at Vandenburg Air Force Base, Santa Barbara County, California. Museum of Systematics and Ecology Environmental Report No. 3. Department of Ecology, Evolution and Marine Biology, University of California at Santa Barbara.

Marshall, R.M. 2000. Population Status on Breeding Grounds. In Status, Ecology, and Conservation of the Southwestern Willow Flycatcher, ed. D.M. Finch and S.H. Stoleson. Gen. Tech. Rpt. RMRS-GTR-60. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.

Sedgwick, J. A. 2000. Willow Flycatcher (*Empidonax traillii*). In The Birds of North America, No. 533, eds. A. Poole and F. Gill. The Birds of North America, Inc.

Unitt, P. 1987. *Empidonax traillii extimus*: An Endangered Subspecies. W. Birds 18: 137–62.

Unitt, P. 2004. San Diego County Bird Atlas. Ibis Publishing Company and San Diego Natural History Museum.

U.S. Fish and Wildlife Service. 1995. Endangered and Threatened Wildlife and Plants; Final Rule Determining Endangered Status for the Southwestern Willow Flycatcher. Federal Register 60 (38).

U.S. Fish and Wildlife Service. 1997. Final Determination of Critical Habitat for the Southwestern Willow Flycatcher. Federal Register 62: 39129–47.

U.S. Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Southwestern Willow Flycatcher. Final Rule. Federal Register 78:50542–629.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White, eds. 1990. California's Wildlife: Volume II: Birds. California Statewide Wildlife Habitat Relationship System. California Department of Fish and Game.

Western Yellow-Billed Cuckoo (*Coccyzus americanus occidentalis*)
Status: Federal Threatened; State Endangered

General Biology

WYBC is in the Cuculidae family. It is a relatively large, long, and slim-bodied bird. The thick, down curved bill is mostly yellow in color and almost as long as the head. It has a flat head, thin body, long tail, with pointed swept back wings when in flight. It is warm brown in color above, and a clean whitish color below. It has a blackish face mask with a yellow ring around its eye (USFWS 2015). This shy migrant bird winters in South America and breeds in the western U.S. WYBC is considered

a separate population from its eastern counterpart. Currently, WYBC is only known to breed in Arizona, California, Colorado, Idaho, New Mexico, and Utah (Johnson 2009).

Critical Habitat and Recovery Plans

Critical habitat for this species was proposed in 2014, constituting 546,335 acres in Arizona, California, Colorado, Idaho, Nevada, New Mexico, Texas, Utah, and Wyoming (USFWS 2014a, 2014b). This included approximately 395 acres that falls within the CRCP Plan Area. A proposed revision in the area of WYBC critical habitat that was published in the Federal Register on February 27, 2020, would eliminate all 395 acres within the CRCP Plan area and reduce the total critical habitat for this species to 493,665 acres in Arizona, California, Colorado, Idaho, Nevada, New Mexico, Texas, Utah, and Wyoming. No recovery plan has been issued for this species.

Distribution

The geographical breeding range of WYBC in western North America includes low- to moderate-elevation areas west of the crest of the Rocky Mountains in Canada and the United States, as well as river systems in Mexico. Currently, WYBC is only known to breed in California, Arizona, New Mexico, Colorado, Idaho, and Nevada. In California, breeding is restricted to the Sacramento, Kern, and Colorado Rivers. The Palo Verde Ecological Reserve north of Blythe in Riverside County supported 50 confirmed breeding territories in 2016. Fall migration routes follow the western coasts of Central America (including Mexico, Nicaragua, and Costa Rica), and wintering was documented in the Gran Chaco region of northern Argentina and southern Bolivia.

Habitat

Preferred habitat for WYBC consists of riparian woodlands with mixed stands of willow-cottonwood vegetation, mesquite-thorn forest vegetation, or a combination of these in contiguous or nearly contiguous patches that are greater than 325 feet in width and 200 acres or more in extent (USFWS 2014a, 2014b). Nest sites within these habitat patches are generally within willow-dominated areas with dense canopy closure (greater than 70 percent), and a cooler, more humid environment than the surrounding riparian and upland habitats. At Palo Verde Ecological Reserve near the Colorado River, nesting has been documented in Fremont cottonwood (*Populus fremontii*), honey mesquite (*Prosopis glandulosa*), and Gooding's willow (*Salix gooddingii)* (Parametrix and Southern Sierra Research Station 2016).

Threats

The main threats to WYBC include loss of suitable riparian habitat due to conversion to agriculture, alteration of natural river processes through ground-water pumping and flood control, non-native plant invasions, and development/urbanization. Pesticides from polluted runoff from agricultural fields may be found in prey items consumed by WYBC, causing reproductive problems such as eggshell thinning (Hughes 1999).

<u>Literature Cited:</u>

Hughes, Janice M. 1999. Yellow-Billed Cuckoo (*Coccyzus americanus*). In The Birds of North America Online, ed. A. Poole. Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu/bna/species/418

Johnson, M. J. 2009. Understanding the Habitat Needs of the Declining Western Yellow-Billed Cuckoo. U.S. Geological Survey. Available at: http://pubs.usgs.gov/fs/2009/3091/fs2009-3091.pdf

Parametrix, Inc., and Southern Sierra Research Station. 2016. Yellow-Billed Cuckoo Surveys on the Lower Colorado River, 2016 Annual Report. Submitted to the Bureau of Reclamation, Boulder City, NV, by D. Tracy and S.E. McNeil, Southern Sierra Research Station, Weldon, CA, and J. Lisignoli, Parametrix, Inc., Albuquerque, NM.

U.S. Fish and Wildlife Service. 2014b. Western Yellow-Billed Cuckoo Factsheet. Available at: https://www.fws.gov/sacramento/outreach/Public-Advisories/WesternYellow-BilledCuckoo/docs/WYBC-factsheet-southwestlearning.pdf

U.S. Fish and Wildlife Service. 2014a. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-Billed Cuckoo; Proposed Rule. Available at: https://www.gpo.gov/fdsys/pkg/FR-2014-08-15/pdf/2014-19178.pdf

U.S. Fish and Wildlife Service. 2015. Species Profile for Yellow-Billed Cuckoo. Available at: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06R

U.S. Fish and Wildlife Service. February 27, 2020. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-Billed Cuckoo. Available at: https://www.federalregister.gov/documents/2020/02/27/2020-02642/endangered-and-threatened-wildlife-and-plants-revised-designation-of-critical-habitat-for-the. Accessed May 1, 2020.

Mammals

San Bernardino Kangaroo Rat (*Dipodomys merriami parvus*)
Status: Federal Endangered; State Species of Special Concern

General Biology

SBKR is in the Heteromyidae family. It is yellowish-brown and has a body length of about 3.7 inches and a total length of nine to 9.3 inches. It is darker and smaller than either of the other two subspecies of Merriam's kangaroo rat in southern California and is the only species of kangaroo rat with four toes on both of its hind feet. SBKR reside in burrow systems, which appear to be occupied by a single adult. The burrow systems of adults are often clustered in a given area and individuals typically emerge from their burrows after sunset; they may be active at any time during the night. Typical of kangaroo rats, Merriam's kangaroo rats are granivorous (seed eaters) and often store large quantities of seeds in surface caches (Reichman and Price 1993, 543).

Although reproductive activities peak in June and July, SBKR appears to have a prolonged breeding season, as new litters have been recorded as late as November (USFWS 2009). Long-range dispersal and population expansion by SBKR is likely hampered by the presence of other rodents.

Kangaroo rat populations typically exhibit large fluctuations in density in response to temporal variability in plant productivity (Brown and Harney 1993, 624; Goldingay et al. 1997). Reproduction appears to be timed to coincide with high food-availability, but the rate of population growth is limited by the relatively small size of litters and long intervals between litters (Brown and Harney 1993, 625). Even during favorable times, adults tend to promote their own survival at the expense of reproduction and unlike other Heteromyids, *Dipodomys* does not have the ability to use stored foods (i.e., enter a state of torpor) which would help ameliorate population decreases during periods of drought and/or low resource abundance (Brown and Harney 1993, 625).

Critical Habitat and Recovery Plans

Current critical habitat for this species was originally designated in 2002. Additional critical habitat was designated in 2008 but was subsequently overruled by a federal district court. Critical habitat for this species currently consists of 7,779 acres within San Bernardino and Riverside Counties. The critical habitat designated represents much of the remaining occupied habitat (USFWS 2008b, 61955).

- ***Unit 1: Santa Ana River***
  - Located in San Bernardino County, encompasses approximately 3,258 acres, and includes the Santa Ana River and portions of City, Plunge, and Mill creeks
- ***Unit 2: Lytle and Cajon Creeks***
  - Encompasses approximately 3,904 acres in San Bernardino County, includes the northern extent of this species' remaining distribution
- ***Unit 3: San Jacinto River-Bautista Creek***
  - Encompasses approximately 617 acres in Riverside County and includes portions of San Bernardino National Forest, Soboba Band of Luiseno Indians Reservation, Bautista Creek, and areas along the San Jacinto River in the vicinity of San Jacinto, Hemet, and Valle Vista

Distribution

The historical range of SBKR extended from the San Bernardino Valley in San Bernardino County to the Menifee Valley in Riverside County (USFWS 1998). Extant populations are restricted to areas along the Santa Ana River, Mill Creek, Plunge Creek, City Creek, Lytle Creek, Cajon Wash, Cable Creek, San Jacinto River, and Bautista Creek (USFWS 2002).

Habitat

Soil texture is a primary limiting factor in the habitat and distribution of SBKR. Sandy loam substrates within alluvial fan and floodplain landforms are preferred. Within these areas, this species is known to dig simple, shallow burrows (USFWS 1998). Vegetation associated with SBKR includes scattered, low shrub canopy cover of alluvial sage-scrub and chaparral (USFWS 2002). SBKR are also known to occur on gentle slopes, along washes, and on adjacent upland refugia areas with soils containing sand, loam and gravel deposited by rivers and streams (Center for Biological Biodiversity n.d.).

Threats

Threats to all of the remaining populations of SBKR include habitat loss, destruction, degradation, and fragmentation due to sand and gravel mining operations, flood control projects, urban development, off-highway vehicle use, or some combination of these. In addition, the three largest remaining populations of this subspecies are endangered due to their small size and to habitat loss caused by changes in the natural stream flow regime, including seasonal flooding and associated modification of plant succession patterns. Loss and fragmentation of San Bernardino kangaroo rat habitat is expected to continue as Southern California's human population expands. Further habitat losses resulting from development or alteration of the landscape will likely have a significant adverse effect on the viability of remaining SBKR populations (USFWS 1998).

Literature Cited:

Brown, J.H., and B.A. Harney. 1993. Population and Community Ecology of Heteromyid Rodents in Temperate Habitats. In Biology of the Heteromyidae, ed. H. H. Genoways and J. H. Brown, 539–74. Special Publication No. 10. The American Society of Mammalogists.

Center for Biological Diversity. n.d. Natural History (San Bernardino Kangaroo Rat). Available at: http://www.biologicaldiversity.org/species/mammals/San_Bernardino_kangaroo_rat/natural_history.html. Accessed 27 July 2017.

Goldingay, R.L., P.A. Kelly, and D. F. Williams. 1997. The Kangaroo Rats of California: Endemism and Conservation of Keystone Species. Pacific Conservation Biology 3:47–60.

Reichman, O.J., and M. V. Price. 1993. Ecological Aspects of Heteromyid Foraging. In Biology of the Heteromyidae, ed. H. H. Genoways and J. H. Brown, 539–74. Special Publication No. 10. American Society of Mammologists.

U.S. Fish and Wildlife Service. 1998. Endangered and Threatened Wildlife and Plants; Final Rule to List San Bernardino Kangaroo Rat as Endangered. Federal Register 63 (185): 51005–17.

U.S. Fish and Wildlife Service. 2002. Service Proposes Critical Habitat for Endangered San Bernardino Kangaroo Rat.

U.S. Fish and Wildlife Service. 2009. San Bernardino Kangaroo Rat (*Dipodomys merriami parvus*) 5-Year Review: Summary and Evaluation.

San Joaquin Kit Fox (*Vulpes macrotis mutica)*
Status: Federal Endangered; State Threatened

General Biology

SJKF is in the Canidae family. It is one of the eight recognized subspecies of kit fox. SJKF are approximately 32 inches in total length, which include a 12-inch black-tipped tail. It has large ears that are set close together, slim body with long slender legs, narrow nose, and long, bushy tail tapering slightly toward the tip. The tail is usually carried low and straight. The color and texture of the fur of kit foxes varies seasonally and geographically. Buff, tan, and yellowish gray are the most common colors.

SJKFs are active year-round and are primarily nocturnal. Dens are used for housing and protection. One fox may use several dens, particularly during the summer months. SJKFs construct their own dens, but they can also enlarge or modify burrows constructed by other animals, such as ground squirrels, badgers, and coyotes. They also den in constructed structures, such as culverts, abandoned pipes, and banks in roadbeds. Most dens, especially natal and pupping dens, have at least two entrances (Morrell 1972).

SJKFs are able to reproduce when they are one year old, although they may not breed in their first year. Adult pairs remain together year-round but may not share the same den. The pups emerge from the den for the first time when they are slightly older than one month. After four to five months, usually in August or September, the young begin dispersing. Similar to other predators, reproductive success of SJKFs is related to the abundance of their prey. Decreases in prey abundance caused by circumstances such as drought and excessive rainfall result in decreases of reproductive success of kit foxes.

Critical Habitat and Recovery Plans

Critical habitat for this species has not been designated. SJKF is included in the Recovery Plan for Upland Species of the San Joaquin Valley, California prepared by USFWS (1998).

Distribution

Although no extensive survey has been conducted of the historical range, kit foxes are thought to inhabit suitable habitat on the San Joaquin Valley floor and in the surrounding foothills of the coastal ranges, Sierra Nevada, and Tehachapi Mountains. Kit foxes have been found on all the larger, scattered islands of natural land on the valley floor in Kern, Tulare, Kings, Fresno, Madera, San Benito, Merced, Stanislaus, San Joaquin, Alameda, and Contra Costa Counties. They also occur in the interior basins and ranges in Monterey, San Benito, San Luis Obispo, and possibly Santa Clara Counties; and in the upper Cuyama River watershed in northern Ventura and Santa Barbara Counties and southeastern San Luis Obispo County (USFWS 1983).

Habitat

Although SJKF has been found in urban areas such as Bakersfield, California, SJKF typically occur in desert-like habitats such as shrublands and grasslands (USFWS 1998). Areas are characterized by sparse or absent shrub cover, sparse ground cover, and short vegetative structures in hot, dry environments. Vegetation communities associated with SJKF in the southwestern portion of its range include valley sink scrub, valley saltbush, and annual grasslands. This species can also be found in agricultural areas including row crops, irrigated pastures, orchards, vineyards, oilfields and grazed annual grassland.

SJKF dens are usually located in loose-textured soils but can also be found in a variety of soil types. Den density decreases in areas with shallow soils, high water tables or hardpan layers. This species can also occupy constructed structures which resemble dens or burrows, such as abandoned pipelines and culverts. Presence of SJKF also requires prey sources such as kangaroo rats, mice, and squirrels.

Threats

SJKF are subject to predation or competitive exclusion by other species, such as the coyote, non-native red foxes, domestic dog, bobcat, and large raptors. The extent to which gray and kit foxes compete for resources is unknown. The need for similar den sites and prey species probably place non-native red foxes in direct competition with the much smaller kit fox. Non-native red foxes are expanding their geographic range in central California and competing with or preying on kit foxes. Coyotes aggressively dominate encounters with red foxes and will pursue and kill both red and gray foxes, as well as kit foxes (USFWS 1998). Loss and degradation of habitat by agricultural and industrial developments and urbanization continue, decreasing carrying capacity of remaining habitat and threatening kit foxes (USFWS 1998).

Petroleum field development in the southern half of the San Joaquin Valley affects kit foxes by causing habitat loss due to grading and construction for roads, well pads, tank settings, pipelines, and settling ponds. Habitat degradation derives from increased noise, ground vibrations, venting of toxic and noxious gases, and release of petroleum products and wastewater. Traffic-related mortality is also a factor for kit foxes living in oil fields. The cumulative and long-term effects of these activities on kit fox populations are not fully known (USFWS 1998).

Other developments within the kit fox's range include cities and towns, aqueducts, irrigation canals, surface mining, road networks, nonpetroleum industrial projects, power lines, and wind farms. These developments negatively impact kit fox habitat, but kit foxes may survive within or adjacent to them given adequate prey base and den sites (USFWS 1998).

The use of pesticides and rodenticides also pose threats to kit foxes. Pest control practices have impacted kit foxes in the past, directly, secondarily, or indirectly by reducing prey. The federal government began controlling the use of rodenticides in 1972 with a ban of Compound 1080 on federal lands (USFWS 1998).

Literature Cited:

Morrell, S. H. 1972. The Life History of the San Joaquin Kit Fox. California Fish and Game 58: 162–74.

U. S. Fish and Wildlife Service. 1983. San Joaquin Kit Fox Recovery Plan.

U.S. Fish and Wildlife Service. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California.

Stephens' Kangaroo Rat (*Dipodomys stephensi)*
Status: Federal Endangered; State Threatened

General Biology

SKR is in the Heteromyidae family. It is a small rodent with a large head, external cheek pouches, elongated and well-developed hind legs used for jumping, and small front legs used for grasping food. This species can be distinguished from near relatives by a narrower white tail band, dusky soles on the hind feet, and a more grizzled appearance (USFWS 1987).

SKR is a solitary, nocturnal, burrowing granivore preferring open types of habitat (Bleich 1977; Jones 1985). Burrows are usually found in clusters.Little information on life history or social behavior is known under field conditions.

SKR breeding season occurs during late spring and early summer (Lackey 1967a; Bleich 1973). The age of maturity is unknown; however, in some years, young-of-the-year may reproduce. When there are periods of little rainfall, reproduction may be suspended and survivorship may decrease (Burke et al. 1991) SKR is considered mid-tier among Heteromyids in regards to size and maturity rate (Lackey 1967b).

Critical Habitat and Recovery Plans

No critical habitat has been designated for SKR. A recovery plan for this species was drafted in 1997 but has not been finalized to date.

Distribution

SKR is endemic to the Perris and San Jacinto Valleys in western Riverside County and the San Luis Rey and Temecula Valleys in northern San Diego County. As the flat valleys have become more populated, the SKR has been increasingly confined to the bases of hills, the tops of level ridges, and the margins of plowed fields. There is no current estimate of the total SKR population, but both overall numbers and average densities have declined steeply. Loss of habitat to development continues at an accelerating rate (USFWS 1993).

Habitat

SKR occurs in open habitats and is commonly associated with grasslands, coastal sagebrush, and California buckwheat scrub, although populations can occur in shrubless areas. This species is usually found in areas with a vegetative cover of less than 30 percent. It is not uncommon to find SKR along dirt roads and other types of disturbed areas with high percentages of bare ground. This species generally requires herbaceous layers for foraging, usually dominated by storksbill (USFWS 1997). Certain non-native annual grasses, such as ripgut grass (*Bromus diandrus*), have been found to exclude SKR from otherwise suitable habitat. SKR is found between 180 and 101 feet above sea level and typically occurs in relatively flat or gently sloping ground (USFWS 1997). Like SBKR, soil texture is a limiting factor in their habitat and distribution. SKR prefers well drained soil such as

gravelly soil and typically avoids clay soils. In areas of hard soils, they have been known to occupy other small mammal burrows (USFWS 1997).

Threats

SKR was listed as an endangered species based, in large part, on a dramatic decline in the amount of occupied and potential SKR habitat in Southern California. Its habitat has become greatly reduced as a result of agriculture and urban development, which has also resulted in increased fragmentation of the remaining habitat. As a result, populations have become susceptible to the effects of some types of grazing, off-road vehicle activity, use of rodenticides, genetic bottlenecks, and predators such as domestic cats (*Felis catus*) which are all associated with adjacent development (Bleich 1977).

Literature Cited:

Bleich, B. C. 1977. *Dipodomys stephensi*. Mammalian Species. American Society of Mammalogists.

Burke, R.L., J. Tasse, C. Badgley, S.R. Jones, N. Fishbein, S. Phillips, and M.E. Soule. 1991. Conservation of the Stephens' Kangaroo Rat (*Dipodomys stephensi*): Planning for Persistence. Bull. Southern California Acad. Sci. 90 (1): 10–40.

Jones, W.T. 1985. Body Size and Life-History Variables in Heteromyids. J. Mamm. 66 (1): 128–32.

Lackey, J.A. 1967a. Biosystematics of Heermanni Group Kangaroo Rats in Southern California. Transaction of the San Diego Society of Natural History 14 (22): 313–44.

Lackey, J. A. 1967b. Growth and Development of *Dipodomys stephensi*. Journal of Mammalogy 48:624–32.

U.S. Fish and Wildlife Service. 1987. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Stephens' Kangaroo Rat. Federal Register 52: 44453–56.

U.S. Fish and Wildlife Service. 1993. Stephens' kangaroo rat ecological study (Naval Weapons Station, Fallbrook Annex San Diego County, California). Report to U.S. Navy Southwestern Division, Naval Facilities Engineering Command, San Diego, CA.

U.S. Fish and Wildlife Service. 1997. Draft Recovery Plan for the Stephen's Kangaroo Rat.

Plant Species

Braunton's Milk-Vetch (*Astragalus brauntonii*)
Status: Federal Endangered; 1B.1

General Biology

BMV is a short-lived perennial herb in the pea family (Fabaceae). It grows up to five feet tall with several to many stems rising from a thick taproot and woody crown. Stems appear white due to a dense covering of wooly hairs. The compound leaves range from 1.5 to 6.5 inches long, with 25 to 33 oblong-ovate, pale to greenish abruptly pointed leaflets. Flowers are a typical pea-type flower on short stalks, and are light purple, with 35 to 60 clustered in the last 1.5 to 5.5 inches of stems and branches. The fruit is an ovoid, slightly curved bean pod 2.5 to 3.5 inches long with three to six seeds (USFWS 1999, 2009).

Critical Habitat and Recovery Plans

Critical habitat was designated in 2006 and includes 3,300 acres distributed throughout Los Angeles, Orange, and Ventura Counties (USFWS 2006). A recovery plan for this species and five other plant species was released by USFWS in 1999.

Distribution

BMV is known from the mountains surrounding the Los Angeles Basin in Los Angeles, Orange, and Ventura Counties of Southern California (USFWS 2009). BMV is endemic to coastal Southern California and occurs only in five distinct geographic areas in Ventura, Los Angeles, and Orange Counties. These areas include (1) Simi Hills in eastern Ventura and western Los Angeles Counties; (2) eastern Santa Monica Mountains in Los Angeles County; (3) western Santa Monica Mountains near Pacific Palisades, Los Angeles County; (4) San Gabriel Mountains in Monrovia, Los Angeles County; and (5) Santa Ana Mountains in Orange County.

Habitat

BMV is found on limestone outcrops and knolls with shallow calcium-carbonate soils, or rarely downslope from such areas, in chaparral and coastal sage scrub communities at elevations ranging from 800 to 2,100 feet. BMV does not tolerate shading and occurs where microsite conditions inhibit shrub growth, or where disturbances (such as fire, flooding, erosion) reduces competition and stimulates seed germination; vegetative cover is typically less than 10 percent. Its bloom period is January to August.

Threats

Threats are varied and include habitat loss, fragmentation or degradation due to residential and commercial development, loss of pollinators and associated species, disruption of natural fire cycles, prescribed fuel modification for fire prevention (e.g., vegetation thinning, fire breaks, disking, mowing), fire suppression activities, land management activities (e.g., mowing, herbicide and pesticide application, livestock grazing), encroachment and competition with non-native invasive species, recreational activities (e.g., off-highway vehicles, equestrian activities), habitat alteration due to extreme weather conditions, and dangers from genetic drift and random catastrophic or climatic

events due to restricted distribution, narrow habitat requirements and small population size (USFWS 1999, 2009).

Literature Cited:

U.S. Fish and Wildlife Service. 1999. Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin. Available at: http://ecos.fws.gov/docs/recovery_plan/990930a.pdf

U.S. Fish and Wildlife Service. 2006. Designation of Critical Habitat for *Astragulus brauntonii* and *Pentachaeta lyonia*. Federal Register 71: 66374–423.

U.S. Fish and Wildlife Service. 2009. Braunton's Milk-Vetch (*Astragalus brauntonii*) 5-Year Review. Available at: http://ecos.fws.gov/docs/five_year_review/doc2381.pdf

California Seablite (*Suaeda californica*)
Status: Federal Endangered, State Endangered, CRPR 1B.1

General Biology

California seablite is a perennial shrub of the goosefoot family (Chenopodiaceae). It is a California endemic plant species currently found along the coastal region of central San Luis Obispo County that forms low mounds 1.2 to 3.2 inches tall with fleshy, narrow succulent leaves growing on stems each 0.2 to 1.4 inches long. The tiny flowers (0.08 to 0.12 inch across) are borne July to October.

Critical Habitat and Recovery Plans

No critical habitat rules have been published for the California seablite populations (USFWS 2017). It is included in the Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California (USFWS 2013).

Distribution

The current naturally occurring populations of California seablite are restricted to the upper tidal salt marshes of Morro Bay and estuarine creek mouths near Cayucos, California (Walgren 2006). Due to several reintroductions between 1999 and 2008, it is currently known from three sites in the San Francisco Bay region (USFWS 2013).

Habitat

It is found in estuarine habitats such as herbaceous wetlands and usually is restricted to the upper intertidal zone of a coastal salt marsh along the perimeter of a bay at zero to 50 feet in elevation (U.S. Fish and Wildlife Service, 2017). California seablite is usually found in seasonal wetlands but may occur in non-wetland habitats as well. Historically, populations once occurred in the San Francisco Bay area, but salt marsh habitats there have long-since been urbanized. Potential habitat along the central California coast is extremely limited (NatureServe 2017). Its bloom period is from July to October.

Threats

The primary threat with the greatest impact is habitat degradation/loss. The remaining populations are threatened by anything that alters the salt marsh habitat, including any increased sedimentation of Morro Bay, dredging projects, non-native plants, bluff erosion, and recreation (CDFW 2000; Baldwin et al. 2003). The plant's restricted range and limited number of individuals also threatens it with extinction due to random events (USFWS 1994).

Literature Cited:

Baldwin, B.G., S. Boyd, B.J. Ertter, R.W. Patterson, T.J. Rosatti, and D.H. Wilken. n.d. Jepson Flora Project. Regents of the University of California. Available at: http://ucjeps.berkeley.edu/jepson_flora_project.html

NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available at: http://explorer.natureserve.org. Accessed 18 July 2017.

U.S. Fish and Wildlife Service. 1994. Endangered and Threatened Wildlife and Plants; Endangered or Threatened Status for Five Plants and the Mono Shoulderband Snail from Western San Luis Obispo County, California. Federal Register 59 (240): 64613–23.

U.S. Fish and Wildlife Service. 2013. Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California.

U.S. Fish and Wildlife Service. n.d. Environmental Conservation Online System (ECOS). Available at: https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=6310

Walgren, Michael, Park Ecologist, California Department of Parks and Recreation, Morro Bay, CA. 31 July 2006. Electronic mail sent by Michael Walgren to Valary Bloom.

Chorro Creek Bog Thistle (*Cirsium fontinale* var. *obispoense*)
Status: Federal Candidate, State Endangered, CRPR 1B.2

General Biology

CCBT is a San Luis Obispo County endemic plant species belonging to the sunflower family (Asteraceae). First-year thistle plants form a large rosette; in the second or third year, the plant produces a branching stalk up to six feet in height and bearing numerous heads of whitish to pinkish-lavender tinged flowers. Its nodding flower heads and glandular hairs on the leaves separate it from other thistles that occur in the area (CDFW 2004).

Critical Habitat and Recovery Plans

No critical habitat has been established for this species. CCBT was included in the recovery plan for the Morro Shoulderband Snail and Four Plants from San Luis Obispo County in 1998 (USFWS 1998).

Distribution

CCBT is known from only 13 CNDDB occurrences, all within San Luis Obispo County. Due to its specific habitat requirements, it is unlikely that CCBT was ever widespread or abundant (USFWS 2017).

Habitat

Habitat for CCBT is restricted to open boggy seep areas and drainages in serpentine soils in chaparral, coastal scrub and valley grasslands found at elevations between 110 to 1,260 feet. Its blooming period is generally February through July but may extend to October (California Native Plant Society 2017).

Threats

Populations are threatened by impacts from cattle such as trampling, changes in the water quality of occupied habitat including loss of natural water supply, competition with non-native plant species, and possibly the future effects of extreme weather conditions. There are ongoing conservation efforts to monitor the size and health of the population in Camp San Luis Obispo (CDFW 2017).

Literature Cited:

California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plants and Animals of California Species Accounts.

California Department of Fish and Wildlife. 2017. California Natural Diversity Database. Rare Find 5 Results for *Cirsium fontinale var. obispoense*.

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available at: http://www.rareplants.cnps.org. Accessed 12 July 2017.

U.S. Fish and Wildlife Service. 1998. Recovery Plan for the Morro Shoulderband Snail and Four Plants from Western San Luis Obispo County, California.

U.S. Fish and Wildlife Service. 2017. Environmental Conservation Online System: Species Profile for Chorro Creek Bog Thistle (*Cirsium fontinale var. obispoense*). Available at: https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=5991#status. Accessed 12 July 2017.

Conejo Dudleya (*Dudleya abramsii* ssp. *parva or Dudleya parva*)
Status: Federal Threatened, CRPR 1B.2

General Biology

The conejo dudleya is a California endemic plant species belonging to the stonecrop family (Crassulaceae). It is a perennial herb with succulent leaves that grow in a basal rosette with flowering stems 1.2 to 7 inches tall that branch with small yellow flowers. Conejo dudleya rosettes, unlike most taxa in this subsection of Dudleya, have leaves that wither by early summer before flowering.

Critical Habitat and Recovery Plans

No critical habitat has been designated for this species. Conejo dudleya was included in a recovery plan for six plants species from the mountains surrounding the Los Angeles Basin (USFWS 1999).

Distribution

There are 18 reported occurrences of conejo dudleya from the western end of Simi Hills to the Santa Monica Mountains in Ventura County. Within this range, there is a large meta-population that extends along the northern slope of Mountclef Ridge from the vicinity of the Reagan Library in the east to Camarillo Springs Road in the west (USFWS 2015).

Habitat

It grows at the base of scattered volcanic or sandstone rock outcrops in grassland and coastal sage scrub habitats between approximately 200 to 1,480 feet in elevation (USFWS 1997; California Native Plant Society, Rare Plant Program 2017). The bloom period spans April through July.

Threats

Threats to this species include recreational activity (hiking and equestrian use), urban development, fire management and suppression activities, and collection (Skinner and Pavlik 1994). No critical habitat rules have been published for the conejo dudleya (NatureServe 2017).

Literature Cited:

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available at: http://www.rareplants.cnps.org. Accessed 12 July 2017.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 12 July 2017.

Skinner, Mark W., and Bruce M. Pavlik, eds. 1994. Inventory of Rare and Endangered Vascular Plants of California. CNPS Special Publication No. 1. 5th ed.

U.S. Fish and Wildlife Service. 1997. Threatened Species Status for *Dudleya. abramsii ssp. Parva* (Conejo Dudleya). Federal Register 62 (19); 50 CFR Part 17: RIN 1018–AB88.

U.S. Fish and Wildlife Service. 1999. Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin.

U.S. Fish and Wildlife Service. 2015. Conejo Dudleya 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc4507.pdf. Accessed 27 July 2017.

U.S. Fish and Wildlife Service. 2017. Environmental Conservation Online System: Species Profile for Conejo Dudleya (*Dudleya. abramsii ssp. Parva*). Available at: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q0O7. Accessed 12 July 2017.

Gambel's Watercress (*Nasturtium gambelii*)
Status: Federal Endangered, State Endangered, CRPR 1B.1

General Biology

GWC is an herbaceous perennial in the mustard family (Brassicaceae). This species characteristically roots from the stem with scattered compound leaves and dense clusters of white flowers (CDFW 2004). GWC closely reassembles the non-native common watercress (*N. officinale*). The narrow fruits with seeds arranged in one row (rather than two) and the more angular and sharply toothed leaflets distinguish this species from common watercress.

Critical Habitat and Recovery Plans

No critical habitat has been designated for this species. A recovery plan for this species was established in 1998 (USFWS 1998).

Distribution

Historically, GWC occurred in numerous wetland habitats in central and Southern California (Orange, San Bernardino, Los Angeles, Santa Barbara, and San Luis Obispo Counties). Currently GWC is known from four small populations: three in San Luis Obispo County and one in adjacent Santa Barbara County. San Luis Obispo populations occur at Little Oso Flaco Lake and Black Lake Canyon (CDFW 2004); however, these populations have been observed introgressed with non-native *N. officinale* species (USFW 1993). Only one remaining native wild population is extant at Vandenberg Air Force Base in northern Santa Barbara County (Keil 1997; CNDDB 2010).

Habitat

GWC is found in freshwater or brackish marsh habitats at the margins of lakes and along slow-flowing streams with sandy acidic soils. It grows in or just above the water surface and requires a permanent source of water. These habitats occur from sea level to approximately 1,480 feet in elevation (NatureServe 2017). Its bloom period is from April to June.

Threats

Existing populations are primarily threatened by competition with exotic species and development where suitable habitat remains.

Literature Cited:

California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plants and Animals of California Species Accounts.

California Natural Diversity Database. 2010. Element Occurrence Reports for *Nasturtium gambelii*. Rarefind.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 12 July 2017.

U.S. Fish and Wildlife Service. 1993. Endangered Species Status for *Rorippa gambelli* (Gambel's Watercress). Final Rule. Federal Register 58 (147): 41378–84.

U.S. Fish and Wildlife Service. 1998. Recovery Plan for Marsh Sandwort (*Arenaria paludicola*) and Gambel's Watercress (*Rorippa gambelii*).

Gaviota Tarplant (*Deinandra increscens* ssp. *villosa*)
Status: Federal Endangered, State Endangered, CRPR 1B.1

General Biology

The Gaviota tarplant is a California endemic plant species belonging to the sunflower family (Asteraceae). This summer flowering annual has variable gray-green soft hairy leaves with stems branching near the base. The flowering stems are 11.8 to 35.4 inches tall and bear yellow ray and disk flowers. The foliage is aromatic and the soft hairy leaves distinguish this subspecies from the other two subspecies of *Deinandra increscens* (CDFW 2004).

Critical Habitat and Recovery Plans

Critical habitat was designated for Gaviota tarplant on November 7, 2002 (USFWS 2002). Approximately 9,709 acres of critical habitat has been designated in San Barbara County. No recovery plan has been issued for this species.

Distribution

Historically, populations of Gaviota tarplant were only known from locations on marine terraces in the vicinity of Gaviota, Santa Barbara County. Currently populations have been observed at approximately seven new locations ranging westward from Gaviota along the coast and in the Santa Ynez Mountains.

Habitat

Gaviota tarplant is found along the west coast of Santa Barbara County in habitats where needlegrass grasslands intergrade with coastal sage scrub on sandy soils associated with marine terraces and uplifted marine sediments, ranging from 150 to 1,000 feet in elevation (NatureServe 2017). As is typical of annual plant species, the populations of Gaviota tarplant from year to year vary dramatically, generally depending on the amount and timing of rainfall and temperature regimes during critical stages of germination and seedling growth. There are some years when known occurrences may contain few to no individuals. It blooms from May through October.

Threats

Primary threats for Gaviota tarplant are destruction of individual plants, habitat loss, and habitat degradation from the development and decommissioning of oil and gas facilities, including pipelines, incompatible fire management practices, residential and commercial development, and competition with non-native weeds.

Literature Cited:

California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plants and Animals of California Species Accounts.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 18 July 2017.

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Eriodictyon capitatum* (Lompoc Yerba Santa) and *Deinandra increscens* ssp. *villosa* (Gaviota Tarplant). Final Rule. Federal Register 67 (216): 67968–8000.

Indian Knob Mountainbalm (*Eriodictyon altissimum*)
Status: Federal Endangered, State Endangered, CRPR 1B.1

General Biology

IKM is a California endemic plant species belonging to the borage family (Boraginaceae). IKM is an evergreen shrub that reaches a height of approximately six to 13 feet. It is characterized by long, narrow sticky leaves and clusters of tubular pale lavender flowers. Similar to other fire-adapted chaparral plants, IKM produces new growth primarily from rhizomatous suckers.

Critical Habitat and Recovery Plans

No critical habitat rules have been published for this species. IKM was included in the recovery plan for the Morro Shoulderband Snail and Four Plants from San Luis Obispo County in 1998 (USFWS 1998).

Distribution

This species is restricted to a limited area in the coastal region of San Luis Obispo County. This species is known from six occurrences in the Irish Hills and on Indian Knob in San Luis Obispo County (USFW 1994).

Habitat

IKM grows on shallow, sandy soils derived from siliceous sandstone ridges in coast live oak woodland and coast maritime chaparral between approximately 260 to 890 feet in elevation (CDFW 2004; California Native Plant Society, Rare Plant Program 2017). Its bloom period spans March through June.

Threats

IKM is threatened by urbanization, energy development, and vehicles and possibly threatened by alteration of fire regimes and non-native plants (California Native Plant Society, Rare Plant Program 2017).

Literature Cited:

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available at: http://www.rareplants.cnps.org. Accessed 16 July 2017.

U.S. Fish and Wildlife Service. 1994. Endangered or Threatened Status for Five Plants and the Morro Shoulderband Snail from Western San Luis Obispo County, California. Federal Register 59 (240): 64613–23.

U.S. Fish and Wildlife Service. 1998. Recovery Plan for the Morro Shoulderband Snail and Four Plants from Western San Luis Obispo County, California.

Lompoc Yerba Santa (*Eriodictyon capitatum*)
Status: Federal Endangered, State Rare, CRPR 1B.2

General Biology

LYS is a California endemic plant species belonging to the borage family (Boraginaceae). LYS grows as an aromatic evergreen shrub usually 6.5 feet tall with stems covered by long, narrow sticky leaves and terminal clusters of tubular pale lavender flowers. LYS is distinguished from other members of the genus primarily by its capitate (head-like) inflorescences and narrow leaves (USFWS 1994).

Critical Habitat and Recovery Plans

Approximately 6,400 acres of critical habitat was designated for LYS on November 7, 2002 (USFWS 2002). No recovery plan has been issued for this species.

Distribution

LYS is known from four occurrences in southwestern Santa Barbara County on Vandenberg Air Force Base, on the west crest of the Santa Ynez Mountains on Hollister Ranch, and on Graciosa Ridge in the Solomon Hills southeast of Orcutt.

Habitat

LYS generally occurs between approximately 130 and 2,950 feet in elevation (California Native Plant Society, Rare Plant Program 2017). It is found in two distinct habitats with strongly acidic soils. LYS grows on sandstone soils in chaparral and coastal sage scrub communities and on diatomaceous Monterey shales with an overstory of Bishop pine (California Native Plant Society 1987). Its bloom period spans March through September.

Threats

Threats to LYS are fire management practices, invasive non-native plant species, low seed productivity, and naturally occurring catastrophic events such as wildfire (CDFW 2004).

Literature Cited:

California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plants and Animals of California Species Accounts.

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available at: http://www.rareplants.cnps.org. Accessed 16 July 2017.

U.S. Fish and Wildlife Service. 1994. Final Rule for Endangered Status for Four Plants from South Central Coastal California. Final Rule. Federal Register 65 (54): 67968–8001.

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Eriodictyon capitatum* (Lompoc Yerba Santa) and *Deinandra increscens* ssp. *villosa* (Gaviota Tarplant). Final Rule. Federal Register 67 (216).

Lyon's Pentachaeta (*Pentachaeta lyonii*)
Status: Federal Endangered, State Endangered

General Biology

Lyon's pentachaeta is an annual herb in the sunflower family (Asteracea). Plants grow from two to 19 inches tall, branching from the base. Leaves are narrowly linear with small hairs along the edges; nodes[549] are often hairy. Stems and branches are terminated by flowering heads, with 30 or more heads per plant. The cup-shaped daisy-like heads have small, lanceolate, hairy bracts in two or three rows, and containing many small yellow florets. There are 17 to 42 showy ray florets (the "petals" of the daisy) that curl slightly backwards, surrounding 21 to 91 disk florets in the center. The fruit of each flower is a tiny, sunflower-like seed topped by bristles (USFWS 1999, 2008).

Critical Habitat and Recovery Plans

Approximately 3,396 acres of critical habitat was designated in Los Angeles and Ventura Counties in 2006 (USFWS 2006). The entire critical habitat designation is within the Plan Area. This species was included in a recovery plan for six plants from the mountains surrounding the Los Angeles Basin (USFWS 1999).

Distribution

Lyon's pentachaeta is known from the Santa Monica Mountains and western Simi Hills, and historically from the Palos Verdes Peninsula and Santa Catalina Island in Los Angeles and Ventura counties of Southern California (USFWS 2008). There are two occurrence areas that overlap the general project area: (1) the Santa Monica Mountains in eastern Ventura and western Los Angeles Counties and (2) the western Simi Hills in Ventura County.

[549] Node – "a point on a stem where leaves, buds or branches usually arise" (Weber & Wittmann 2012).

Habitat

Lyon's pentachaeta is found on saddles, tops of hills and knolls, and flat areas at the base of slopes in pocket grasslands or openings (including margins of roads and trails) typically with low vegetative cover and exposed soils with macrobiotic crusts in a mosaic of chaparral and coastal sage scrub with rocky clay soils of volcanic origin at elevations of 280 to 2,060 feet. Its bloom period is April to June.

Threats

Threats to Lyon's pentachaeta include habitat loss, fragmentation, or degradation due to residential and commercial development, loss of pollinators and associated species, disruption of natural fire cycles, prescribed fuel modification for fire prevention (e.g., vegetation thinning, fire breaks, disking, mowing), fire suppression activities, land management activities (e.g., mowing, herbicide and pesticide application, livestock grazing), encroachment and competition with non-native invasive species, recreational activities (e.g., off-highway vehicles, equestrian activities), habitat alteration due to extreme weather conditions, and dangers from genetic drift and random catastrophic or climatic events due to restricted distribution, narrow habitat requirements and small population size (USFWS 1999, 2008).

Literature Cited:

U.S. Fish and Wildlife Service. 1999. Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin. Available at: http://ecos.fws.gov/docs/recovery_plan/990930a.pdf

U.S. Fish and Wildlife Service. 2006. Designation of Critical Habitat for *Astragulus brauntonii* and *Pentachaeta lyonia*. Federal Register 71:66374–423.

U.S. Fish and Wildlife Service. 2008. Lyon's Pentachaeta (*Pentachaeta lyonii*) 5-Year Review. Available at: http://ecos.fws.gov/docs/five_year_review/doc1994.pdf

Marcescent Dudleya (*Dudleya cymosa* ssp. *marcescens*)
Status: Federal Threatened, CRPR 1B.2

General Biology

The marcescent dudleya is a California endemic plant species belonging to the stonecrop family (Crassulaceae). It is a perennial herb with succulent leaves that grow in a basal rosette with flowering stems 1.6 to 4 inches tall that branches with bright yellow flowers (USFWS 1997). Marcescent dudleya rosettes, unlike most taxa in this subsection of Dudleya, have leaves that wither by early summer before flowering (USFWS 1997).

Critical Habitat and Recovery Plans

No critical habitat rules have been published for the marcescent dudleya (NatureServe 2017). Marcescent dudleya was included in a recovery plan for six plants from the mountains surrounding the Los Angeles Basin (USFWS 1999).

Distribution

There have been 10 reported occurrences of marcescent dudleya from an area roughly 14 square miles in size in the Santa Monica Mountains within Ventura County (NatureServe 2017). These occurrences are grouped along two watersheds, Little Sycamore Canyon and Malibu Creek, with all other occurrences scattered between these two locations (USFWS 2009).

Habitat

Marcescent dudleya typically occurs on sheer volcanic cliffs and canyon walls in canyons with perennial streams between approximately 490 to 1,740 feet in elevation (California Native Plant Society, Rare Plant Program 2017). It usually grows with mosses and lichens in places too steep for soils to form. Its bloom period is from April to July.

Threats

Major threats to marcescent dudleya include recreation activities such as rock climbing and residential development (USFWS 2009).

Literature Cited:

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available at: http://www.rareplants.cnps.org. Accessed 12 July 2017.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 13 July 2017.

U.S. Fish and Wildlife Service. 1997. Determination of Endangered Status for Two Plants and Threatened Status for Four Plants from Southern California. Federal Register 62 (19): 4172–83.

U.S. Fish and Wildlife Service. 1999. Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin. Available at: http://ecos.fws.gov/docs/recovery_plan/990930a.pdf

U.S. Fish and Wildlife Service. 2009. Marcescent Dudleya 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc2543.pdf. Accessed 27 July 2017.

Morro Manzanita (*Arctostaphylos morroensis*)
Status: Federal Threatened, CRPR 1B.1

General Biology

Morro manzanita is a San Luis Obispo County endemic plant species belonging to the heath family (Ericaceae). An evergreen shrub sometimes reaching 13 feet in height, Morro manzanita has red shaggy bark, upright spreading branches, and leathery leaves that are dark green above and grayish below with dense, woolly hairs. It produces clusters of white-pinkish, urn-shaped flowers, followed by orange-brown, berry-like fruits (NatureServe 2017).

Critical Habitat and Recovery Plans

No critical habitat has been designated (USFWS 2013). Morro manzanita was included in the Recovery Plan for the Morro Shoulderband Snail and Four Plants from San Luis Obispo County in 1998 (USFWS 1998).

Distribution

Morro manzanita is known from fewer than ten occurrences in the Morro Bay area, and approximately 75 percent of its historical habitat has been converted for residential use, resulting in highly fragmented populations (USFWS 2013).

Habitat

It generally occurs between 16 to 670 feet in elevation (California Native Plant Society, Rare Plant Program 2017). The distribution of Morro manzanita is correlated with that of soils derived from ancient sand dunes classified as Baywood fine sands. This species is found in association with coastal dune scrub, maritime chaparral, and coast live oak woodland on sites with low to moderate slopes and in nearly pure stands on steep slopes, especially on north exposures (NatureServe 2017). Its bloom period is from December to March.

Threats

Because of its narrow habitat preference, Morro manzanita is particularly vulnerable to habitat loss and fragmentation. Residential development resulting in habitat loss, alteration of fire regimes, and competition from non-native plants is the primary threat to Morro manzanita.

Literature Cited:

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available at: http://www.rareplants.cnps.org. Accessed 20 June 2017.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

U.S. Fish and Wildlife Service. 2013. *Arctostaphylos morroensis* (Morro Manzanita) 5-Year Review.

Nevin's Barberry (*Berberis nevinii*)
Status: Federal Endangered, State Endangered

General Biology

Nevin's barberry is an evergreen shrub in the barberry family (Berberidaceae) with gray-green leaves divided into flat, feather-like leaflets with toothed margins and a terminal spine.

Critical Habitat and Recovery Plans

Approximately six acres of critical habitat has been designated in Riverside County, California (USFWS 2008a, 2008b, 2010). No critical habitat is within the CRCP Plan Area. No recovery plan has been issued for this species.

Distribution

There are 14 native occurrences of this species known to occur scattered discontinuously from Los Angeles County, the San Bernardino–Riverside County border, and southwestern Riverside County (USFWS 2009). It is most abundantly distributed south of Vail Lake in Riverside County (USFWS 2009).

Habitat

Nevin's barberry occurs in a variety of habitats, including nearly flat sandy washes, terraces, and canyon floors to gravelly wash margins; steep-sloped drainage banks; and steep rocky ridges, slopes, or mountain summits (USFWS 2009). This species is known to occur in chaparral, coastal sage scrub, oak woodland, riparian scrub/woodland, and alluvial scrub vegetation types (USFWS 2009). Most native occurred near are found within an elevation range of 1,400 to 1,700 feet above sea level. This shrub blooms from March through April, with loosely clustered yellow flowers that develop into juicy, yellowish-red berries (USFWS 1998, 2009).

Threats

Major threats to Nevin's barberry include urbanization, road widening, recreational activities, fire management practices and altered fire regimes, as well as risks to environmental events due to small population size and low reproduction rates (USFWS 2009).

Literature Cited:

U.S. Fish and Wildlife Service. 1998. Endangered or Threatened Status for Three Plants from the Chaparral and Scrub of Southwestern California. Federal Register 63: 54956–71.

U.S. Fish and Wildlife Service. 2008a. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Berberis nevinii* (Nevin's barberry). Federal Register 73: 8412–40.

U.S. Fish and Wildlife Service. 2008b. Lyon's pentachaeta (*Pentachaeta lyonii*) 5-Year Review. Available at: http://ecos.fws.gov/docs/five_year_review/doc1994.pdf

U.S. Fish and Wildlife Service. 2009. *Berberis nevinii* (Nevin's Barberry) 5-Year Review: Summary and Evaluation.

U.S. Fish and Wildlife Service. 2010. *Eriastrum densifolium* subsp. *sanctorum* (Santa Ana River Woolly-Star) 5-Year Review: Summary and Evaluation.

Nipomo Mesa Lupine (*Lupinus nipomensis*)
Status: Federal Endangered, State Endangered, CRPR 1B.1

General Biology

NML is a San Luis Obispo County endemic plant species belonging to the pea family (Fabaceae). This low growing annual is 3.9 to 7.8 inches tall with decumbent stems and leaves covered with dense hairs. The flowering stems are not whorled, and have pink flowers (NatureServe 2017). NML is distinguished from the related *L. concinnus* by its decumbent inflorescence, succulent leaflets, lack of axillary flowers, and restriction to sand dune habitat (Walters and Walters 1988).

Critical Habitat and Recovery Plans

No critical habitat or recovery plan has been designated for this species.

Distribution

NML grows in the stabilized back dune habitat of the Guadalupe dunes in the southwestern corner of San Luis Obispo County. The species occurs as one extended population made up of seven occurrences with fewer than 700 plants. The small patches are spread over 1.5 miles west of Highway 1 and between Black Lake Canyon to the north and Oso Flaco Lake to the south. Historical occurrences at three locations have not been observed in recent surveys, including for its type locality (USFWS 2000).

Habitat

NML is restricted to stabilized back dunes supporting a relatively open central coastal dune scrub community. This species generally occurs 426 feet above sea (California Native Plant Society, Rare Plant Program 2017). The majority of the historical habitat is considered degraded by either physical disturbance or invasion by non-native weedy species. All known occurrences of NMP are on private lands and remain unprotected. Its bloom period is from December to May.

Threats

Principle threats to the current population include continued coastal development, off-highway vehicle activity, and expansion of introduced weedy plants, particularly veldt grass and ice plant (CDFW 2004).

Literature Cited:

California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plants and Animals of California Species Accounts.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 18 July 2017.

U.S. Fish and Wildlife Service. 2000. Endangered and Threatened Wildlife and Plants; Final Rule for Endangered Status for Four Plants from South Central Coastal California. Federal Register 65 (54): 14888–97.

Walters, B., and D. Walters. 1988. Taxonomy, Demography, and Ecology of *Lupinus nipomensis* A. Eastwood. California Polytechnic State University, San Luis Obispo.

Pismo Clarkia (*Clarkia speciosa* ssp. *immaculata*)
Status: Federal Endangered, State Rare, CRPR 1B.1

General Biology

The Pismo clarkia is a San Luis Obispo County endemic plant species belonging to the Four O'Clock family (Onagraceae). An annual herb with erect or decumbent branched stems up to 20 inches long with narrow green leaves. The showy flowers with 0.6- to one-inch-wide fan-shaped petals are white or cream-colored at the base, streaking into pinkish or reddish-lavender in the upper part. It is distinguished from the subspecies *speciosa* by its larger flowers and the pattern of petal color.

Critical Habitat and Recovery Plans

Critical habitat for the Pismo clarkia has not been established. Pismo clarkia is included in the Recovery Plan for the Morro Shoulderband Snail and Four Plants from San Luis Obispo County in 1998 (USFWS 1998).

Distribution

Historically, the known distribution of Pismo clarkia ranged from San Luis Obispo south to the Nipomo Mesa area. Currently, it is known from 14 occurrences in the Pismo Beach area with a range that is approximately 14 miles by 7 miles. All of the recently discovered populations occur within this area.

Habitat

Pismo clarkia generally occurs at elevations between 80 and 610 feet above sea level (CDFW 2004) on pockets of dry sandy soils, possibly ancient sand dunes, in grassy openings (including roadsides) within chaparral and oak woodland communities (NatureServe 2017). The bloom period is from May to July.

Threats

The main threat to Pismo clarkia is expanding residential development that causes loss of habitat, the spread of non-native plants, wildfires, and recreational uses (USFWS 2009).

Literature Cited:

California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plants and Animals of California Species Accounts.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 19 July 2017.

U.S. Fish and Wildlife Service. 1998. Recovery Plan for the Morro Shoulderband Snail and Four Plants from Western San Luis Obispo County, California.

U.S. Fish and Wildlife Service. 2009. *Clarkia speciosa subsp. immaculata* (Pismo Clarkia) 5-Year Review: Summary and Evaluation.

San Fernando Valley Spineflower (*Chorizanthe parryi* var. *fernandina*)
Status: Federal Candidate, State Endangered, CRPR 1B.1

General Biology

SFVS is a California endemic plant species belonging to the buckwheat family (Polygonaceae). It is an annual herb that grows low to the ground, between 0.8 and 4 inches tall, with straight involucre awns, differing from most spineflowers in the same genus (Reveal and Rosatti 2017).

Critical Habitat and Recovery Plans

Due to SFVS's candidate status for federal listing, no critical habitat is designated. No recovery plan for this species has been issued.

Distribution

The current known distribution of SFVS spans two counties: Los Angeles and Ventura. Known populations exist in Laskey Mesa (Ventura County) and near Santa Clarita (Los Angeles County). Historically, it was known from surveys and collections in Los Angeles and Orange Counties.

Habitat

SFVS grows in poorly developed soils composed of loam, silty clay loam, and/or sand (USFWS 2016). Its habitat consists of open areas in coastal scrub as well as valleys and foothill grasslands between 492 to 4,002 feet in elevation (California Native Plant Society, Rare Plant Program 2017). Its bloom period spans April through July.

Threats

Current annual population numbers vary within lands designated for conservation but most of its suitable habitat has been replaced by urban sprawl (NatureServe 2017). Urban development and introduction of non-native species are the primary threats for this species.

Literature Cited:

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available at: http://www.rareplants.cnps.org. Accessed 20 June 2017.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

Reveal, James L., and Thomas J. Rosatti 2017. *Chorizanthe parryi* var. *fernandina*. Jepson eFlora, Revision 2. Available at: http://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=56493. Accessed 21 June 2017.

U.S. Fish and Wildlife Service. 2016. Threatened Species Status for *Chorizanthe parryi* var. *fernandina* (San Fernando Spineflower). Proposed Rule. Federal Register 81 (179): 63453–66.

Santa Ana River Woolly-Star (*Eriastrum denifolium* ssp. *sanctorum*)
Status: Federal Endangered, State Endangered, 1B.1

General Biology

SARW is a perennial, woolly-looking subshrub in the phlox family (Polemoniaceae). This rounded or spreading shrub branches from the base, grows to 30 inches tall, and is entirely covered in woolly hairs, resulting in a woolly appearance (USFWS 2010). Violet-blue funnel-shaped flowers are grouped in inflorescences at the ends of stems with about 20 flowers per inflorescence, rising above spiny-tipped bracts (De Groot et al. 2016; USFWS 2010).

Critical Habitat and Recovery Plans

No critical habitat or recovery plan has been designated for SARW.

Distribution

SARW is endemic to the Santa Ana River drainage of Southern California, and occurs within the floodplains of Mill Creek, City Creek, Plunge Creek, the Santa Ana River, Cajon Wash, and Lytle Creek within San Bernardino County. It is also known to occur within more downstream portion of the Santa Ana River within Riverside County, although it was once believed to be extirpated form this area (USFWS 2010).

Habitat

Preferred habitat for SARW includes open, well-lit areas along sandy alluvial terraces where infrequent flood events occur, and where shrublands are persistent along the drainage terrace (USFWS 2010). Its bloom period occurs from May to September (De Groot et al. 2016).

Threats

Major threats to this subspecies include habitat alteration or destruction through urban floodplain development, alteration of hydrology, aggregate mining, off-highway vehicle use, hybridization, and extreme weather conditions (USFWS 2010).

Literature Cited:

De Groot, S., D. Gowen, and R. Patterson. 2016. *Eriastrum densifolium* subsp. *sanctorum*. Jepson eFlora. Available at: http://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=50332. Accessed 7 March 2016.

U.S. Fish and Wildlife Service. 2010. *Eriastrum densifolium* subsp. *sanctorum* (Santa Ana River Woolly-Star) 5-Year Review: Summary and Evaluation.

Santa Monica Mountains Dudleya (*Dudleya cymosa* ssp. *ovatifolia*)
Status: Federal Threatened; CRPR 1B.1

General Biology

SMMD is a succulent perennial herb in the stonecrop family (Crassulaceae). It forms an evergreen basal rosette of fleshy, ovate leaves with pointed tips (0.8 to 2 inches long and 0.6 to 1 inches wide), which are often maroon on the underside. Fleshy, branching, often reddish flowering stems rise from 1.6 to 6 inches tall with densely crowded, small fleshy, leaf-like bracts, and topped with five-lobed pale yellow flowers. The fruit of each flower consists of five many-seeded pods (USFWS 1999, 2009). Forms that are segregated as subspecies *agourensis* have leaves that are bluish and chalky without the maroon under-coloring, and have bright lemon yellow flowers (USFWS 2009).

Critical Habitat and Recovery Plans

No critical habitat has been proposed for this species (USFWS 2015). SMMD was included in the Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin (USFWS 1999).

Distribution

SMMD is known from the Santa Monica Mountains of Los Angeles and Ventura Counties and the Santa Ana Mountains of Orange County in Southern California (USFWS 2009). Currently, there are three populations of SMMD: one occurs in the Santa Ana Mountains (Modjeska Canyon in Orange County), and the other two occur in the Santa Monica Mountains (Topanga and Malibu Canyons, Los Angeles County) (USFWS 2009).

Habitat

SMMD is found on shaded slopes and canyon bottoms on sedimentary or conglomerate rock in chaparral or coastal scrub communities in microhabitats that may be otherwise limited to club mosses, mosses, and lichens; *agourensis* forms are found on volcanic gravels and outcrops in chaparral or coast live oak (*Quercus agrifolia*) or California juniper (*Juniperus californicus*) woodlands. It occurs in elevation ranges between 490 and 1,640 (Wade McCabe 2017). Its bloom time is May to June.

Threats

Threats to the subspecies include habitat loss, fragmentation, or degradation due to residential and commercial development, destruction from fire, fire suppression or fire prevention activities, recreational activities (e.g., rock climbing, hiking substrate removal or graffiti), collection by commercial and private enthusiasts, road maintenance, encroachment by and competition from non-native invasive species, habitat alteration due to extreme weather conditions, and dangers from genetic drift and random catastrophic or climatic events due to restricted distribution, narrow habitat requirements and small population size (USFWS 1999, 2009).

Literature Cited:

U.S. Fish and Wildlife Service. 1999. Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin. Available at: http://ecos.fws.gov/docs/recovery_plan/990930a.pdf

U.S. Fish and Wildlife Service. 2009. *Dudleya cymosa* ssp. *ovatifolia* (Santa Monica Mountains Dudleya) 5-Year Review. Available at: http://ecos.fws.gov/docs/five_year_review/doc3224.pdf

U.S. Fish and Wildlife Service. 2015. Species Profile for Santa Monica Mountains Dudleya (*Dudleya cymosa* ssp. *ovatifolia*). Available at: http://ecos.fws.gov/tess_public/profile/speciesProfile?spcode=Q3AK. Accessed 31 December 2015.

Wade McCabe, Stephen. 2017. *Dudleya cymosa* ssp. *ovatifolia*. Jepson eFlora. Available at: http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=50238. Accessed 30 August 2017.

Seaside Bird's Beak (*Cordylanthus rigidus littoralis*)
Status: State Endangered; CRPR 1B.1

General Biology

SBB is a member of the figwort family (Scrophulariaceae). It is a California endemic plant species currently restricted to the coastal regions of Monterey and Santa Barbara Counties (Smith and Berg 1988). It grows as an annual herb with ascending branches, yellow roots, spikes of purplish flowers, linear leaves, and fine hair interspersed throughout with longer hairs (NatureServe 2017).

Critical Habitat and Recovery Plans

No critical habitat or recovery plan is designated for this species.

Distribution

The current known distribution spans two counties: Monterey and Santa Barbara. Historically, SBB was thought to be restricted to northern Monterey County until recently. Populations of SBB were identified from Burton Mesa (Santa Barbara) and the base closure of Fort Ord (Monterey) (CDFW 2004).

Habitat

SBB occurs in closed-cone pine forest, cismontane woodland, or maritime chaparral from Monterey to Santa Barbara Counties (CDFW 2004). It thrives in sandy soils with recent disturbance or reduced levels of shrub and herbaceous plants competition. It generally occurs between 0 to 1690 feet in elevation (California Native Plant Society, Rare Plant Program 2017). Its bloom period is April through October.

Threats

The current threats to this state listed species are development, energy projects, road widening, vehicles, and military operations. Known populations are present at about 10 sites located on publicly and privately owned lands such as Vandenberg Air Force Base in Santa Barbara. (CDFW 2004).

Literature Cited:

California Department of Fish and Wildlife. 2004. The Status of Rare, Threatened, and Endangered Plant of California from 2000-2004. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=84013&inline=1

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available at: http://www.rareplants.cnps.org.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org.

Smith, J.P., and K. Berg. 1988. California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California. 4th ed. California Native Plant Society.

Slender-Horned Spineflower (*Dodecahema leptoceras*)
Status: Federal Endangered, State Endangered, CRPR 1B.1

General Biology

SHS is a California endemic plant species in the buckwheat family (Polygonaceae). It is a low-growing annual herb 1.2 to 3.1 inches tall distinguished from other spineflowers for having an involucre that is six-angled, with six basal awns, and six terminal awns (Reveal and Rosatti 2017).

Critical Habitat and Recovery Plans

No critical habitat or recovery plan has been designated for this species.

Distribution

SHS current known distribution extends from the San Gabriel Mountains in Los Angeles County, east to the San Bernardino Mountains, and south to the northern edge of the peninsular ranges. At the time of its federal listing in 1978, as *Centrostegia leptocerans*, it was only known from five locations, all in San Bernardino and Riverside counties (USFWS 1987). There are currently 20 extant SHS occurrences distributed among Los Angeles County (Big Tujunga Wash and Bee Canyon), San Bernardino County (upper Santa Ana River, Cajon Creek, and Lytle Creek), and Riverside County (Temescal Wash, Bautista Creek, and near Vail Lake-Kolb and Arroyo Seco Creeks) (USFWS 2010).

Habitat

Habitat for SHS is composed of sandy soil in alluvial fans, floodplains, terraces, washes and benches in chaparral, cismontane woodland, and coastal scrub (NatureServe 2017) between approximately 660 and 2,490 feet in elevation (California Native Plant Society, Rare Plant Program 2017). Its bloom period is from April through June.

Threats

SHS is threatened by urban development and introduction of non-native species.

Literature Cited:

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available at: http://www.rareplants.cnps.org. Accessed 20 June 2017.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 20 June 2017.

Reveal, James L., and Thomas J. Rosatti 2017. *Chorizanthe parryi* var. *fernandina*. Jepson eFlora, Revision 2. Available at: http://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=56493. Accessed 21 June 2017.

U.S. Fish and Wildlife Service. 2010. Slender-Horned Spineflower 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc3622.pdf. Accessed 27 July 2017.

Vandenberg Monkeyflower (*Diplacus vandenbergensis* / *Mimulus fremontii var. vandenbergensis*)
Status: Federal Endangered; 1B.1

General Biology

The Vandenberg monkeyflower is a small annual herb in the lopseed family (Phrymaceae). It grows up to 0.7 foot tall with glandular stems and usually green with purplish tinting. Vandenberg monkeyflower produces a single yellow flower or branch out producing multiple flowers. They have tubular yellow flowers that are bilaterally symmetrical, with the distal ends of the petals forming a unique structure that is likened to a face; hence, the common name monkeyflower (USFWS 2014).

Critical Habitat and Recovery Plans
Critical habitat was designated in 2015 and includes 5,800 acres distributed throughout Santa Barbara County (USFWS 2015). There is no recovery plan.

Distribution

Vandenberg monkeyflower is known to occupy a specific landscape in Santa Barbara County, California. It is endemic to coastal Southern California and is known to occur in the Burton Mesa. Vandenberg monkeyflower is currently known to occur within sandy openings at nine extant locations exclusively on Burton Mesa: (1) Oak Canyon, (2) Pine Canyon (includes historical location in lower Pine Canyon), (3) Lake Canyon, (4) Santa Lucia Canyon, (5) Volans Avenue, (6) Clubhouse Estates, (7) Davis Creek, (8) La Purisima West, and (9) La Purisima East (USFWS 2014).

Habitat

It is restricted to the Burton Mesa region in sandy openings of coastal scrub, chaparral, and woodland communities at elevations ranging from 200 to 400 feet (USFWS 2014). Vandenberg monkeyflower habitat includes sandy openings (canopy gaps) within dominant vegetation (USFWS 2013).

Threats

Vandenberg monkeyflower is threated by development, vehicles, and non-native plants (California Native Plant Society, Rare Plant Program 2017). The species is listed under factors that are set by Section 4(a)(1) of the FESA: Factor A – The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range; Factor D – The Inadequacy of Existing Regulatory Mechanisms; and Factor E – Other Natural or Manmade Factors Affecting Its Continued Existence (USFWS 2014).

Literature Cited:

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available at: http://www.rareplants.cnps.org

U.S. Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Endangered Status for Vandenberg Monkeyflower. Federal Register; 16 U.S.C. 1361–1407; 1531–1544; 4201–4245; unless otherwise noted. Available at: https://www.federalregister.gov/documents/2013/10/29/2013-25397/endangered-and-threatened-wildlife-and-plants-endangered-status-for-vandenberg-monkeyflower

U.S. Fish and Wildlife Service. 2014. Endangered and Threatened Wildlife and Plants; Endangered Status for Vandenberg Monkeyflower. Federal Register; 16 U.S.C. 1361–1407; 1531–1544; 4201–4245, unless otherwise noted. Available at: https://www.federalregister.gov/documents/2014/08/26/2014-20054/endangered-and-threatened-wildlife-and-plants-endangered-status-for-vandenberg-monkeyflower

U.S. Fish and Wildlife Service. 2015. Designation of Critical Habitat for *Displacus vandenbergensis* (Vandenberg Monkeyflower). Federal Register 80:48142–70.

Ventura Marsh Milk-Vetch (*Astragalus pycnostachyus* var. *lanosissimus*)
Status: Federal Endangered, State Endangered, CRPR 1B.1

General Biology

VMMV is a California endemic plant species belonging to the pea family (Fabaceae). It is a short-lived herbaceous perennial, believed to have a three- to four-year lifespan. VMMV has a thick taproot and multiple erect, reddish stems, 15.7 to 35.4 inches tall that emerge from the root crown. The compound leaves are densely covered with silvery-white hairs with 27 to 39 leaflets. The numerous yellowish-white to cream colored flowers are in dense clusters (Wilken and Wardlaw 2001).

Critical Habitat and Recovery Plans

Approximately 420 acres of VMMV critical habitat was established in Santa Barbara and Ventura Counties by the USFWS in 2004 (USFWS 2004).

Distribution

Historically, VMMV is known from coastal sites in Ventura, Los Angeles, and Orange Counties (USFWS 2001). VMMV was rediscovered near Oxnard in 1997 and is now known from one natural occurrence composed of 30 to 50 reproductive plants (California Native Plant Society, Rare Plant Program. 2017). There are introduced sites within coastal Santa Barbara County that have had varying

degrees of successful establishment of VMMV. The current known distribution (including outplanting sites) spans two counties: Santa Barbara and Ventura.

Habitat

From information based on historical collections Wilken and Wardlaw (2001) concluded that this subspecies occurred in on open sites near the coast on soils with a high water table, such as on bluffs or flats near seeps or bodies of brackish or fresh water, or in or near coastal marshes. The current naturally occurring population of VMMV is in a sparsely vegetated low area of degraded dune habitat that was previously used for disposal of petroleum waste products in Ventura County (USFWS 2010). Its bloom period is from June to October.

Threats

Both the natural and introduced sites sustain substantial threats from urban development, herbivory (from introduced snails and slugs), disease, competition from non-native invasive weeds and hydrological alterations (NatureServe 2017).

Literature Cited:

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available at: http://www.rareplants.cnps.org. Accessed 18 July 2017.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 18 July 2017.

U.S. Fish and Wildlife Service. 2001. Endangered and Threatened Wildlife and Plants; Final Rule for Endangered Status for *Astragalus pycnostachyus var. lanosissimus* (Ventura Marsh Milk-Vetch). Federal Register 66 (98): 27901–8.

U.S. Fish and Wildlife Service. 2004. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for *Astragalus pycnostachyus var. lanosissimus* (Ventura Marsh Milk-Vetch). Federal Register 69 (98): 29081.

U.S. Fish and Wildlife Service. 2010. *Astragalus pycnostachyus var. lanosissimus* (Ventura Marsh Milk-Vetch) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service Ventura Fish and Wildlife Office Ventura, California June 2010

Wilken D. and T. Wardlaw. 2001. Ecological and Life History Characteristics of Ventura Marsh Milkvetch (*Astragalus pycnostachyus var. lanosissimus*) and Their Implications for Recovery. Prepared for California Department of Fish and Game, South Coast Region, San Diego, CA. Funded by U.S. Fish and Wildlife Service Section 6 Program, Contract No. P995002.

Verity's Dudleya (*Dudleya verityi*)
Status: Federal Threatened, CRPR 1B.1

General Biology

Verity's dudleya is a California endemic plant species belonging to the stonecrop family (Crassulaceae). It is a succulent, rosette-forming perennial herb with leaves that grow in a basal rosette. Verity's dudleya is unique among the dudleya family in that it forms multiple rosettes, as many as 100 to a colony. The flowering stems are two to 5.9 inches tall and branch with lemon yellow flowers (USFWS 1997).

Critical Habitat and Recovery Plans

No critical habitat rules have been published for this species. Verity's dudleya was included in the Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin (USFWS 1999).

Distribution

Verity's dudleya is a narrow endemic species with a native range on the lower slopes of a single mountain in Southern California. The entire distribution of the species is scattered of a four-mile stretch of land along the northern slope of Conejo Mountain and on a north-facing volcanic outcrops in the vicinity of the California State University, Channel Islands campus (USFWS 2009).

Habitat

It generally occurs between approximately 200 and 1,200 feet in elevation in chaparral, cismontane woodland, and coastal scrub habitat where it may be locally abundant on rock outcrops (California Native Plant Society, Rare Plant Program 2017). The bloom period spans May through June.

Threats

Current threats to the remaining populations include fire, mining, flood control activities, development, and non-native plants (USFWS 2009).

Literature Cited:

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available at: http://www.rareplants.cnps.org. Accessed 12 July 2017.

U.S. Fish and Wildlife Service. 1997. Determination of Endangered Status for Two Plants and Threatened Status for Four Plants from Southern California. Federal Register 62 (19): 4172–83.

U.S. Fish and Wildlife Service. 1999. Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin. Available at: http://ecos.fws.gov/docs/recovery_plan/990930a.pdf

U.S. Fish and Wildlife Service. 2009. Verity's Dudleya 5-Year Review. Available at: https://ecos.fws.gov/docs/five_year_review/doc2554.pdf. Accessed 27 July 2017.

Fully Protected Species

Fish

Unarmored Threespine Stickleback (*Gasterosteus aculeatus williamsoni*)
Status: Federally Endangered

General Biology

UTS is in the Gasterosteidae family. The Santa Clara River populations of UTS spend all of their life in freshwater in the upper portions of that basin (Baskin 1974, 1975). Young UTS hatch in a nest from eggs which have been brooded for several days by the adult male, which fans the eggs and guards the nest and surrounding territory from possible predators (Baskin 1974, 1975; Baskin and Bell 1976). The parental care is essential for successful reproduction. UTS populations tend to decline because of natural mortality and low recruitment during the winter (USFWS 1985).

Reproduction occurs during almost every month. A large increase in reproductive activity occurs in the spring, about March, and continues at a lower level throughout the summer and fall (USFWS 1985).

Males develop nuptial coloration (bright red throat, blue sides, green eyes), establish a territory, and build a nest of aquatic vegetation on the stream bottom during breeding season. These nests are located in places where there is ample vegetation and a gentle flow of water. Females lay the eggs, and males fertilize and guard them. Males also use their pectoral fins to pass a current of water over the eggs. This "fanning" behavior is essential for the proper development of the eggs (USFWS 1985).

Adults (1.3 inches standard length or longer) are found in all areas of the stream and tend to gather in areas of slower moving or standing water. In rapid moving water, adults are usually found behind obstructions, or at the edge of the stream, especially under the edge of algal (*Cladophora* spp.) mats.

Population size estimates (Baskin 1975; Baskin and Bell 1976) indicate that the best habitat is a small clean pond in the stream with a constant flow of water through it. A pond such as this once located at Thousand Trails in Soledad Canyon supported between two and 3.4 fish per square meter. The cleanliness of the water in Soledad Canyon is indicated by the 2.49 diatom diversity index found there by Riznyk (in Baskin 1974).

Critical Habitat and Recovery Plans

Critical habitat for UTS was proposed in 1980; however, it was determined by the USFWS in 2002 that no critical habitat designation should be made. A recovery plan for the species was published in 1977 and revised in 1985 (USFWS 1977, 1985).

Distribution

Distribution of UTS is restricted to the upper Santa Clara River and its tributaries in Los Angeles County, San Antonio Creek on Vandenberg Air Force Base in Santa Barbara County, and the Shay Creek vicinity in San Bernardino County (USFWS 2009). Historic populations occurred within the San Gabriel and Santa Ana Rivers, but these have since been deemed extirpated.

Habitat

Previous studies suggest that UTS thrives in headwater streams with slow, continuous flows that are isolated—except during rainy periods—from the ocean by stretches of dry streambed (USFWS 1980). Adults are found in all areas of the stream and tend to gather in areas of slower-moving or standing water. In rapid moving water, adults are usually found behind obstructions, or at the edge of the stream, especially under the edge of algal (*Cladophora* spp.) mats. Population size estimates are based on the availability of ideal habitat, which consists of small, clean pools in a stream with perennial flows (Baskin 1974, 1975).

Threats

The management of UTS presents some unusual problems not typically encountered in endangered species management. In addition to the usual challenges of maintaining essential habitat and sufficient numbers of individuals, UTS is a subspecies and is susceptible to introgression by *Gasterosteus aculeatus microcephalus*. Lateral plate counts also have been shown to be strongly influenced by selective predation, and the introduction of predators to the essential habitat might selectively eliminate zero-plated sticklebacks, obliterating the unique features by which UTS is recognized (Bell 1976a, 1976b).

Literature Cited:

Baskin, J. N. 1974. Survey of the Unarmored Threespine Stickleback, *Gasterosteus aculeatus williamsoni*, in the Upper Santa Clara River Drainage. Unpublished Report, Contract No. 14-16-001-5387SE, U.S. Bureau of Sport Fish, and Wildlife.

Baskin, J. N. 1975. Biology and the Habitat of the Unarmored Threespine Stickleback, *Gasterosteus aculeatus williamsoni*, in the Upper Santa Clara River, California. Unpublished Report, Contract No. AB-27, California Department of Fish and Game.

Baskin, J. N., and M. A. Bell. 1976. Unarmored Threespine Stickleback Survey and Report. Unpublished Report, Contract No. 39-5495, U.S. Department of Agriculture Forest Service.

Bell, M.A. 1976a. Evolution of Phenotypic Diversity in *Gasterosteus aculeatus* Superspecies on the Pacific Coast of North America. Syst. Zool. 25: 211–27.

Bell, M.A. 1976b. The Evolution of Phenotypic Diversity in the Threespine Sticklebacks, *Gasterosteus aculeatus*. PhD diss., University of California, Los Angeles.

U.S. Fish and Wildlife Service. 1980. Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for the Endangered Unarmored Threespine Stickleback. Proposed Rule. Federal Register 223: 76012–15.

U.S. Fish and Wildlife Service. 1985. Unarmored Threespine Stickleback Recovery Plan (Revised).

U.S. Fish and Wildlife Service. 2009. Unarmored Threespine Stickleback (*Gasterosteus aculeatus williamsoni*) 5-Year Review: Summary and Evaluation.

Birds

American Peregrine Falcon *(Falco peregrinus anatum)*
Status: Delisted

General Biology

In California, APF is in the Falconidae family. It occurs all over the state, most commonly in Northern California. This is a medium-sized falcon with long pointed wings, a dark crown and nape, and a dark wedge extending below the eye. Its forehead is pale in immature individuals, which are mainly brownish above rather than black or gray as in adults (National Geographic Society 1983).

APF are diurnal. In general, much hunting occurs in morning and to a lesser extent in the evening, but APF may hunt anytime during day. This species builds its nests in substrates on ledges of cliffs ranging from 26 to 1,312 feet in height. The male creates a depression in the substrate by scraping it with his feet. Most APFs will use ledges that had been used by other APF in previous years. APFs arrive at nest sites around April or May, and egg-laying may begin from two weeks to two months later depending on the latitude.

Critical Habitat and Recovery Plans

Critical habitat for APF was proposed in 1976 and finalized in 1977. No recovery plan for this species was ever issued; however, USFWS issued a Monitoring Plan for APF in 2003.

Distribution

In California, APF is an uncommon breeder (mostly along coastal areas in the Plan Area) and uncommon winter migrant in coastal and more inland areas (Zeiner et al. 1990). However, since the 1970s, the breeding population has dramatically increased, and active nest sites are known from 40 counties, spanning the length of California.

Habitat

Breeding APFs utilize habitats containing cliffs and almost always nest near water (Wheeler et al. 2003, 477; White et al. 2002). APFs generally utilize open habitats for foraging. Non-breeding APFs may also occur in open areas without cliffs. Many artificial habitats like towers, bridges and buildings are also utilized by APFs (White et al. 2002).

Threats

The decline of this species has long been linked to the use of persistent organochlorine pesticides, such as DDT. Since the banning of DDT in North America in the early 1970s, APF has made a significant recovery (Rowell 2002). However, organochlorine residues persist in the environment, and this species is still being affected. There are also other threats such as habitat loss, human disturbance, and illegal take.

<u>Literature Cited:</u>

National Geographic Society. 1983. Field Guide to the Birds of North America.

Rowell, P. A. 2002. Update COSEWIC Status Report on Anatum Peregrine Falcon (*Falco peregrinus anatum*). Report Submitted to the Committee on the Status of Endangered Wildlife in Canada. Environment Canada, Ottawa.

White, Clayton M., Nancy J. Clum, Tom J. Cade, and W. Grainger Hunt. 2002. Peregrine Falcon (*Falco peregrinus*). In The Birds of North America Online. Available at: http://bna.birds.cornell.edu/bna/species/660

Wheeler, B.K., C.M. White, and J.M. Economidy. 2003. Raptors of Western North America: The Wheeler Guide.

Zeiner, D.C., W.F. Laudenslayer Jr., K.E. Mayer, and M. White, eds. 1990. California's Wildlife: Volume II. Birds. California Department of Fish and Game.

California Condor *(Gymnogyps californianus)*
Status: Federally Endangered, State Endangered

General Biology

The California condor is in the new world vulture (Cathartidae) family. It is a large, soaring, scavenging bird native to western North America. It is one of the largest flying birds in the world, weighing up to 22 pounds and having a wingspan of up to nine feet. It is almost entirely black except for white lining under its wings and a bald head that is red-orange (USFWS 2013). This species nests in caves or crevices along cliffs and will roost in large trees, snags, rocky outcrops, and cliffs. For foraging, this species utilizes grasslands and savanna foothills (USFWS 2015a).

Critical Habitat and Recovery Plans

The species was afforded critical habitat in 1975 in the coastal mountains of California (USFWS 1975).

Distribution

Although once more widely distributed in western North America, by the 1950s California condors were confined in California to a horseshoe-shaped area encompassing six counties just north of Los Angeles, California (Koford 1953). During 1986 and early 1987, the remaining adult and juvenile wild birds were captured for a captive breeding program, and California condors were absent from the wild until 1992 when the first eight captive reared birds were released in Southern California (USFWS 2013). In 2016, the wild California condor population was estimated to consist of 276 individuals distributed in southern California (80), central California (86), Arizona and Utah (76), and Baja Mexico (34).

Habitat

California condors require large areas of remote lands for foraging, roosting, and nesting (USFWS 2017). Nests are typically located in shallow caves and rock crevices on steep cliffs where there is minimal disturbance; however, they have also been documented using holes at the top of giant sequoia trees as nests. They roost on large trees or snags, or on isolated rocky outcrops and cliffs. Foraging habitat includes open grasslands and oak savanna foothills that support populations of large

mammals such as deer and cattle. These animals provide a source of carrion which serves as the Condor's primary food source.

Threats

Primary threats to this species include lead poisoning, "micro-trash," and habitat modification. California condors are scavengers and will feed on carcasses that have been shot with lead bullets. Ingested meat that contains fragments of lead bullets results in lead poisoning and ultimately death if the condor does not receive medical treatment (USFWS 2015b). Additionally, California condors will occasionally scavenge small items of trash, which they then regurgitate and feed to their young. Young birds have trouble passing this trash and it can lead to a blockage in the gastrointestinal track that prevents them from digesting any other food (USFWS 2015b).

Literature Cited:

Koford, C.B. 1953. The California Condor. National Audubon Society.

U.S. Fish and Wildlife Service. 1975. Proposed Determination of Critical Habitat for Snail Darter, American Crocodile, Whooping Crane, California Condor, Indiana Bat, and Florida Manatee; 40 FR 58308 58312 (Percina (Imostoma) sp., Crocodylus acutus, Grus americana, Gymnogyps californicus, Myotis sodalis, Trichechus manatus. Proposed Rule. Federal Register 40: 58308–12.

U.S. Fish and Wildlife Service. 2013. California Condor 5-Year Review. Available at: http://www.fws.gov/uploadedFiles/Region_8/NWRS/Zone_1/Hopper_Mountain_Complex/Hopper_Mountain/Sections/News/News_Items/PDFs/_California%20Condor%20Five%20Year%20Review_2013%20Final%20Published.pdf. Accessed 4 October 2015.

U.S. Fish and Wildlife Service. 2015a. California Condor Recovery Program. Available at: http://www.fws.gov/cno/es/CalCondor/Condor.cfm. Accessed 5 January 2016.

U.S. Fish and Wildlife Service. 2015b. California Condor Recovery Program—Threats. Available at: http://www.fws.gov/cno/es/CalCondor/CondorThreats.cfm. Accessed 5 January 2016.

U.S. Fish and Wildlife Service. 2017. California Condor Recovery Program. Available at: https://www.fws.gov/cno/es/CalCondor/Condor.cfm. Accessed 27 July 2017.

California Least Tern *(Sterna antillarum browni)*
Status: Federally Endangered, State Endangered

General Biology

CLT is in the Laridae family. These terms have a distinctive black cap with black stripes running from the cap across the eyes to the beak which contrast with their white foreheads. Their upper parts are gray, and they have white underparts. These terns have short, forked tails, orange bills and legs, and a black wedge on the end of their wings. CLT is a diurnal species. CLTs lay clutches of usually two to three eggs, mostly in May to June (July to August nests probably are re-nests). The females mainly incubate their eggs usually 20 to 25 days. The young are tended by both parents, brooded for several days, fly at about three to four weeks, and are dependent for a few weeks more. Their first breeding periods occur at two to three years of age.

Critical Habitat and Recovery Plans

No critical habitat has been designated for CLT. A revised recovery plan was prepared in 1985 by USFWS.

Distribution

CLT occurs along the Pacific coast, from San Francisco to Baja California.

Habitat

CLTs usually inhabit seacoasts, beaches, bays, estuaries, lagoons, lakes, and rivers (American Ornithologists' Union 1983). These terns rest on sandy beaches, mudflats, and salt-pond dikes (Stiles and Skutch 1989). They may roost at night on sandy beaches away from nesting areas for several weeks before nesting. These terns nest usually on open, flat beaches along lagoon or estuary margins; sometimes on mud or sand flats a distance from the ocean or on artificial islands created from dredge spoils (Ehrlich et al. 1992). They usually nest in same area in successive years; tends to return to natal site to nest (Atwood and Massey 1988).

Threats

CLT is threatened by dredging, habitat loss, nesting disturbance, pollution, and predation by domestic and wild animals. Major problems are human use and development of nesting habitat and predation on adults, eggs, and young by birds (e.g., kestrels, night-herons) and mammals (foxes, skunks, domestic cats, and dogs). The reduced number of suitable nesting areas has limited or eliminated the tern's anti-predator strategy of shifting among different nesting areas in different years.

Literature Cited:

American Ornithologists Union. 1957. The A.O.U. Check-List of North American Birds. 5th ed. Port City Press, Inc.

Atwood, J. L., and B. W. Massey. 1988. Site Fidelity of Least Terns in California. Condor 90: 389–94.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1992. Birds in Jeopardy: The Imperiled and Extinct Birds of the United States and Canada, Including Hawaii and Puerto Rico. Stanford University Press.

Stiles, F. G., and A. F. Skutch. 1989. A Guide to the Birds of Costa Rica. Cornell University Press.

Golden Eagle (*Aquila chrysaetos*)
Status: Protected by Bald and Golden Eagle Protection Act

General Biology

The golden eagle is in the Accipitridae family. It is a very large raptor with mostly brown plumage, a golden wash on the back of the head and neck, and a mostly horn-colored bill; its tail is faintly banded. Immatures have white at the base of the primaries and a white tail with a dark terminal

band. Golden eagles are 29 to 40 inches in length, with a wingspan of 79 to 88 inches (National Geographic Society 1983). Golden eagles are diurnal with foraging commonly occurring in the early morning and early evening. They are carnivores whose diet consists primarily of small mammals (e.g., rabbits, marmots, ground squirrels) but sometimes also includes large insects, snakes, birds, juvenile ungulates, and carrion. Nest building may begin one to three months prior to mating and is considered part of the breeding process. Breeding season varies regionally, beginning in November and December in southern areas.

Critical Habitat and Recovery Plans

No critical habitat or recovery plan has been issued for golden eagle as it is not a federally listed species.

Distribution

The golden eagle occurs year-round all over California.

Habitat

Golden eagles generally inhabit open and semi-open country such as prairies, sagebrush, arctic and alpine tundra, savannah or sparse woodland, and barren areas, especially in hilly or mountainous regions, in areas with sufficient mammalian prey base and near suitable nesting sites (Great Basin Bird Observatory 2010).

Threats

The golden eagle is not listed as threatened or endangered; however, there are threats to its survival. This species was on the decline in the early 1900s was due to eradication campaigns, frequently encouraged by the use of bounties (eagle was believed to be a major predator on livestock). They are also extremely susceptible to powerline electrocution because the wings can span phase-to-phase or phase-to-ground wires (Biosystems Analysis 1989); modifications have been made in problem areas. Other threats include ingestion of poison intended for coyotes; ingestion of toxic water from mining activities; occasional shootings; habitat loss to agriculture, suburban land uses, and energy development; loss of potential food resources as a result of habitat degradation or rodent/rabbit control; mortality in inappropriately designed stock tanks, and collisions with structures and with vehicles on roadways. Human disturbance or activity may cause nest abandonment, render a nest site less productive, or prevent a suitable nest site from being utilized, but direct disturbance of nests appears to be infrequent (see Great Basin Bird Observatory 2010).

Literature Cited:

Biosystems Analysis, Inc. 1989. Endangered Species Alert Program Manual: Species Accounts and Procedures. Southern California Edison Environmental Affairs Division.

Great Basin Bird Observatory. 2010. Nevada Comprehensive Bird Conservation Plan. Version 1.0. Great Basin Bird Observatory, Reno, NV. Available at: www.gbbo.org/bird_conservation_plan.html

National Geographic Society. 1983. Field Guide to the Birds of North America.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life. Version 7.1. Available at: http://explorer.natureserve.org. Accessed 8 August 2017.

White-Tailed Kite *(Elanus leucurus)*
Status: None

General Biology

WTK is in the Accipitridae family. It is a medium-sized hawk with long narrow pointed wings, a long white tail, gray back and wings, white face and underside, black spot on the inner portions of its wings, and red eyes. A juvenile is similar looking to the adult; however, the juveniles have buffy streaks on their breast and hard, gray with white-tipped (scalloped) feathers on back, and yellow eyes. WTKs are diurnal. In Southern California, they arrive at a communal roost generally between sunset and dark; activity begins early in the morning (see Palmer 1988). They hunt mostly in early morning and late afternoon (Ridgely et al. 1989). Female incubates usually four to five eggs for about 30 to 32 days. The male provides food for the young. Young leave the nest in 30 to 35 days (or more) sometimes two broods/year. Some may breed at one year (Palmer 1988). In Southern California, communal roosting occurs in fall and winter, and locations of roosts may shift during this period.

Critical Habitat and Recovery Plans

No critical habitat or recovery plan has been issued for WTK as it is not a federally listed species.

Distribution

In California, WTK occurs year-round all over the state.

Habitat

WTKs are commonly found in savanna, open woodlands, marshes, desert grassland, partially cleared lands, and cultivated fields. WTK generally avoids areas with extensive winter freezes, but rainfall and humidity vary greatly throughout this bird's range. WTKs hunt over lightly grazed or ungrazed fields where there may be larger prey populations than in more heavily grazed areas.

Threats

WTK is a relatively rare species, and its prey fluctuates greatly in numbers from year to year—so measuring population trends of this kite is difficult. Populations appear to have experienced a small decline between 1966 and 2014, according to the North American Breeding Bird Survey. Partners in Flight estimate a global breeding population of 2 million with 4 percent living in the U.S. and 10 percent in Mexico. The species rates 8 out of 20 on the Continental Concern Score, and is not on the 2014 State of the Birds Watch List. In the early 20th century, WTK, like many hawks, were subject to shooting as well as egg collecting. Development of land can deprive this species of nest trees, and modern farming techniques can eliminate vegetation that its main prey, voles, uses for cover. In a conservation effort in Northern California, the CDFW set aside grazed pastures and allowed them to return to grassland; they now support about 10 times the number of raptors, including white-tailed kites, as before the program began.

Literature Cited:

Palmer, R. S., ed. 1988. Handbook of North American birds. Vol. 4. Diurnal Raptors, Part 1. Yale University Press.

Ridgely, R. S., and J. A. Gwynne Jr. 1989. A Guide to the Birds of Panama. 2nd ed. Princeton University Press.

Mammals

Morro Bay Kangaroo Rat *(Dipodomys heermanni morroensis)*
Status: State and Federally Listed Endangered Species; State Fully Protected Species

General Biology

MBKR is in the Heteromyidae family. It is relatively small and dark in coloration. MBKRs are nocturnal with little or no activity in January and February, increased activity in early summer, declining activity in midsummer, and possible fall resurgence of activity. They generally emerge soon after dark. Factors such as rain and fog, and sometimes moonlight, may inhibit activity. Breeding appears to begin simultaneously with plant growth in spring. MBKR lifespan is around three years (Matthews and Moseley 1990). Its population density varies widely with habitat. MBKR density estimates varied from 42 per hectare in best habitat to five per hectare in marginal habitat. In one area, individual foraging range was estimated at 98 to 400 feet across.

Critical Habitat and Recovery Plans

Critical habitat for this species was established in 1977. A draft revised recovery plan for MBKR was issued in 2000.

Distribution

MBKR historically occurred in central California from El Dorado County south to Santa Barbara County, but the species is currently restricted to the vicinity of Los Oso, San Luis Obispo County (USFWS 2011).

Habitat

MBKR inhabits early seral stages of the chaparral community; low and sparse vegetation; widely-scattered shrubs; medium-textured sandy loam: southern coastal scrub, coastal sage scrub, or coastal sand plains and stabilized dunes. Plant species in this habitat include bush lupine (*Lupinus albifrons*), dune lupine (*Lupinus chamissonis*), mock heather (*Ericameria ericoides*), coyote bush, California sagebrush, croton, buckwheat, phlox (*Galium* sp.), and deerweed (*Acmispon* sp.); plant roots provide support for burrows (Matthews and Moseley 1990).

Threats

MBKR is endangered as a result of human encroachment on habitat and lack of natural disturbance by fire (e.g., results in unsuitable vegetation density) and other factors (e.g., predation by domestic cats) (Kelt 1988). Habitat fragmentation probably has had a negative impact. These threats are

occurring because of the restricted habitat and narrow range in Southern California which make the species vulnerable to habitat loss from residential and agricultural development. MBKR has an extremely low population size.

Literature Cited:

Kelt, D.A. 1988. *Dipodomys heermanni*. Mammalian Species 323: 1–7.

Matthews, J.R., and C.J. Moseley, eds. 1990. The Official World Wildlife Fund Guide to Endangered Species of North America. Vol. 1. Plants, Mammals. Vol. 2. Birds, Reptiles, Amphibians, Fishes, Mussels, Crustaceans, Snails, Insects, and Arachnids. Beacham Publications, Inc.

U.S. Fish and Wildlife Service. 2011. Morro Bay Kangaroo Rat (*Dipodomys heermanni morroensis*) 5-Year Review: Summary and Evaluation.

FIGURE B-1

Delhi Sands Flower-Loving Fly Modeled Potential

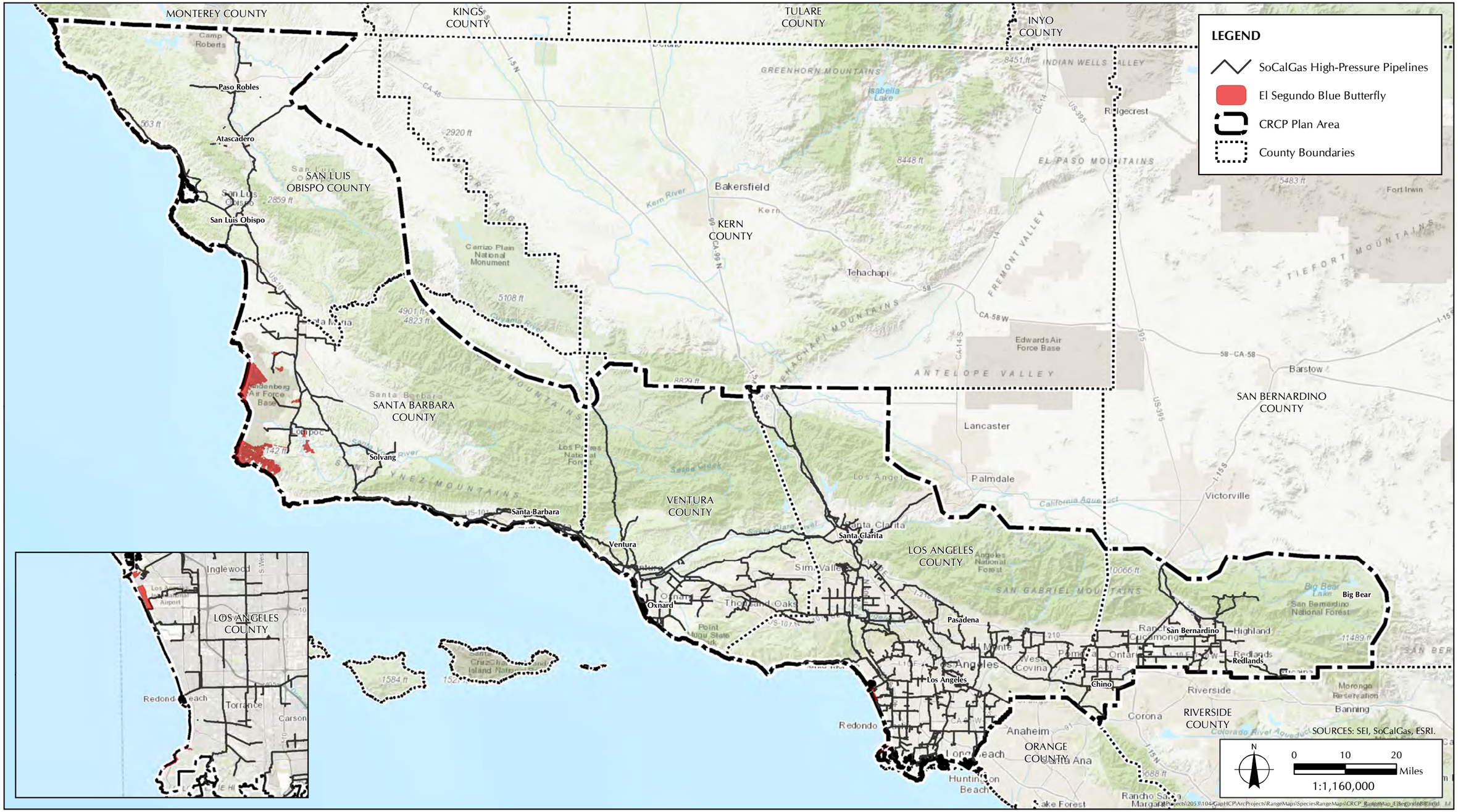

FIGURE B-2

El Segundo Blue Butterfly Modeled Potential

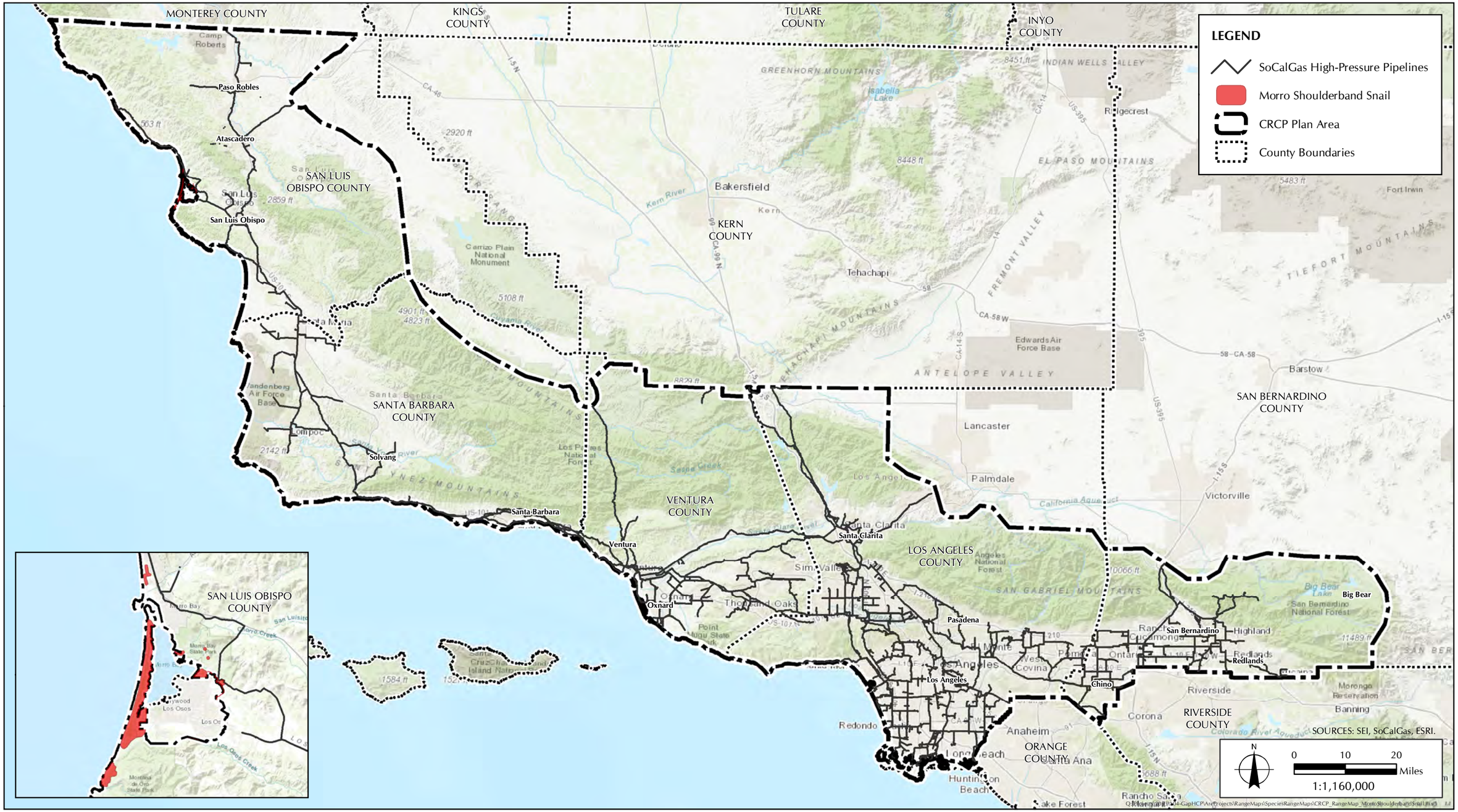

FIGURE B-3

Morro Shoulderband Snail Modeled Potential

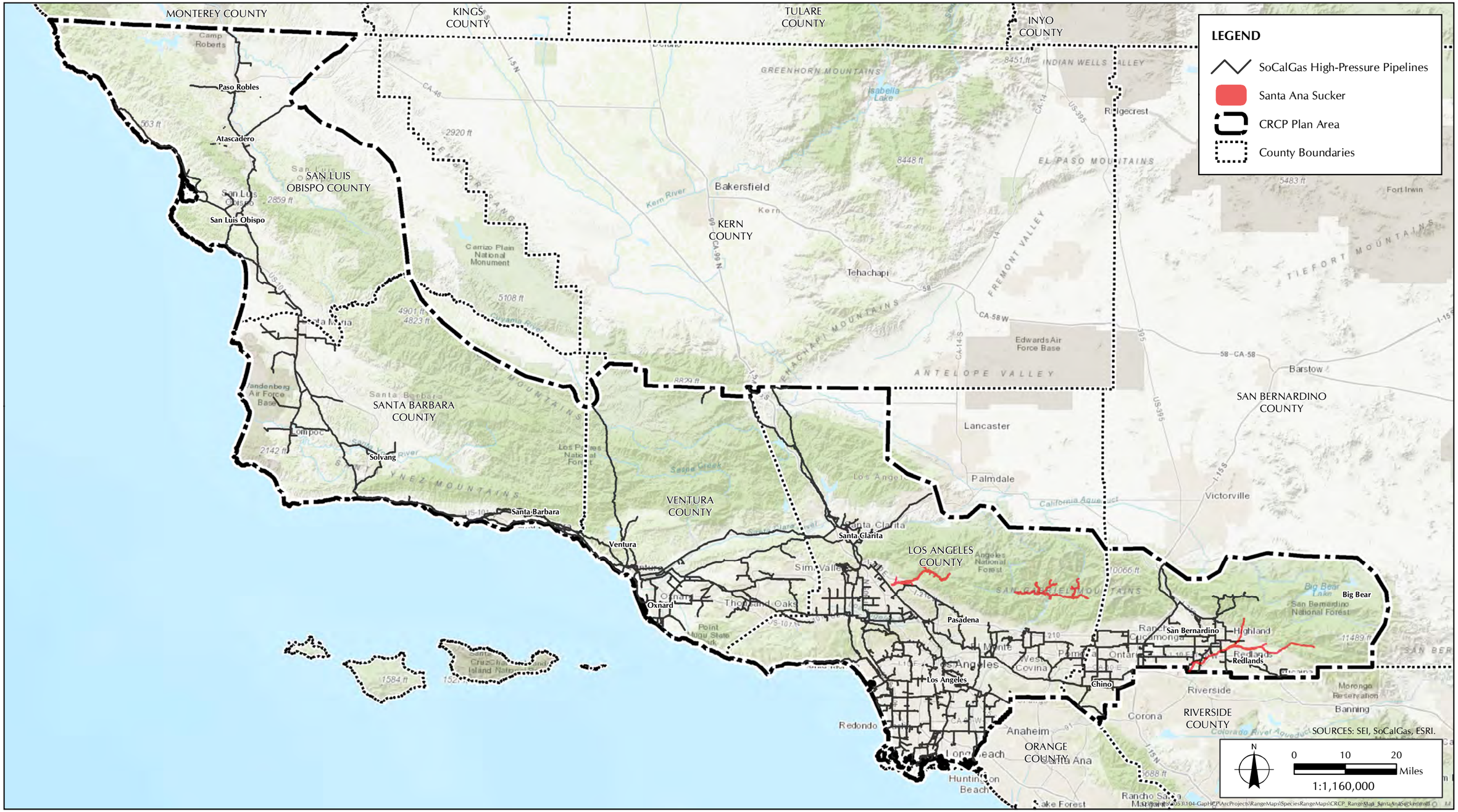

FIGURE B-4

Santa Ana Sucker Modeled Potential

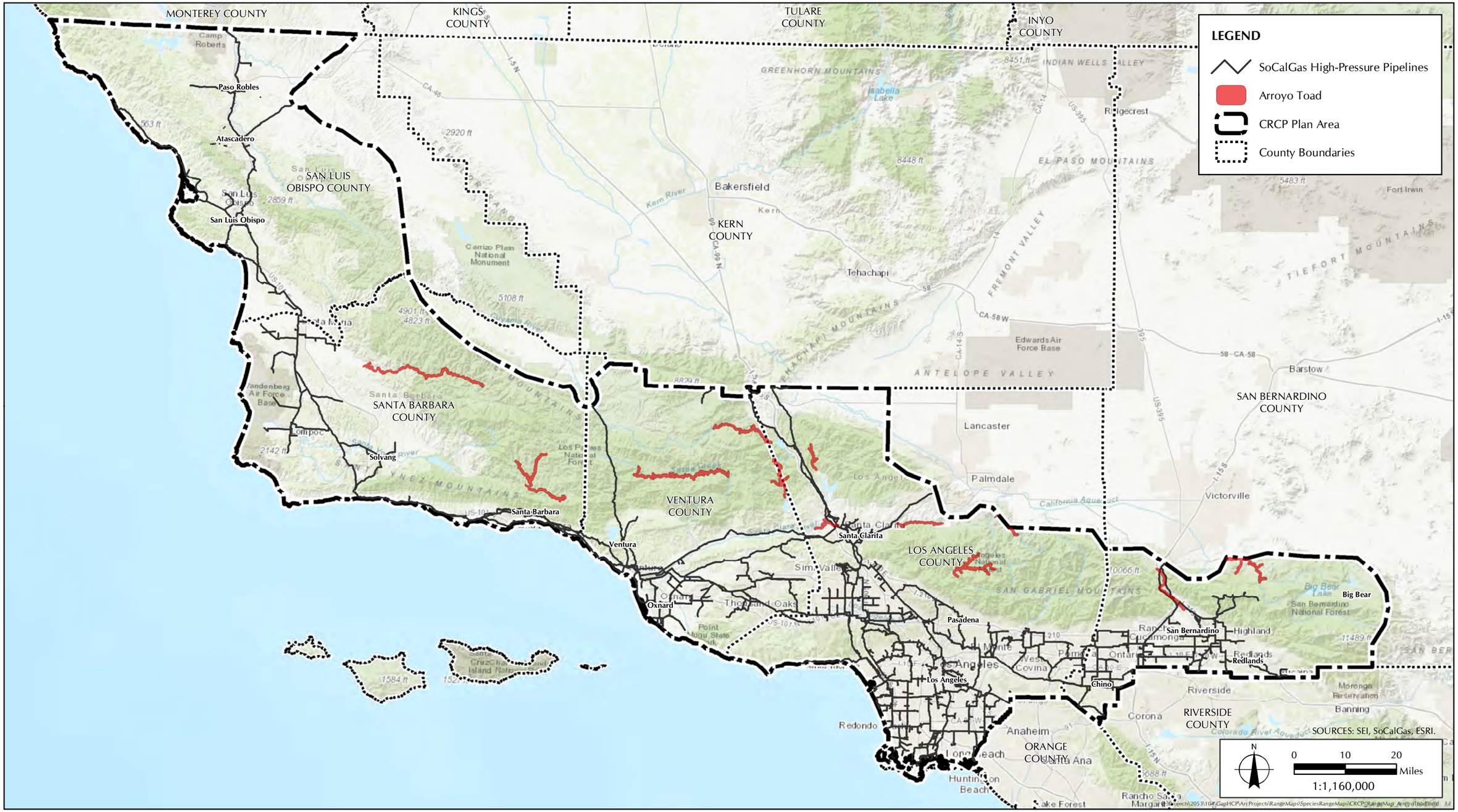

FIGURE B-5

Arroyo Toad Modeled Potential

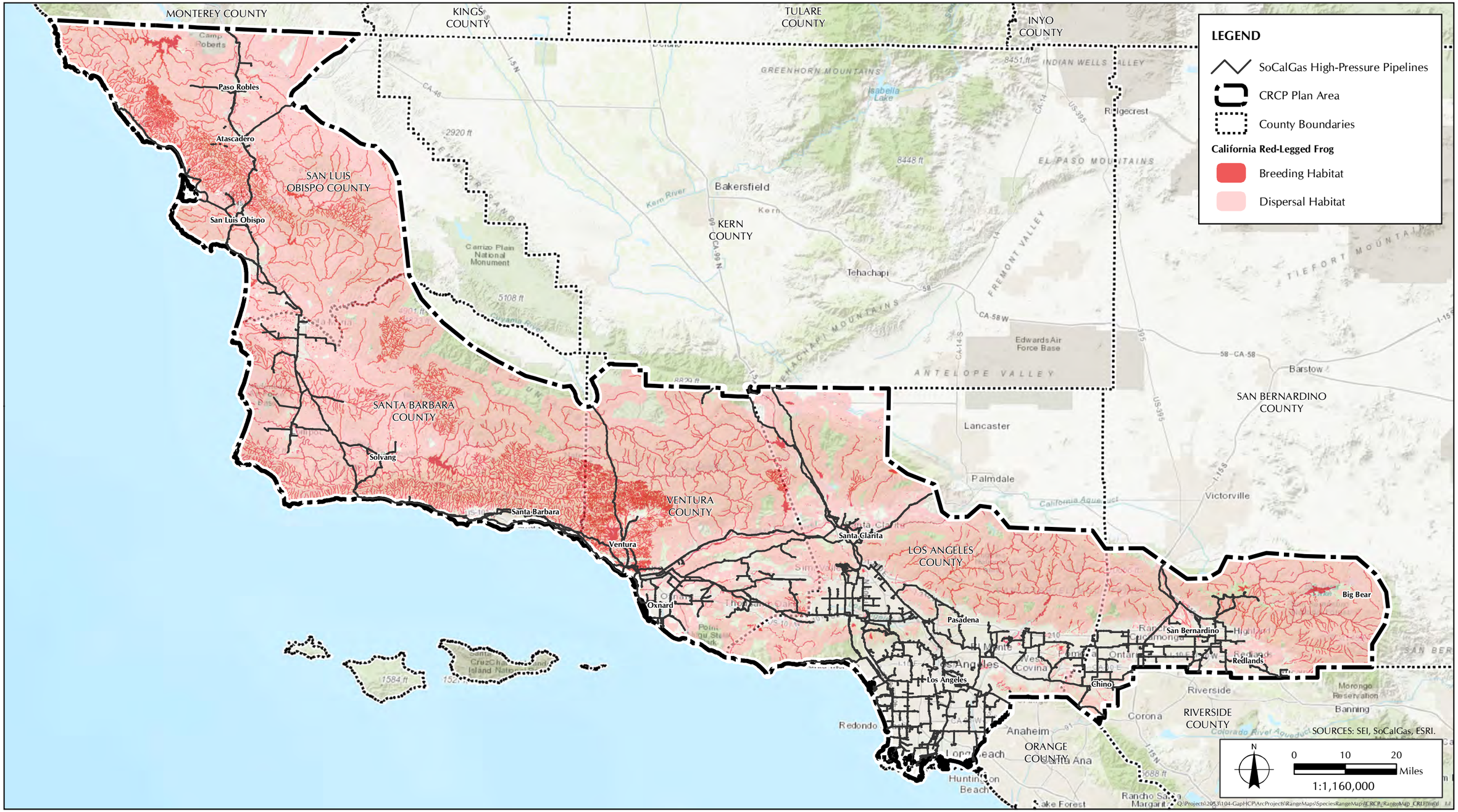

FIGURE B-6

California Red-Legged Frog Modeled Potential

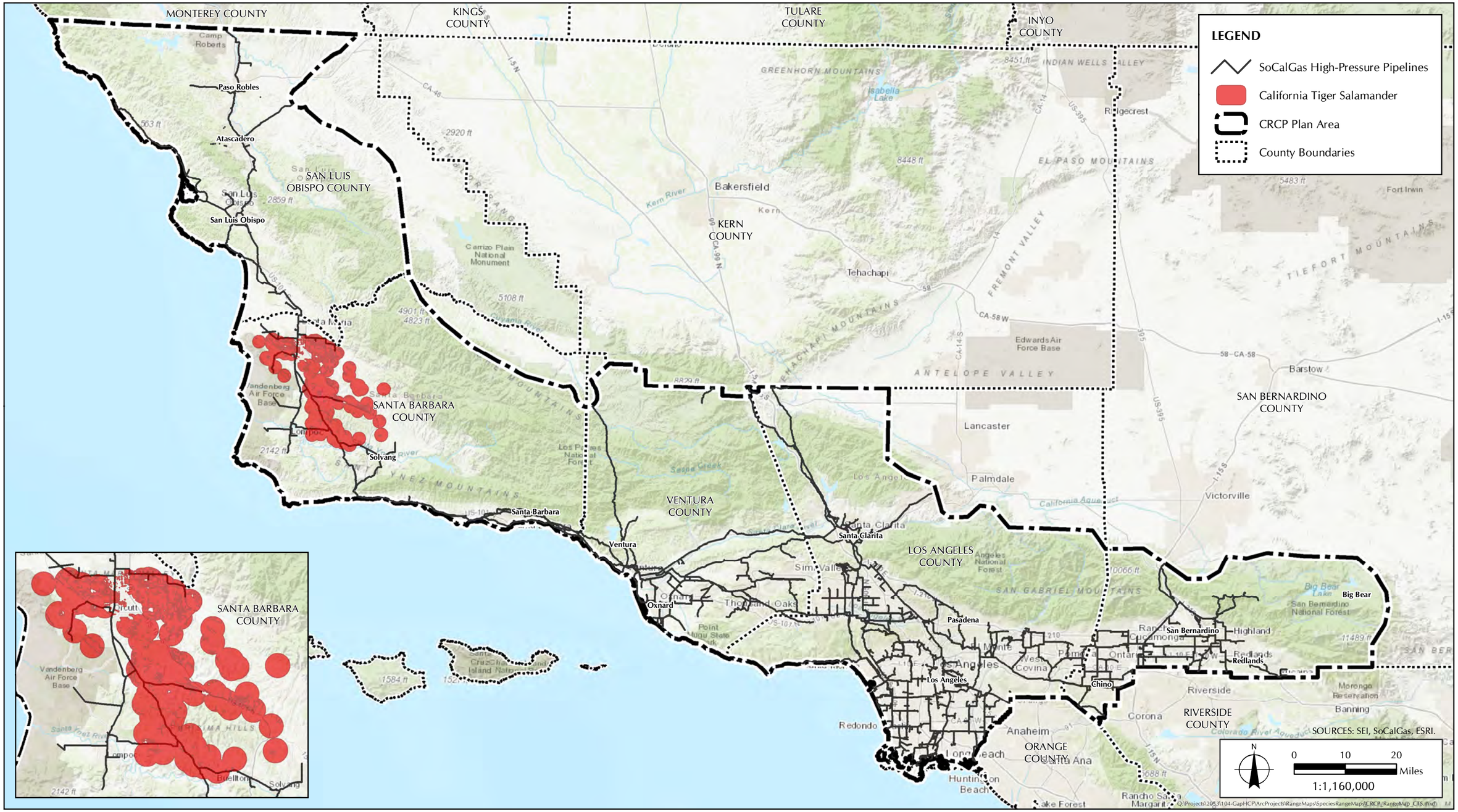

FIGURE B-7

California Tiger Salamander Modeled Potential

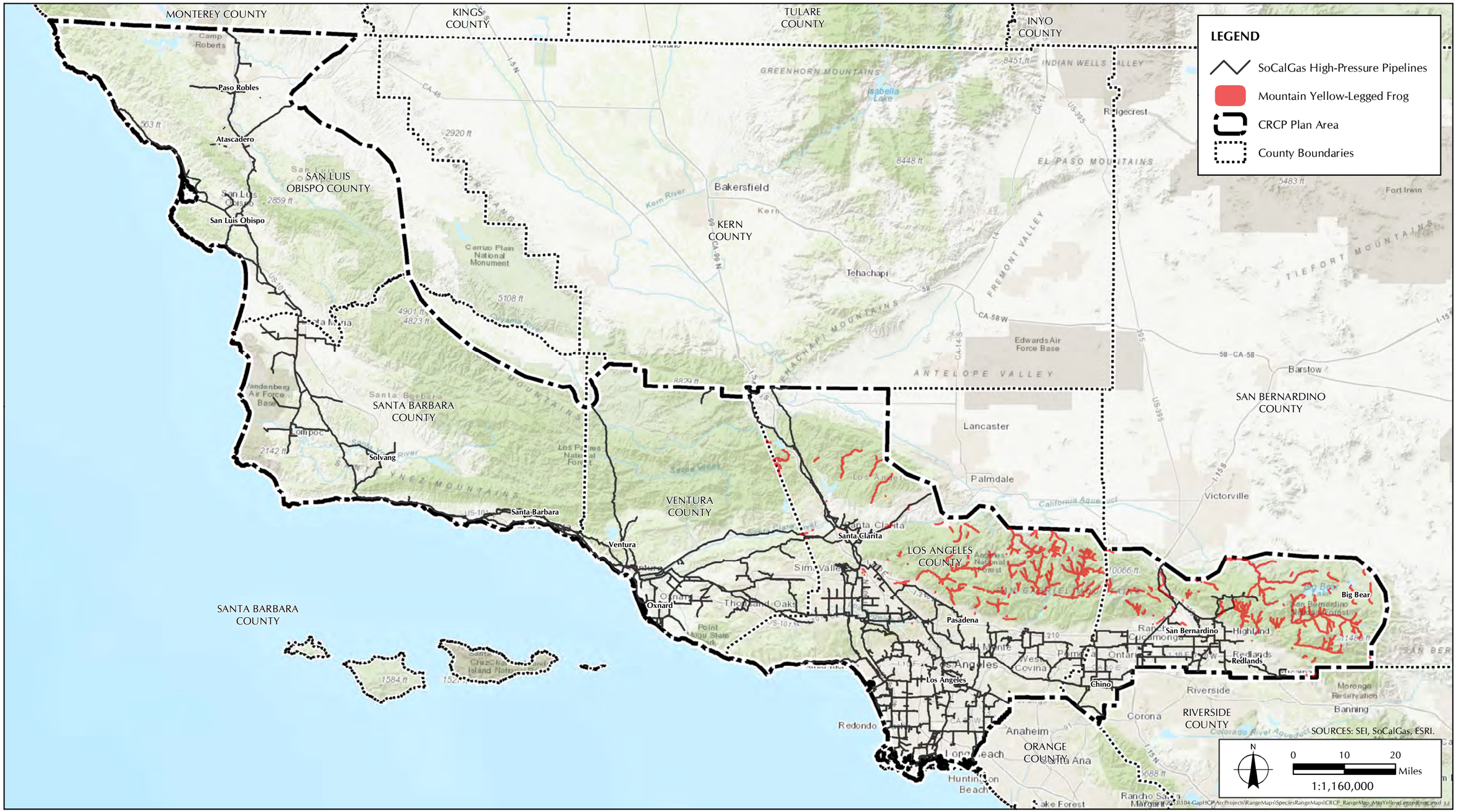

FIGURE B-8

Mountain Yellow-Legged Frog Modeled Potential

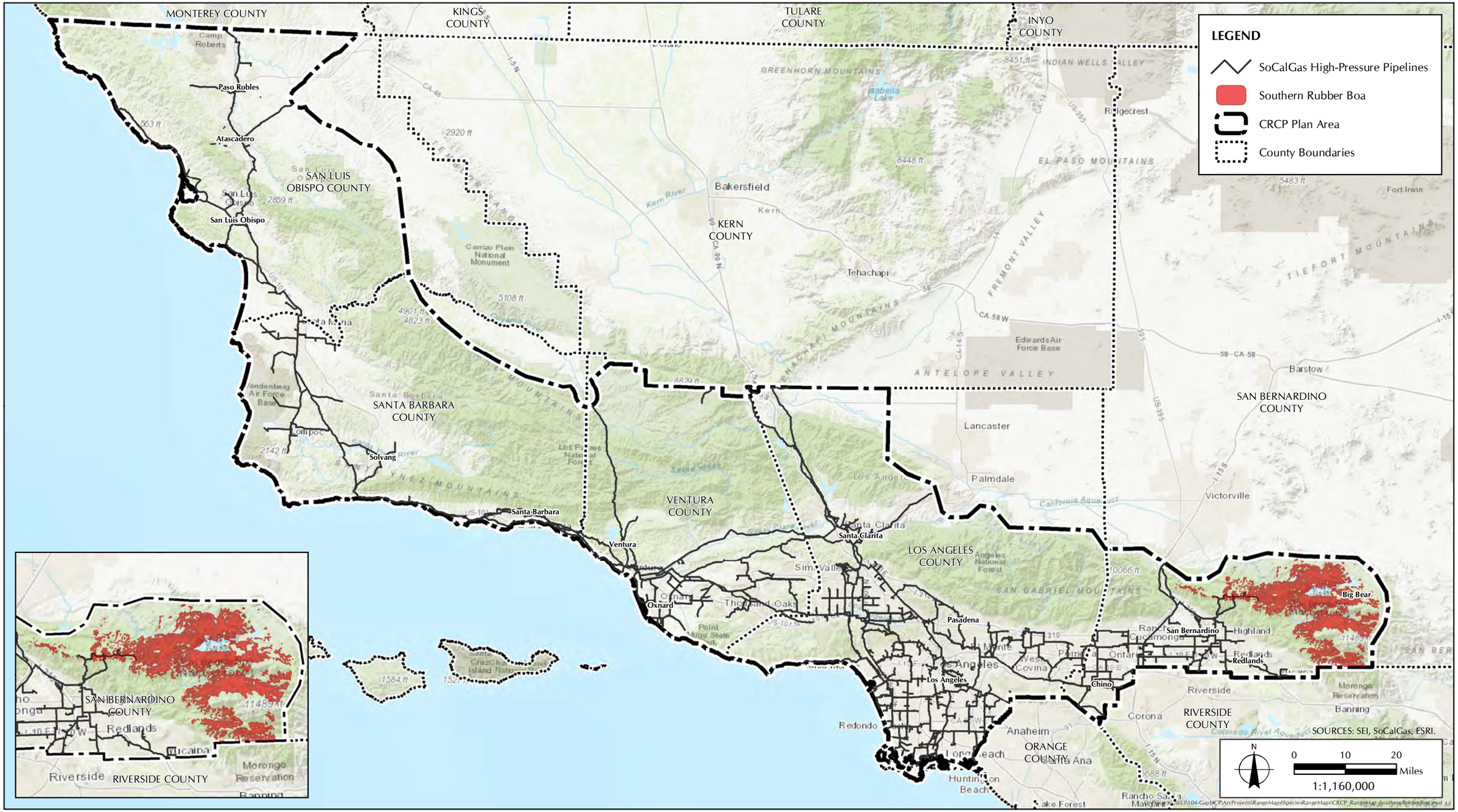

FIGURE B-9

Southern Rubber Boa Modeled Potential

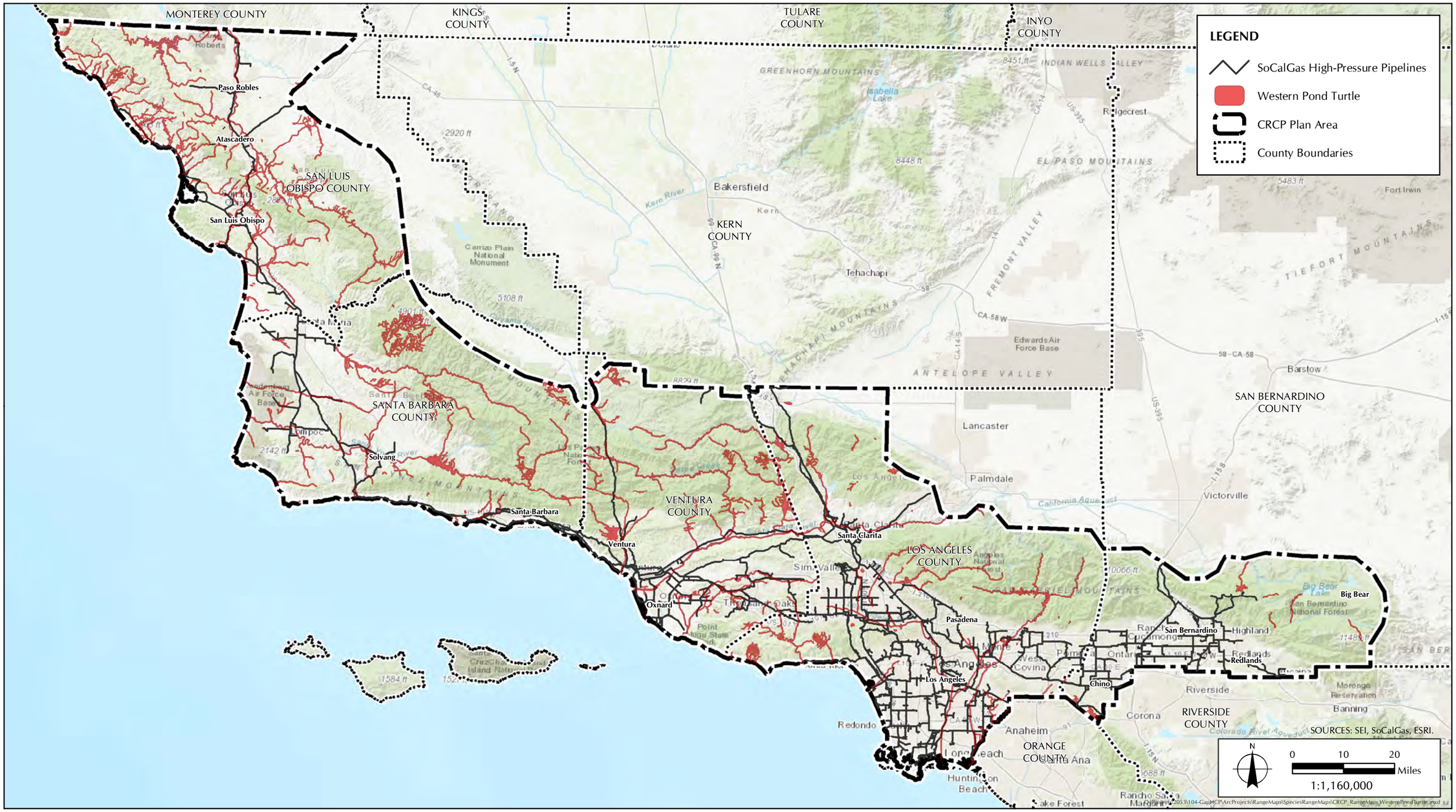

FIGURE B-10

Western Pond Turtle Modeled Potential

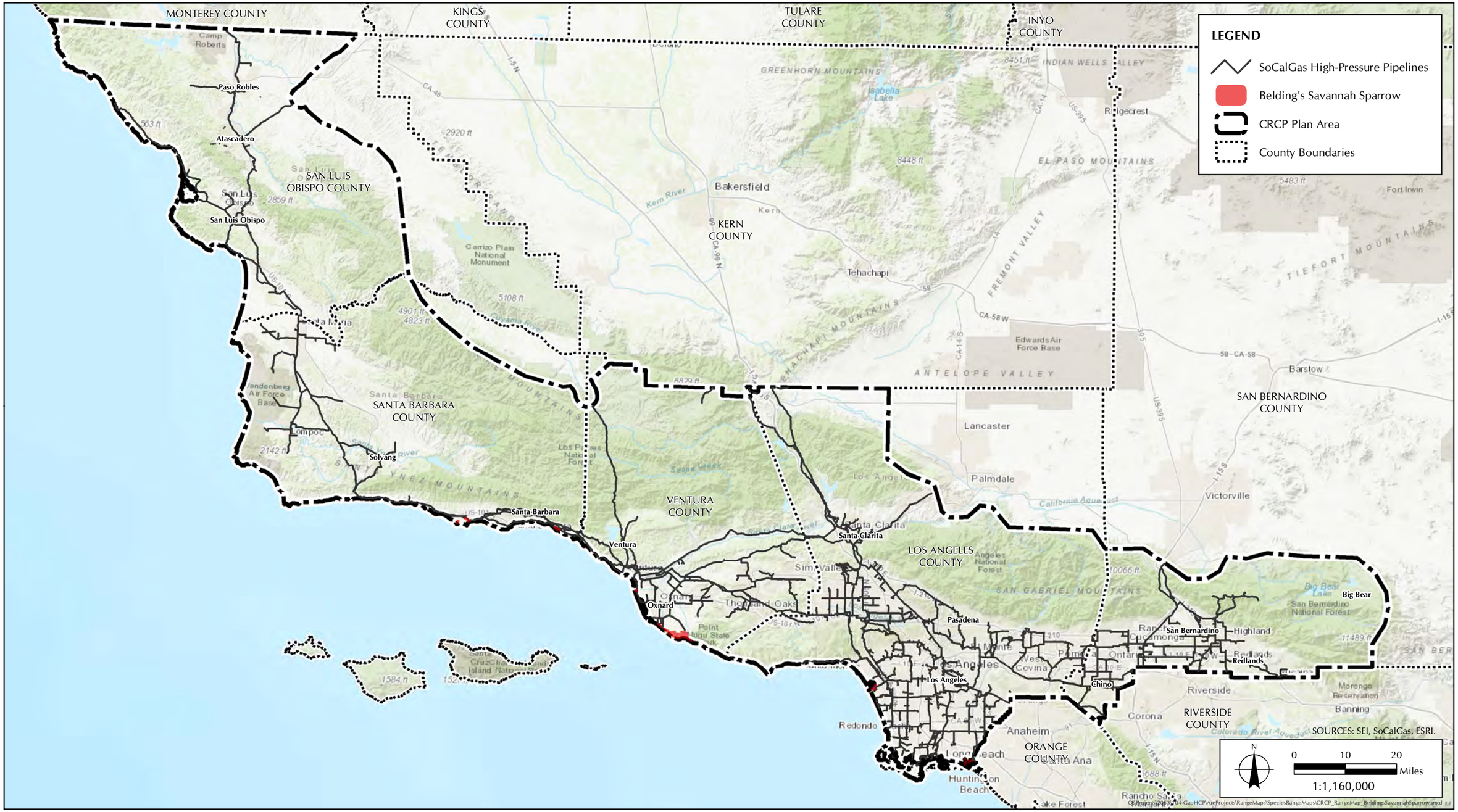

FIGURE B-11

Belding's Savannah Sparrow Modeled Potential

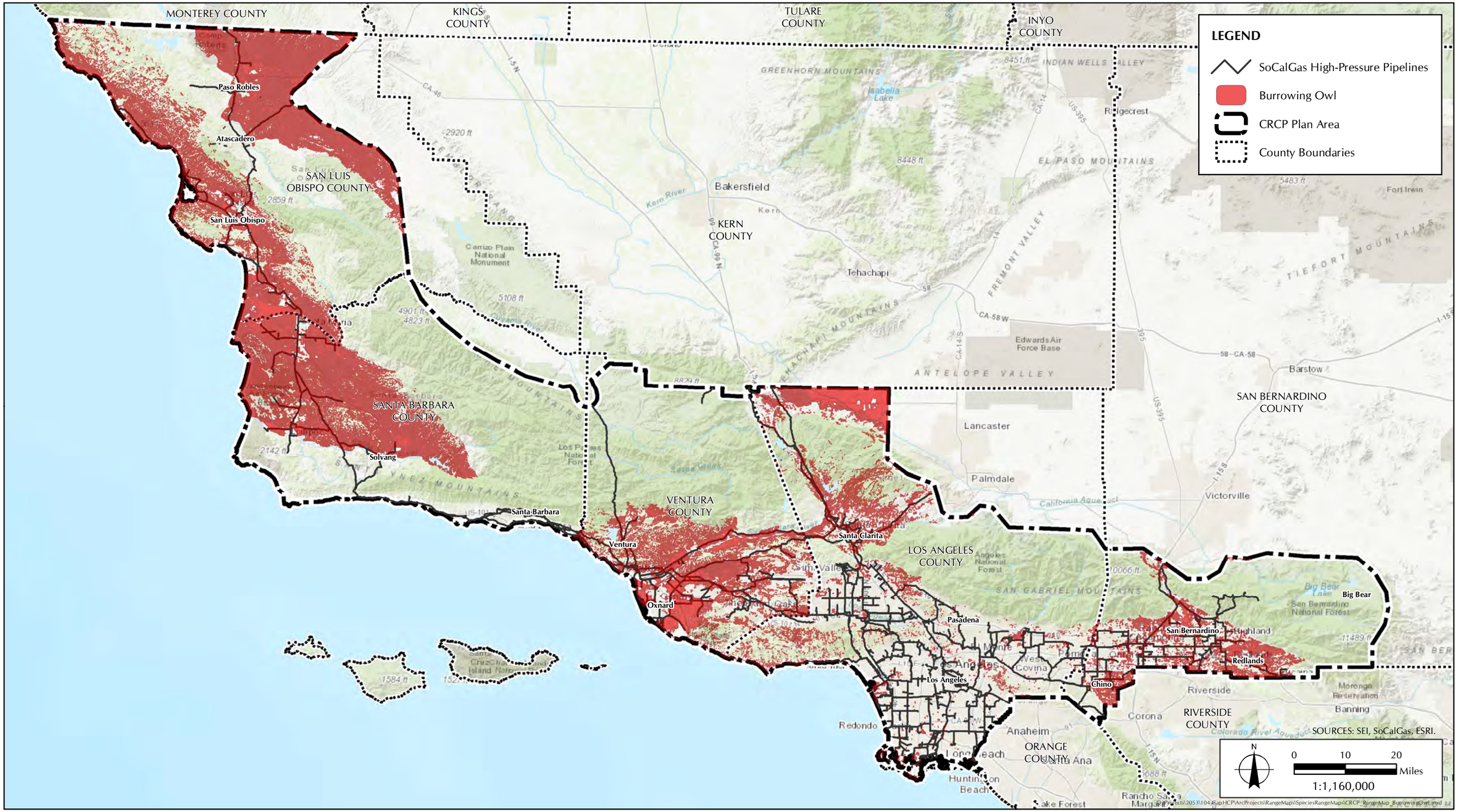

FIGURE B-12

Burrowing Owl Modeled Potential

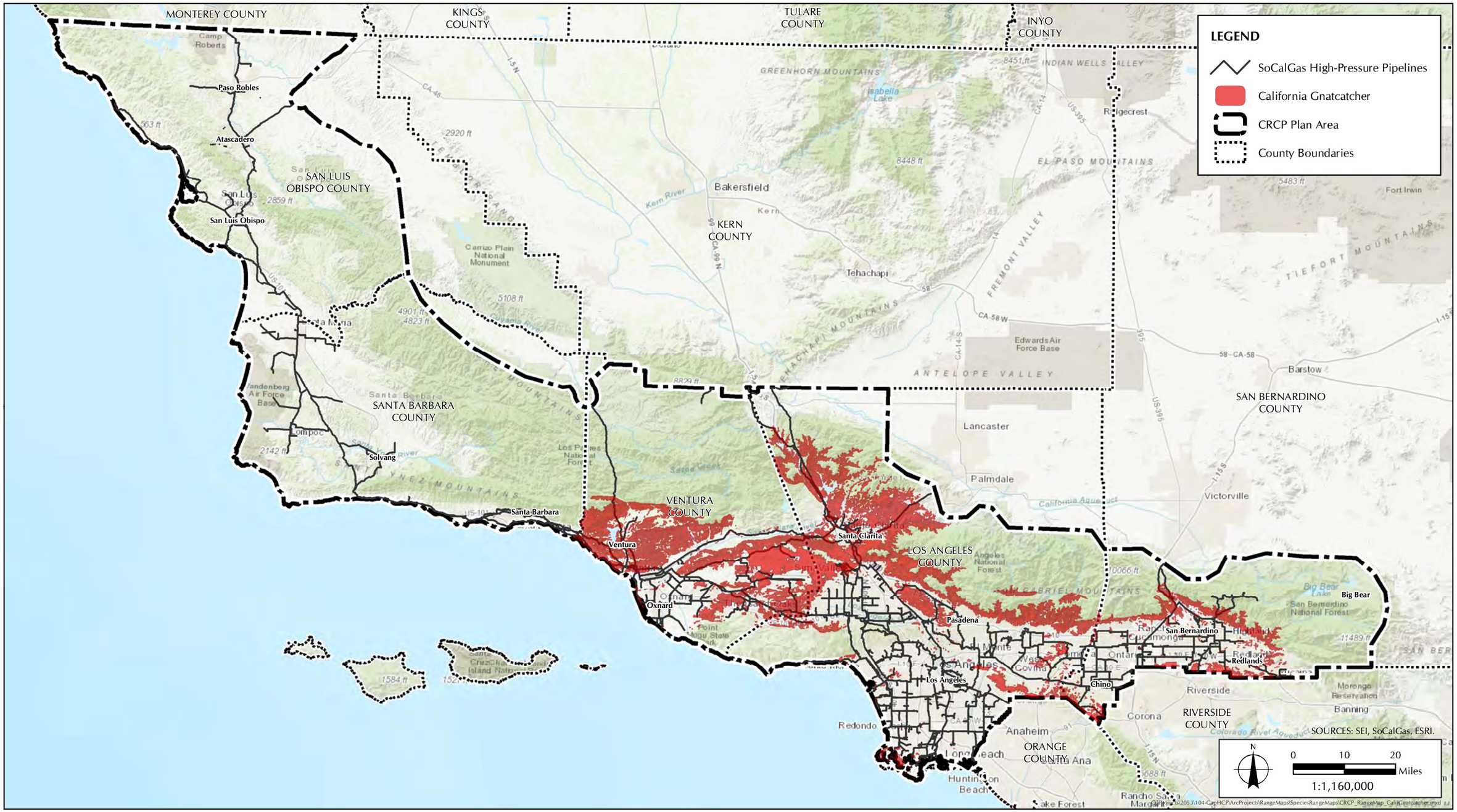

FIGURE B-13

California Gnatcatcher Modeled Potential

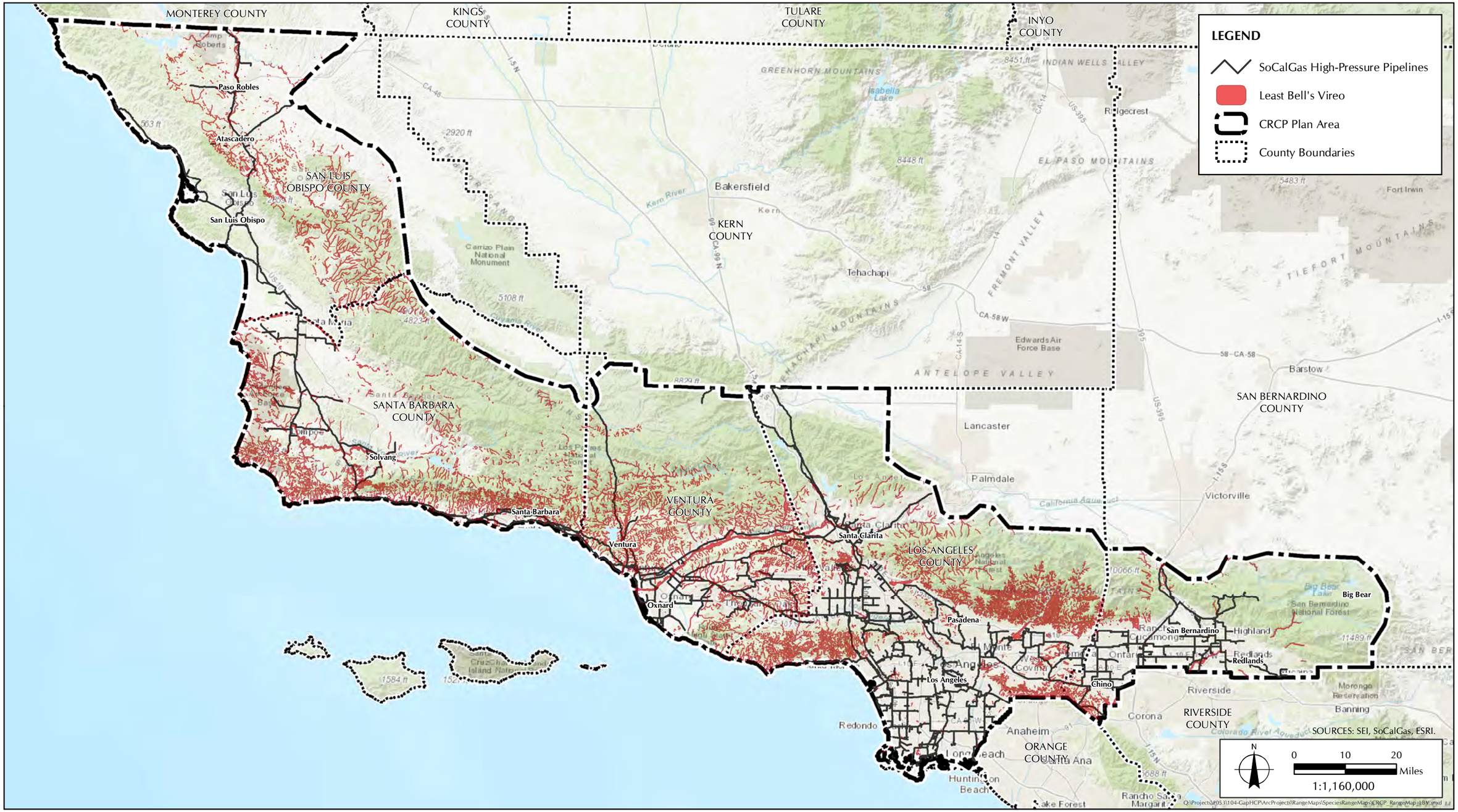

FIGURE B-14

Least Bell's Vireo Modeled Potential

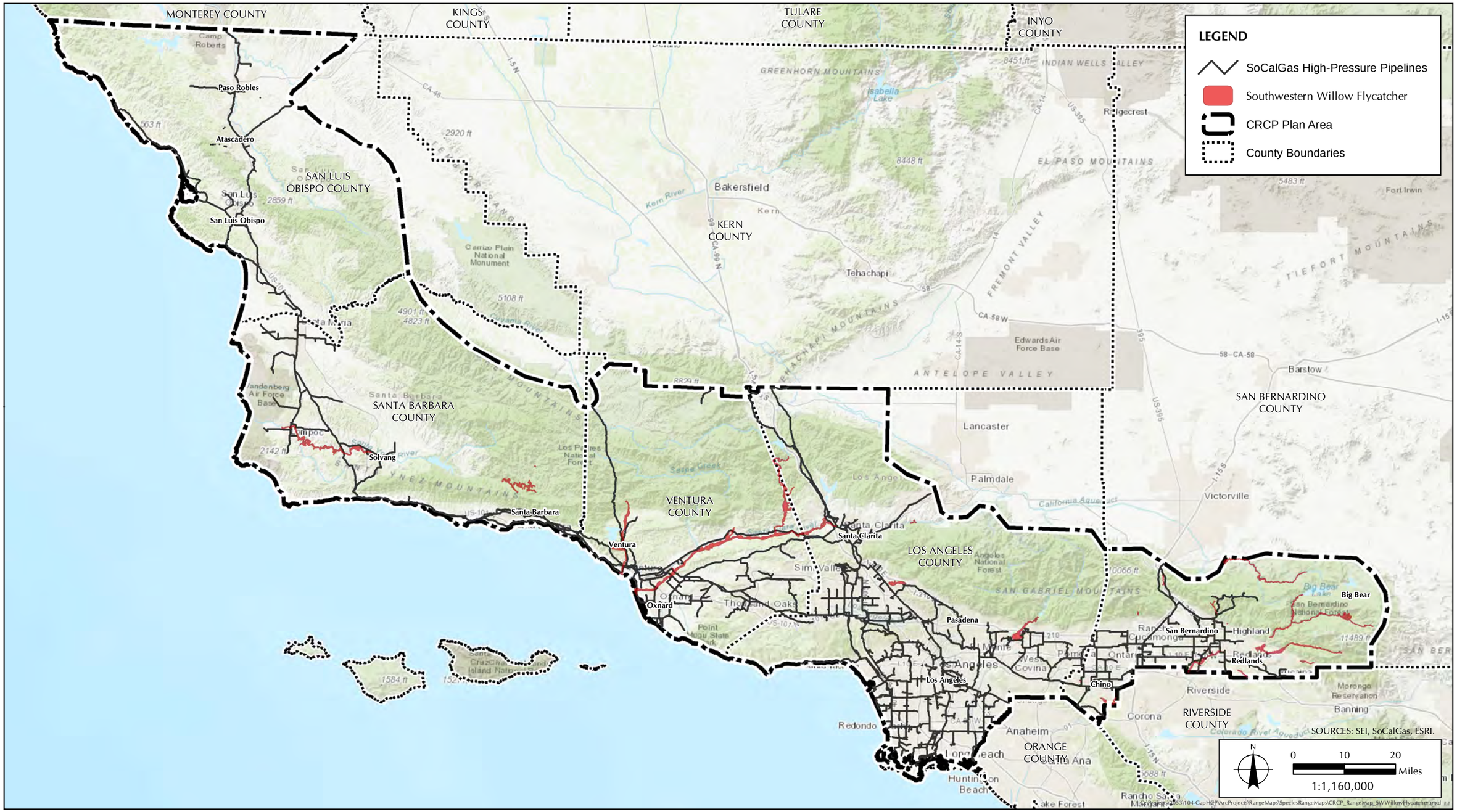

FIGURE B-15

Southwestern Willow Flycatcher Modeled Potential

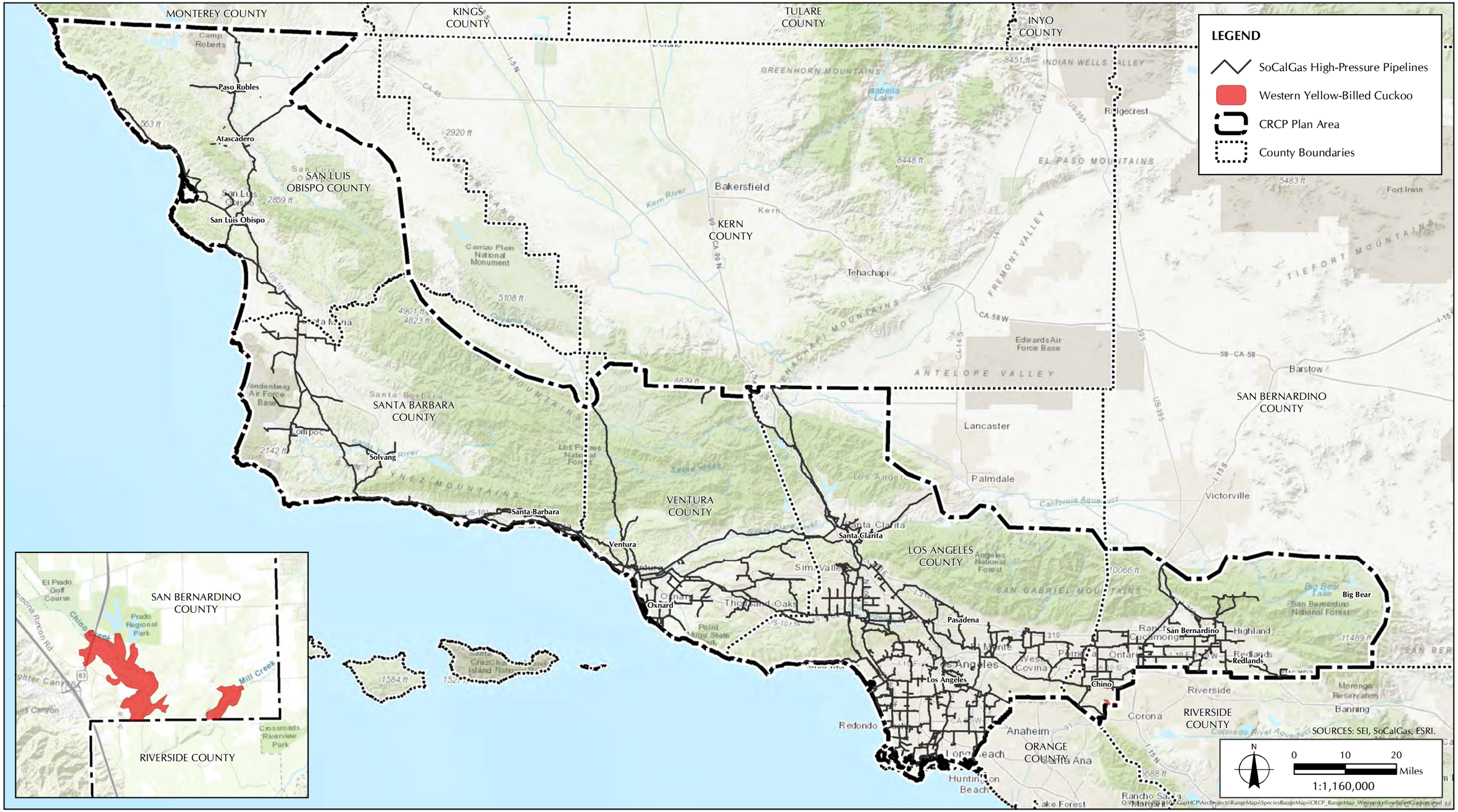

FIGURE B-16

Western Yellow-Billed Cuckoo Modeled Potential

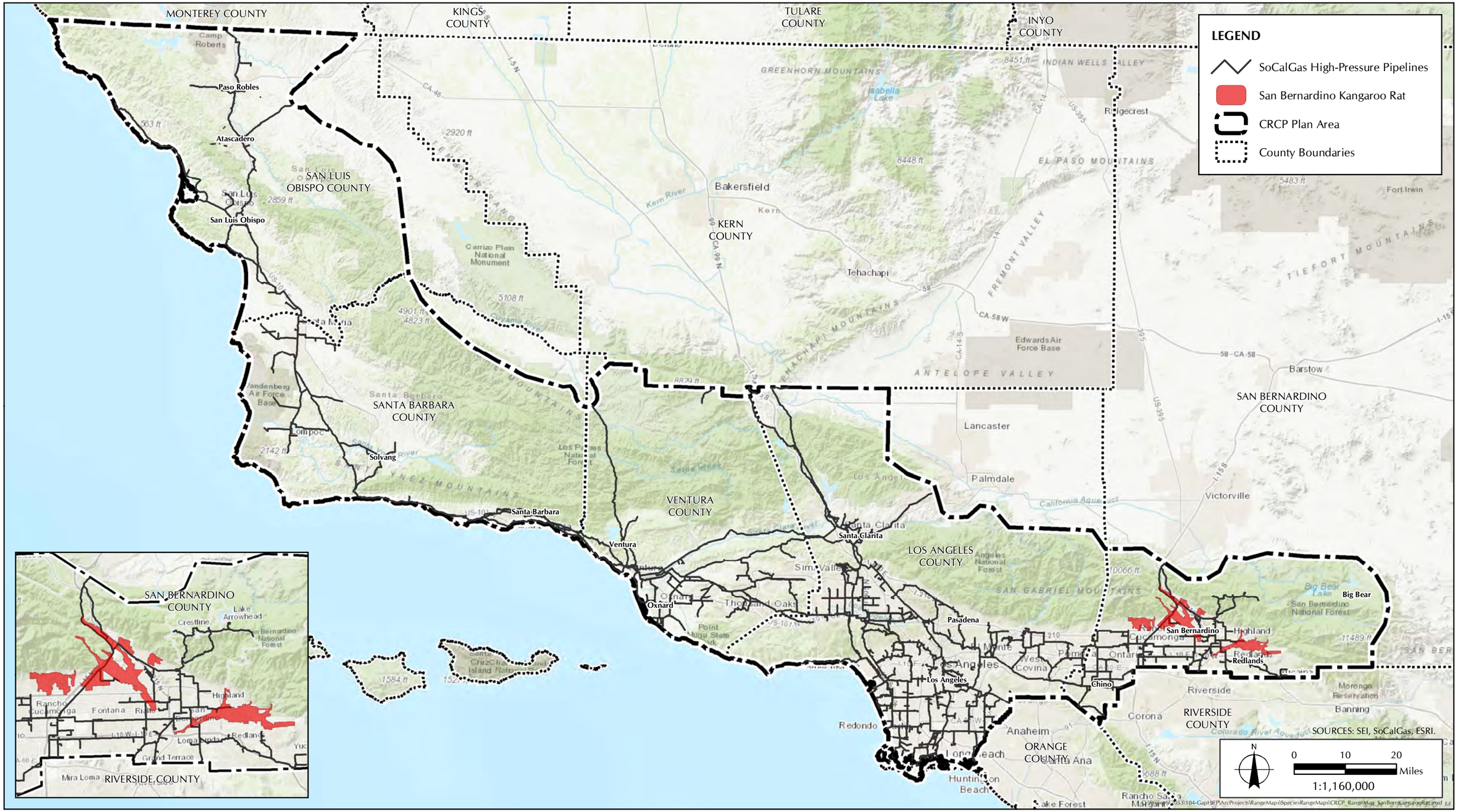

FIGURE B-17

San Bernardino Kangaroo Rat Modeled Potential

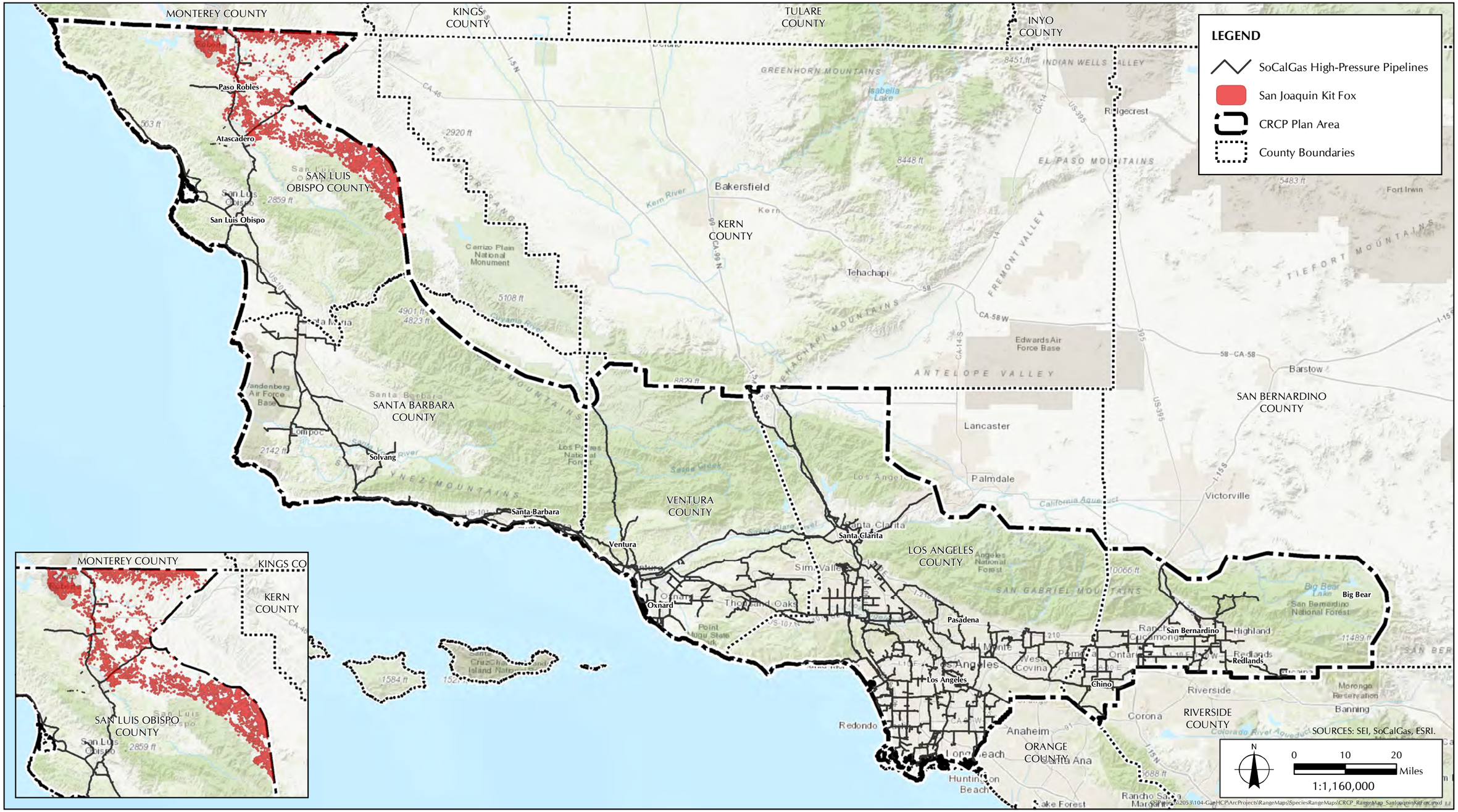

FIGURE B-18

San Joaquin Kit Fox Modeled Potential

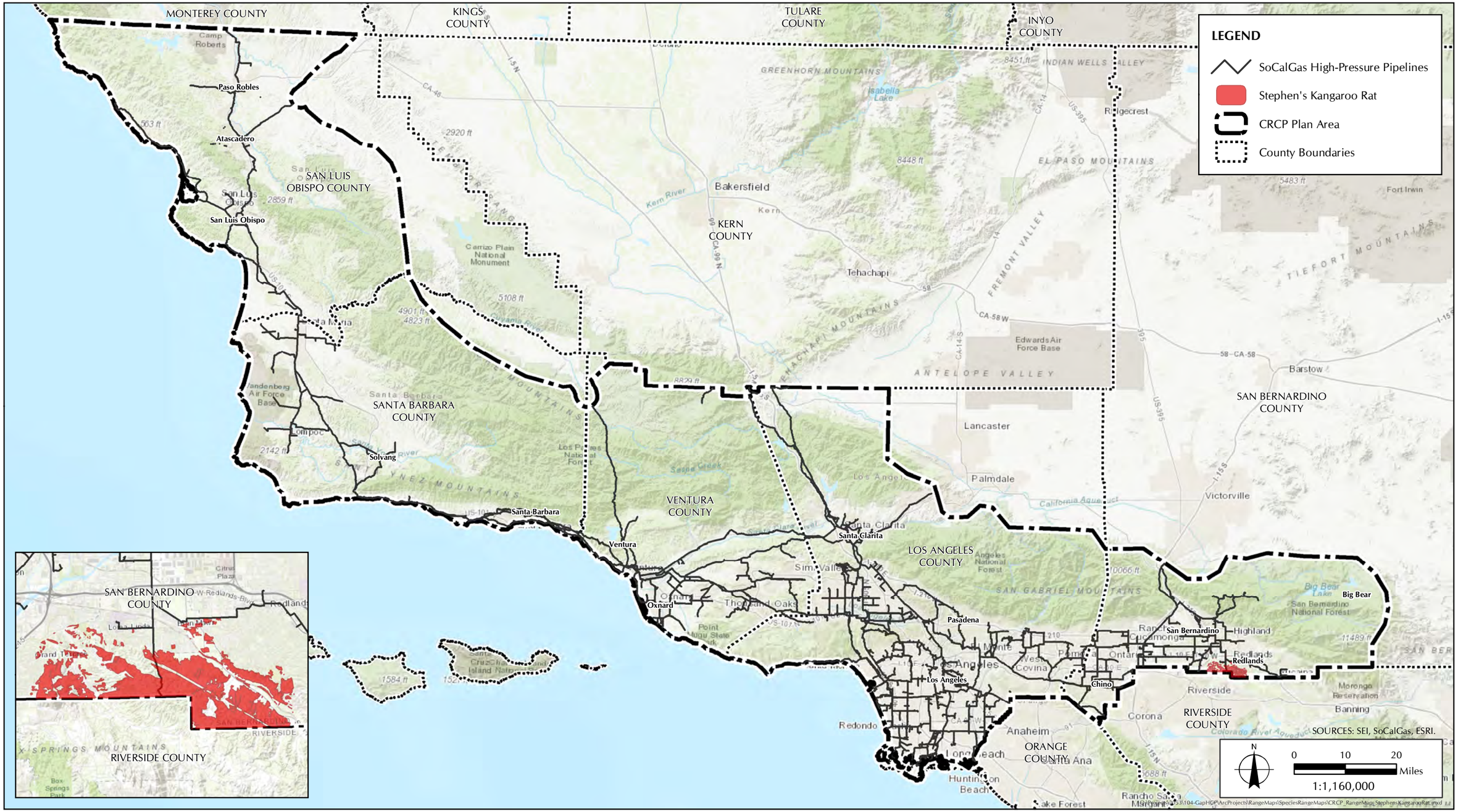

FIGURE B-19

Stephen's Kangaroo Rat Modeled Potential

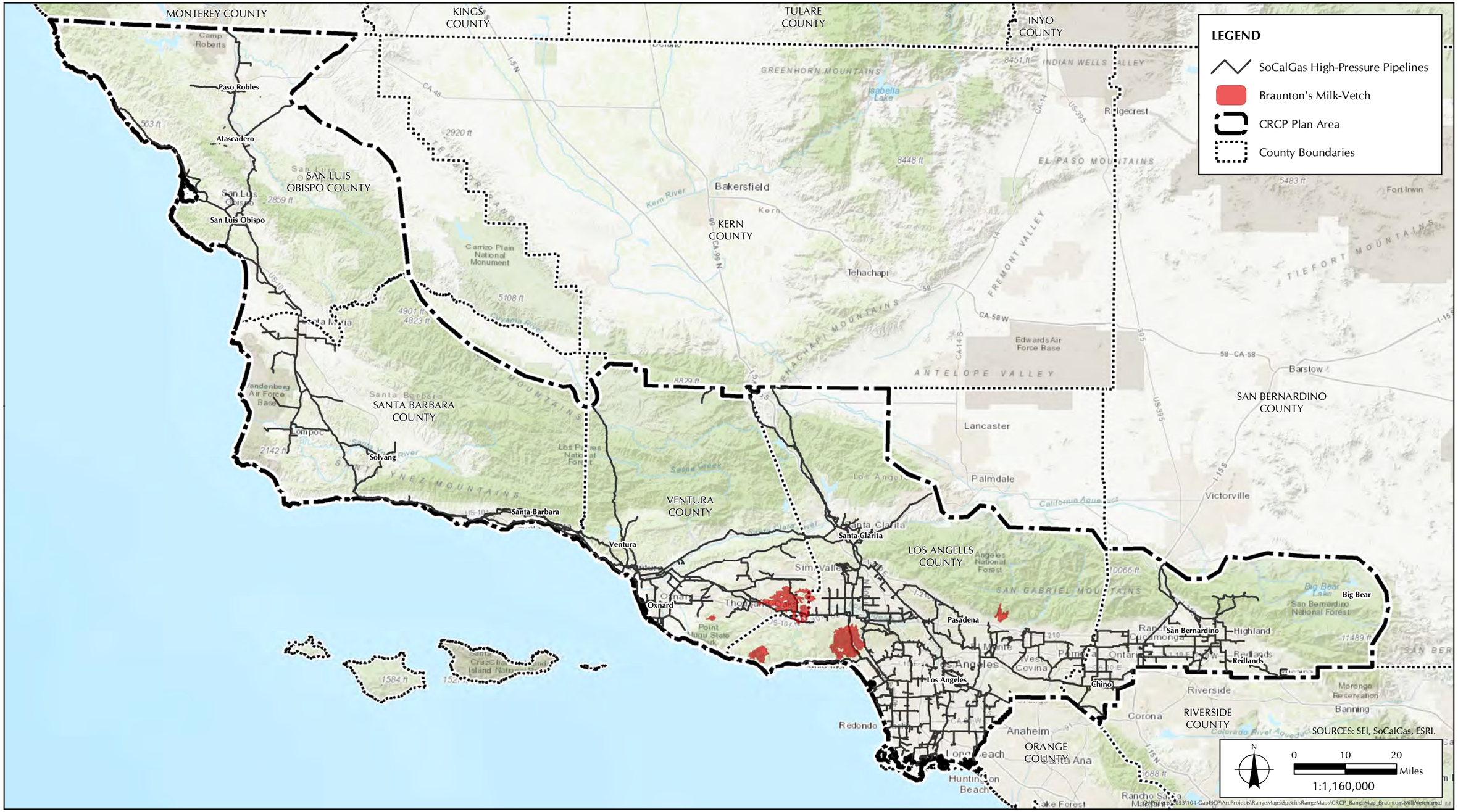

FIGURE B-20

Braunton's Milk-Vetch Modeled Potential

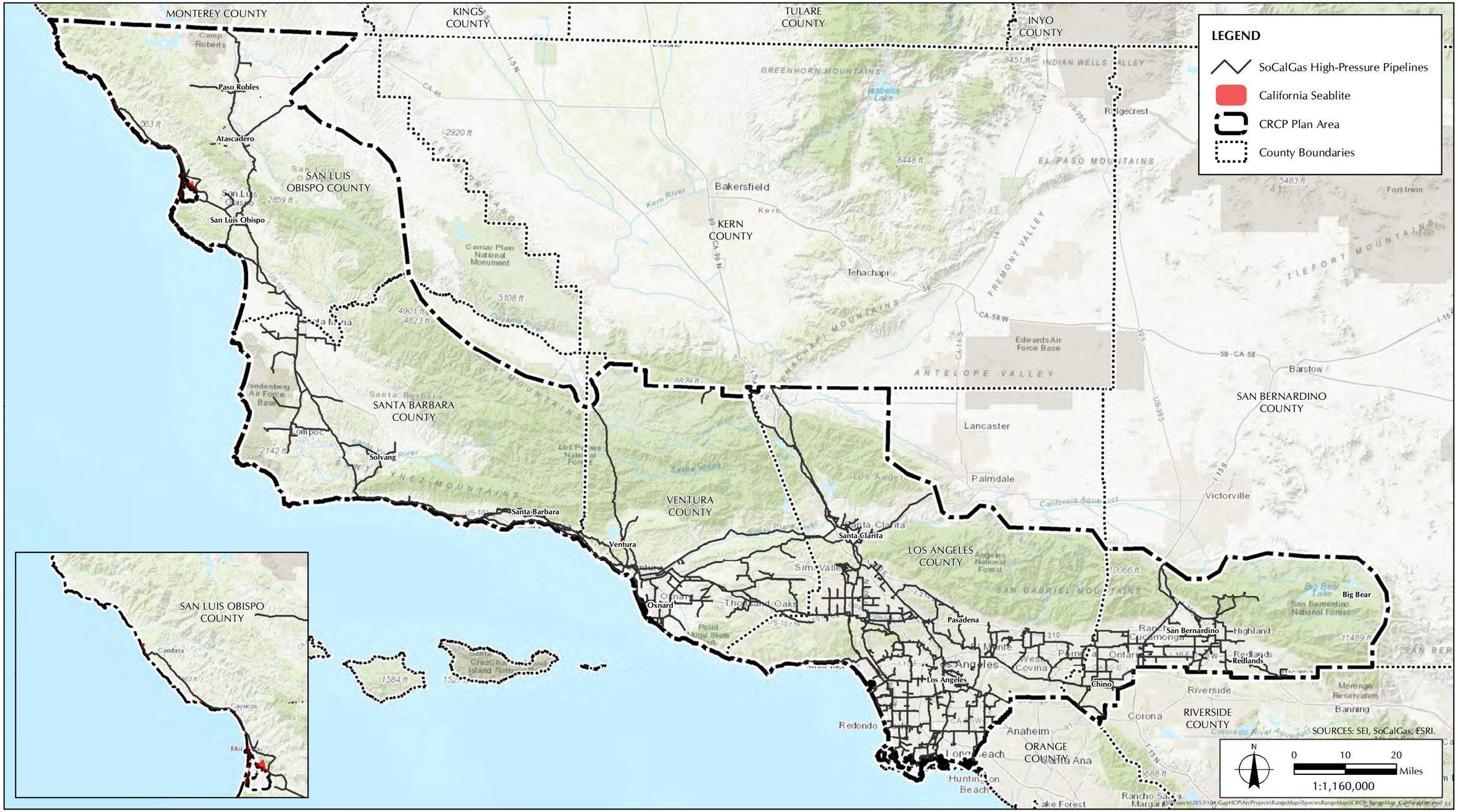

FIGURE B-21

California Seablite Modeled Potential

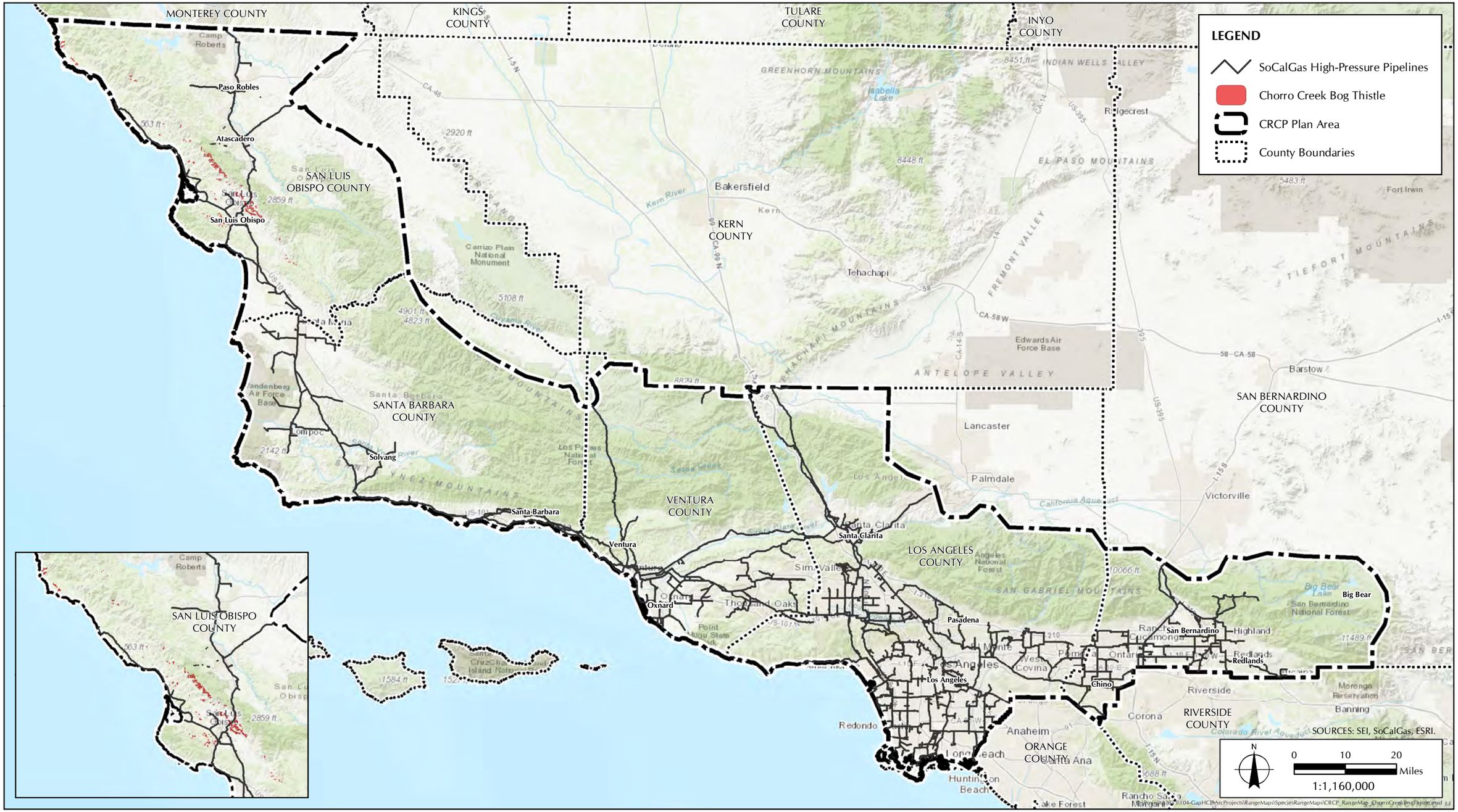

FIGURE B-22

Chorro Creek Bog Thistle Modeled Potential

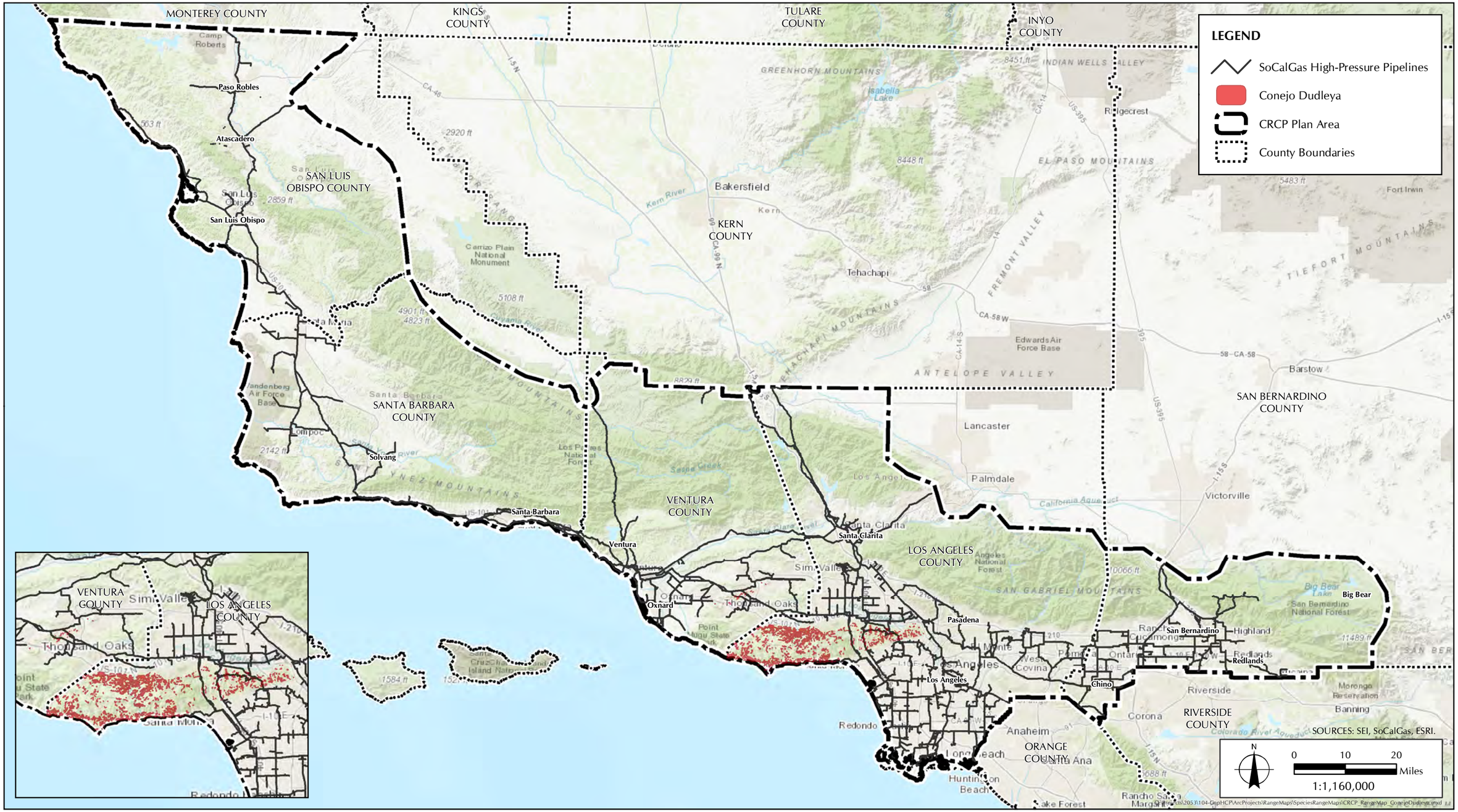

FIGURE B-23

Conejo Dudleya Modeled Potential

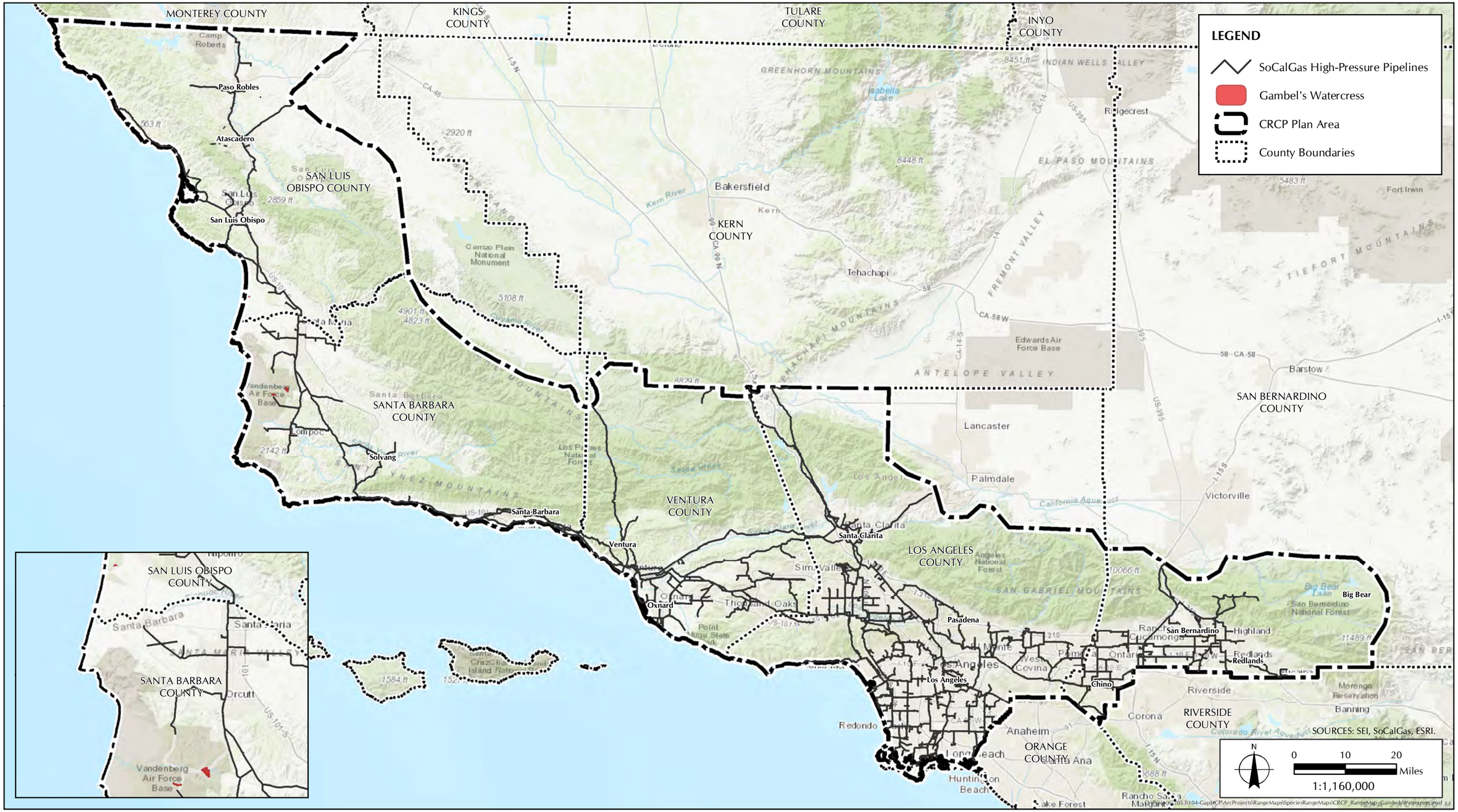

FIGURE B-24

Gambel's Watercress Modeled Potential

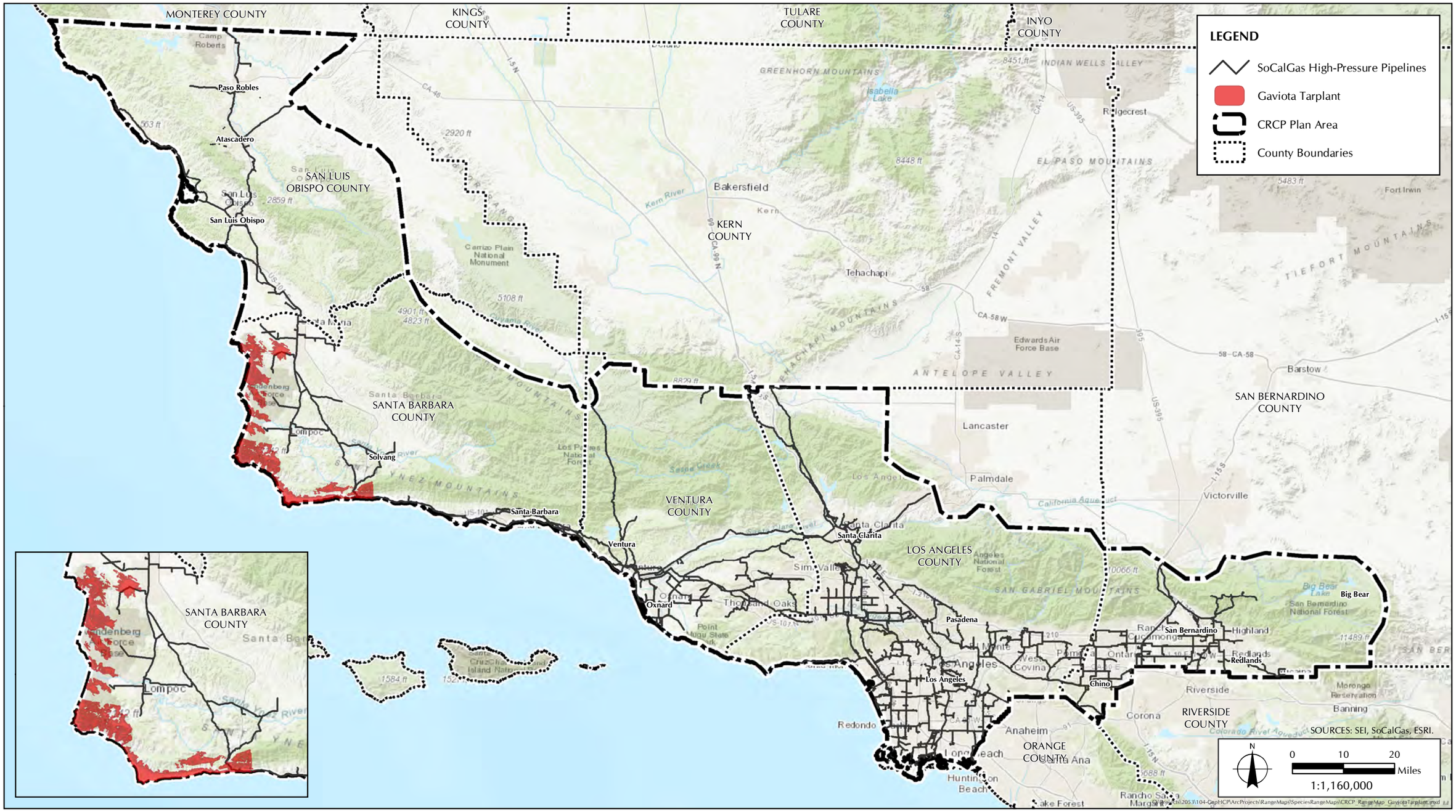

FIGURE B-25

Gaviota Tarplant Modeled Potential

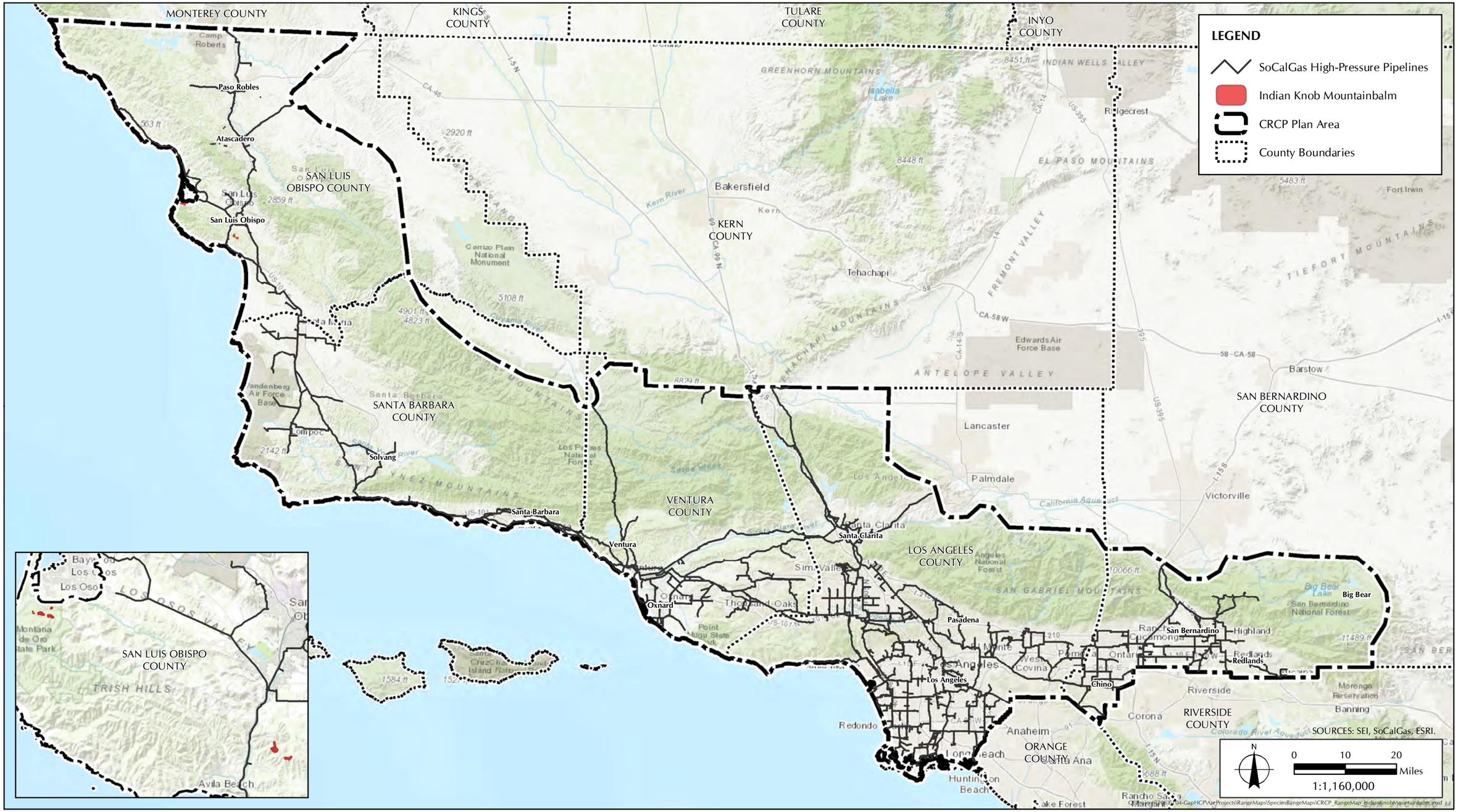

FIGURE B-26

Indian Knob Mountainbalm Modeled Potential

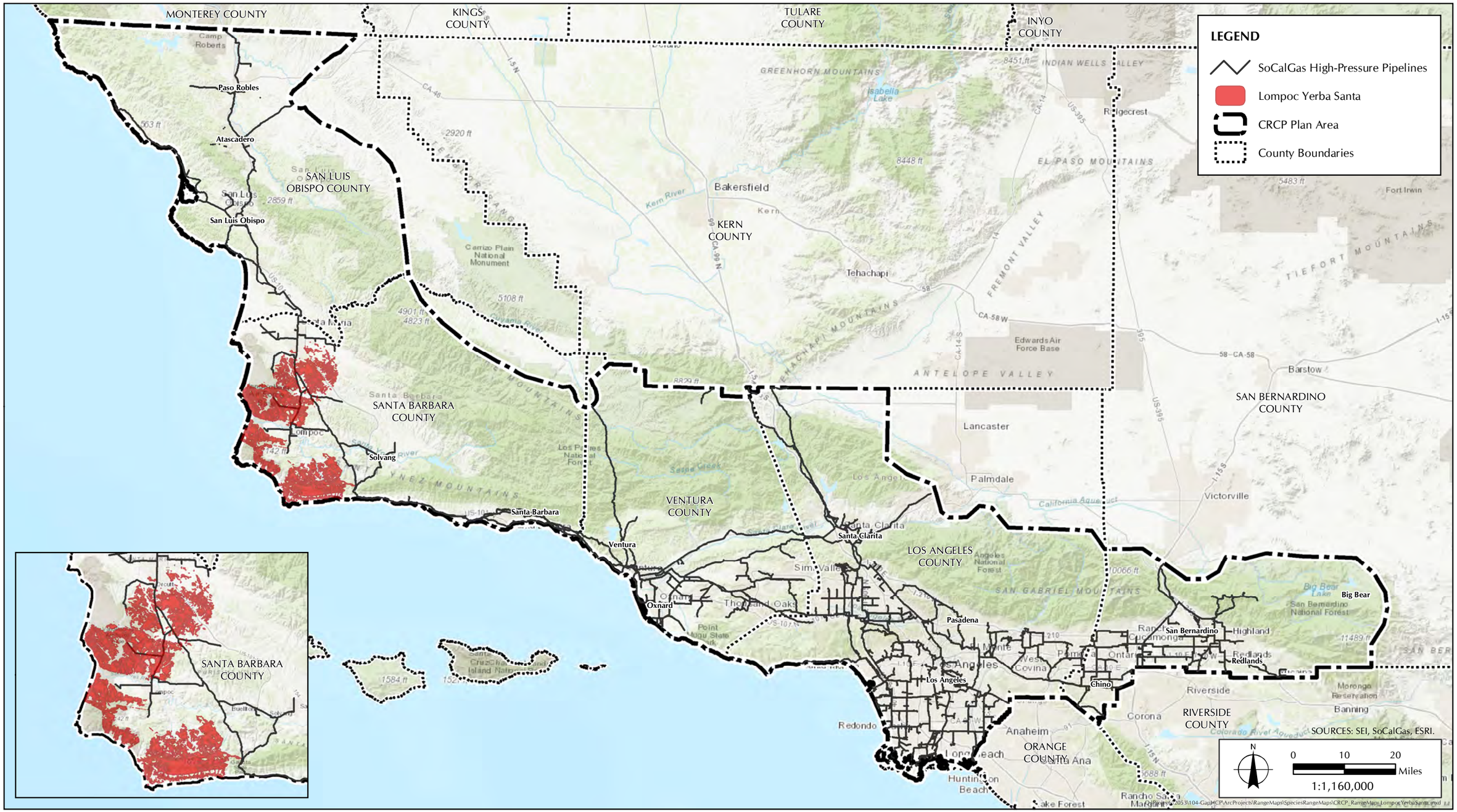

FIGURE B-27

Lompoc Yerba Santa Modeled Potential

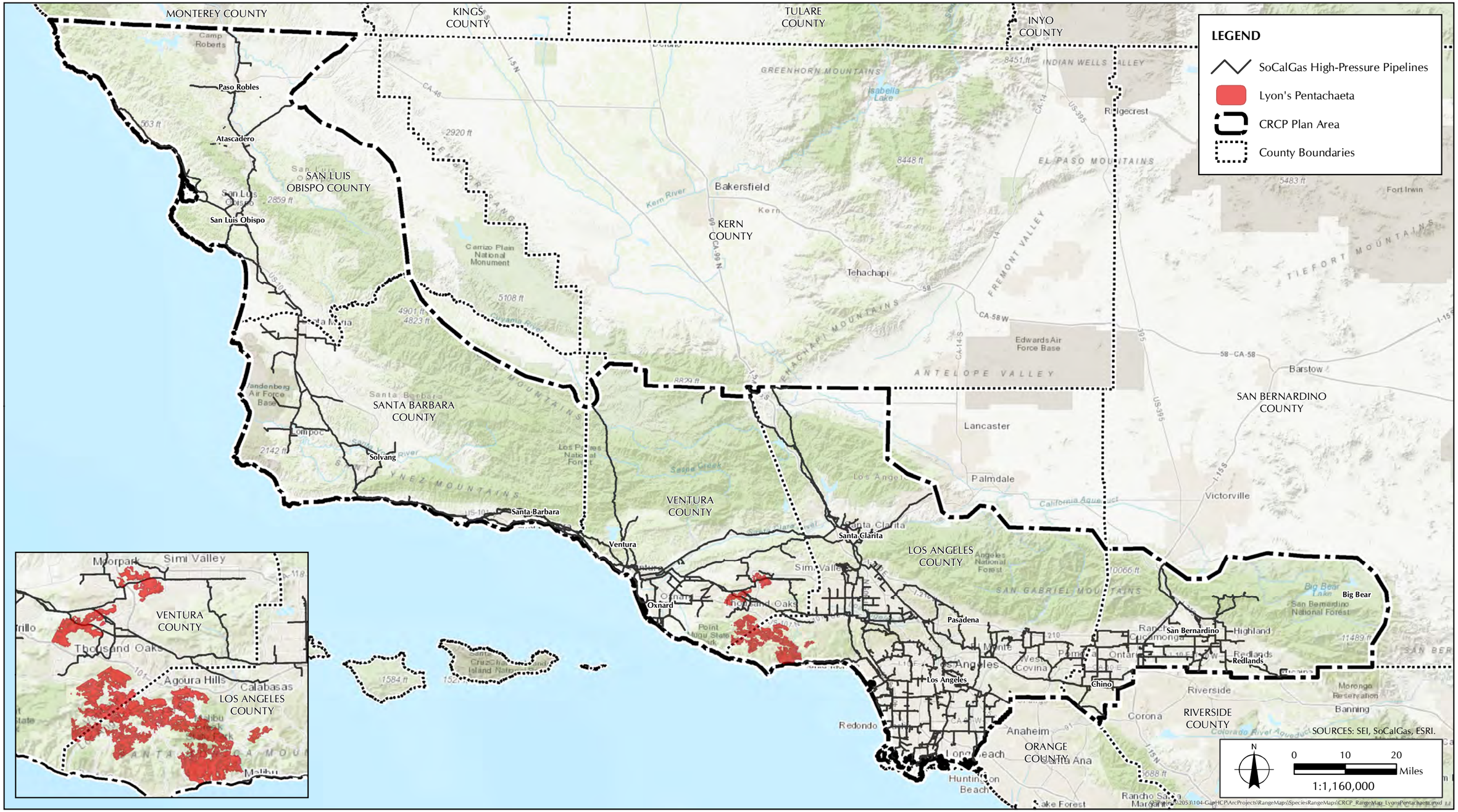

FIGURE B-28

Lyon's Pentachaeta Modeled Potential

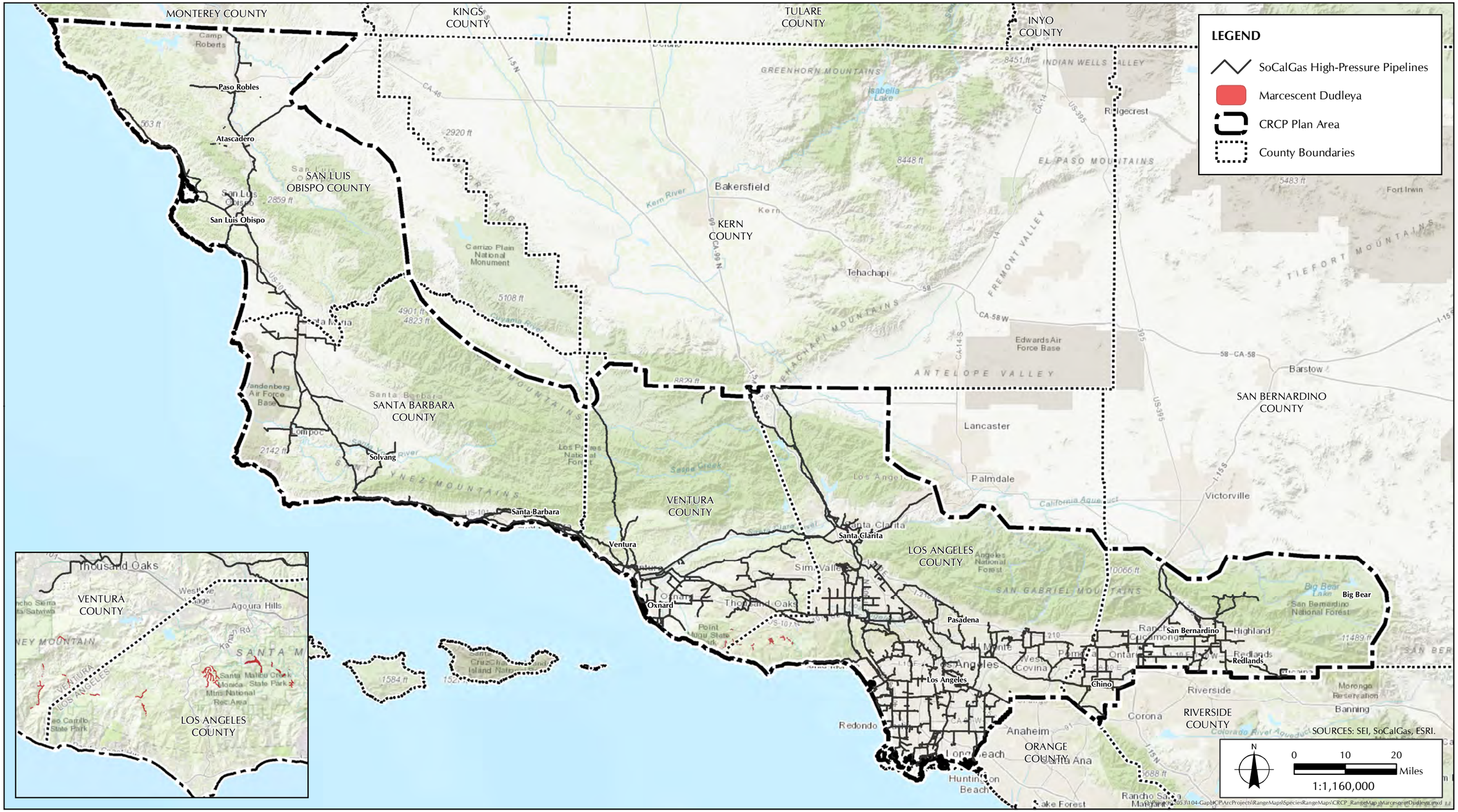

FIGURE B-29

Marcescent Dudleya Modeled Potential

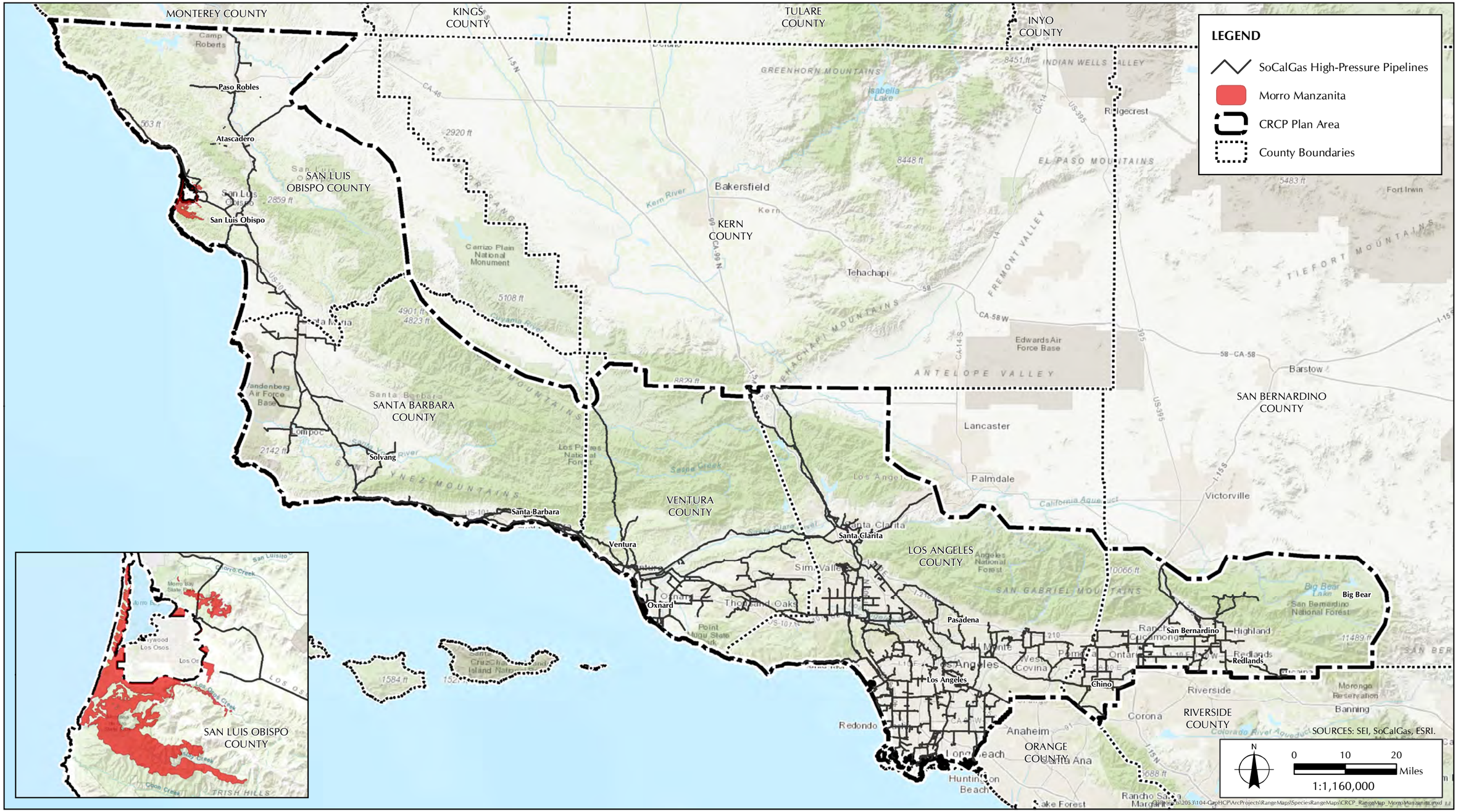

FIGURE B-30

Morro Manzanita Modeled Potential

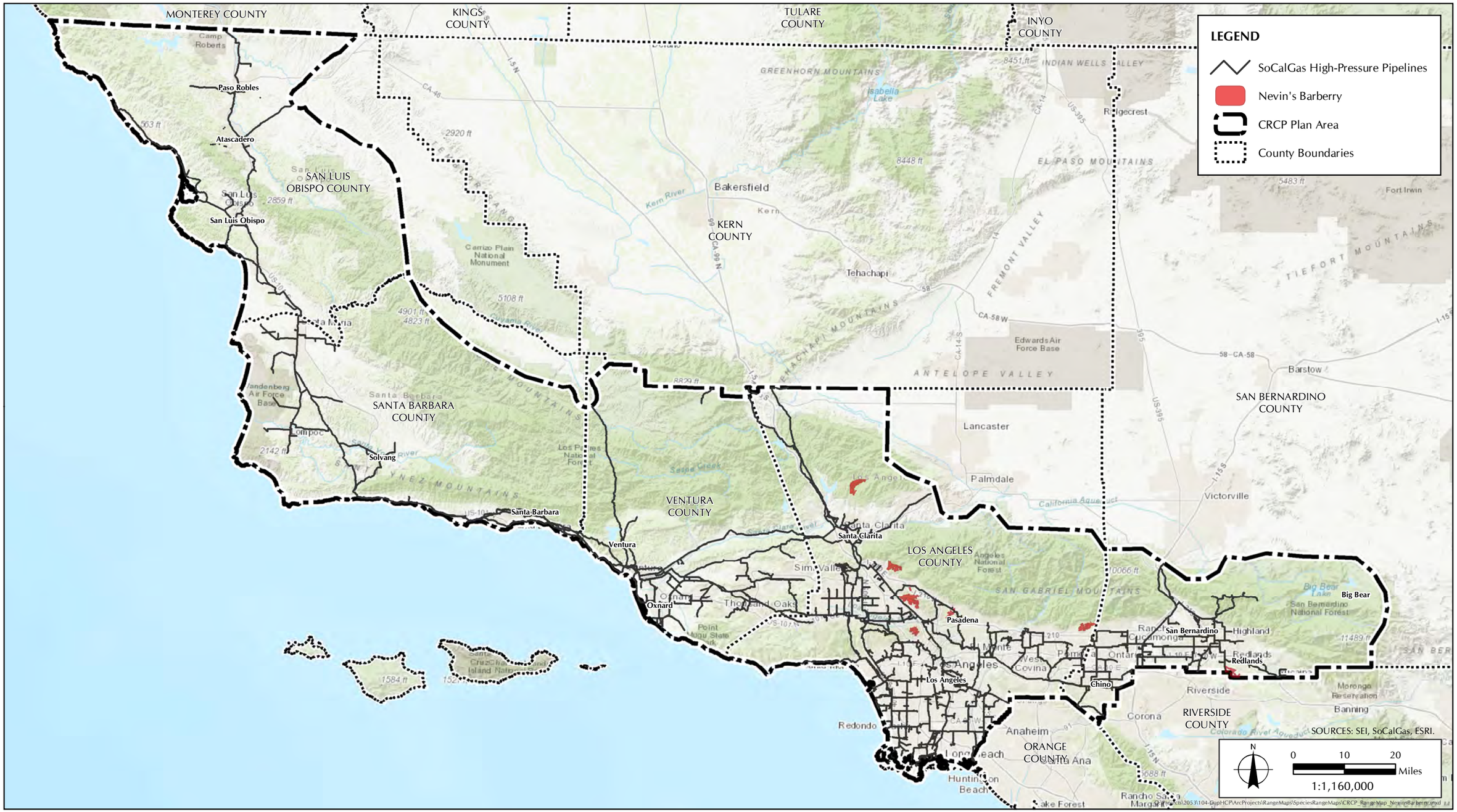

FIGURE B-31

Nevin's Barberry Modeled Potential

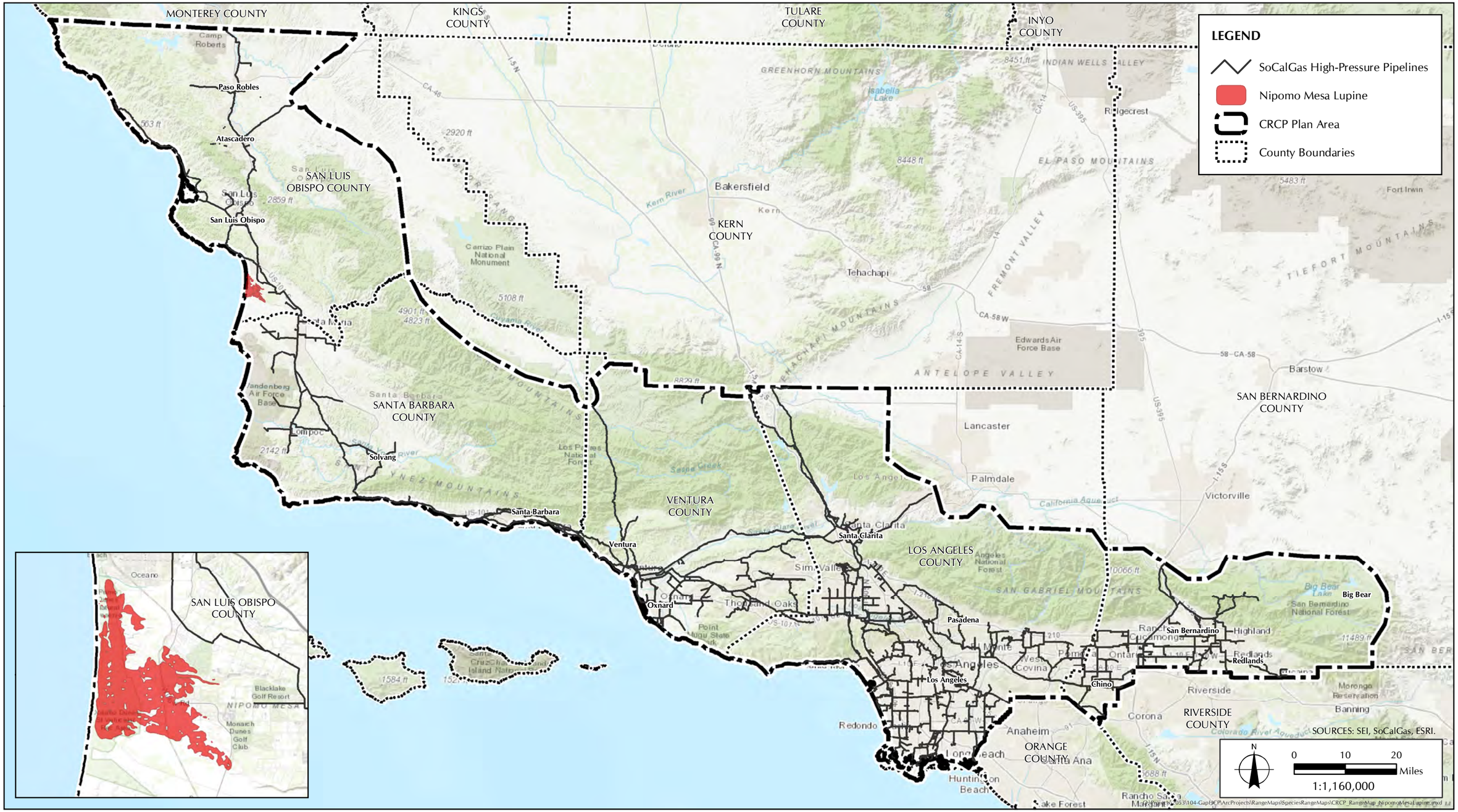

FIGURE B-32

Nipomo Mesa Lupine Modeled Potential

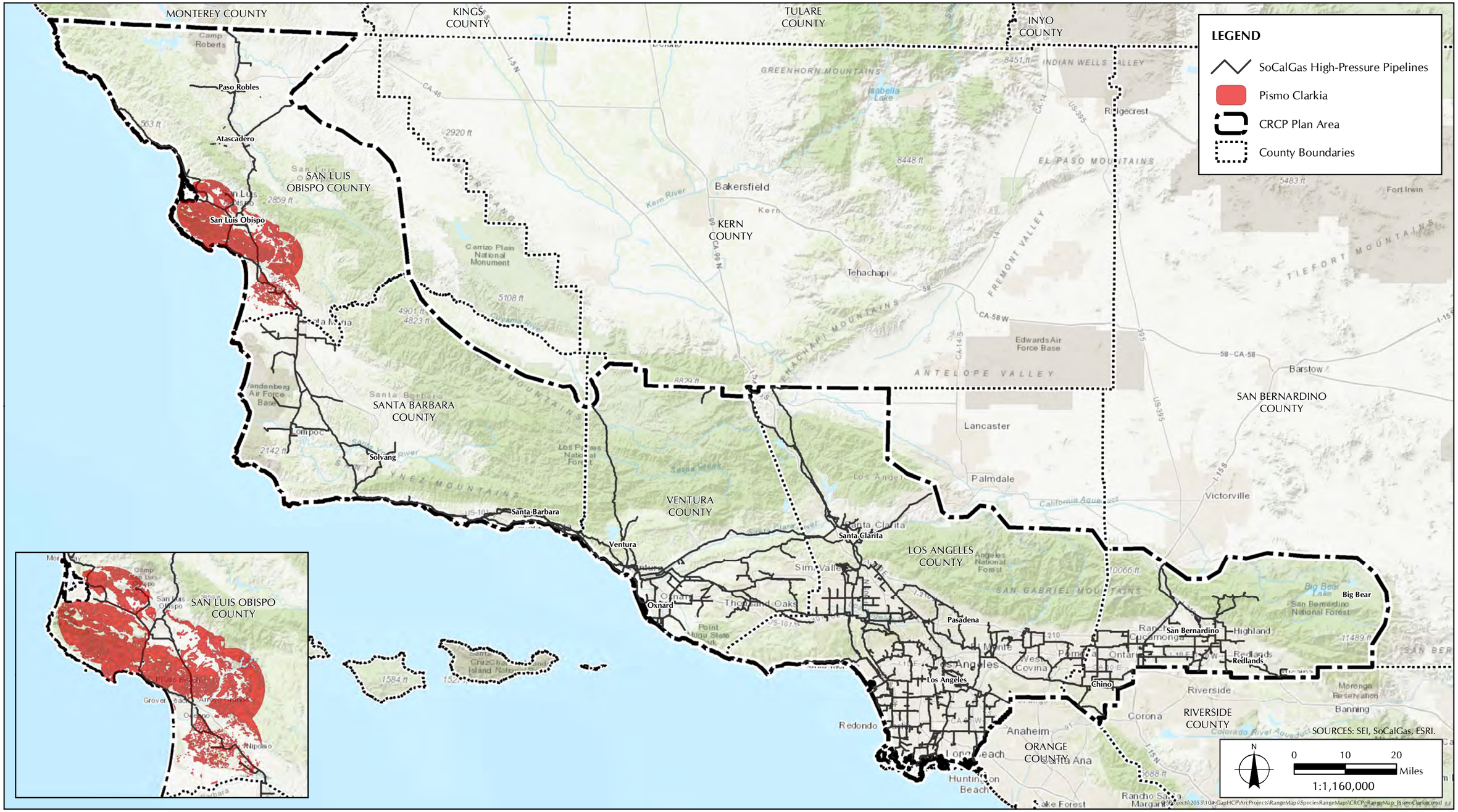

FIGURE B-33

Pismo Clarkia Modeled Potential

FIGURE B-34

San Fernando Valley Spineflower Modeled Potential

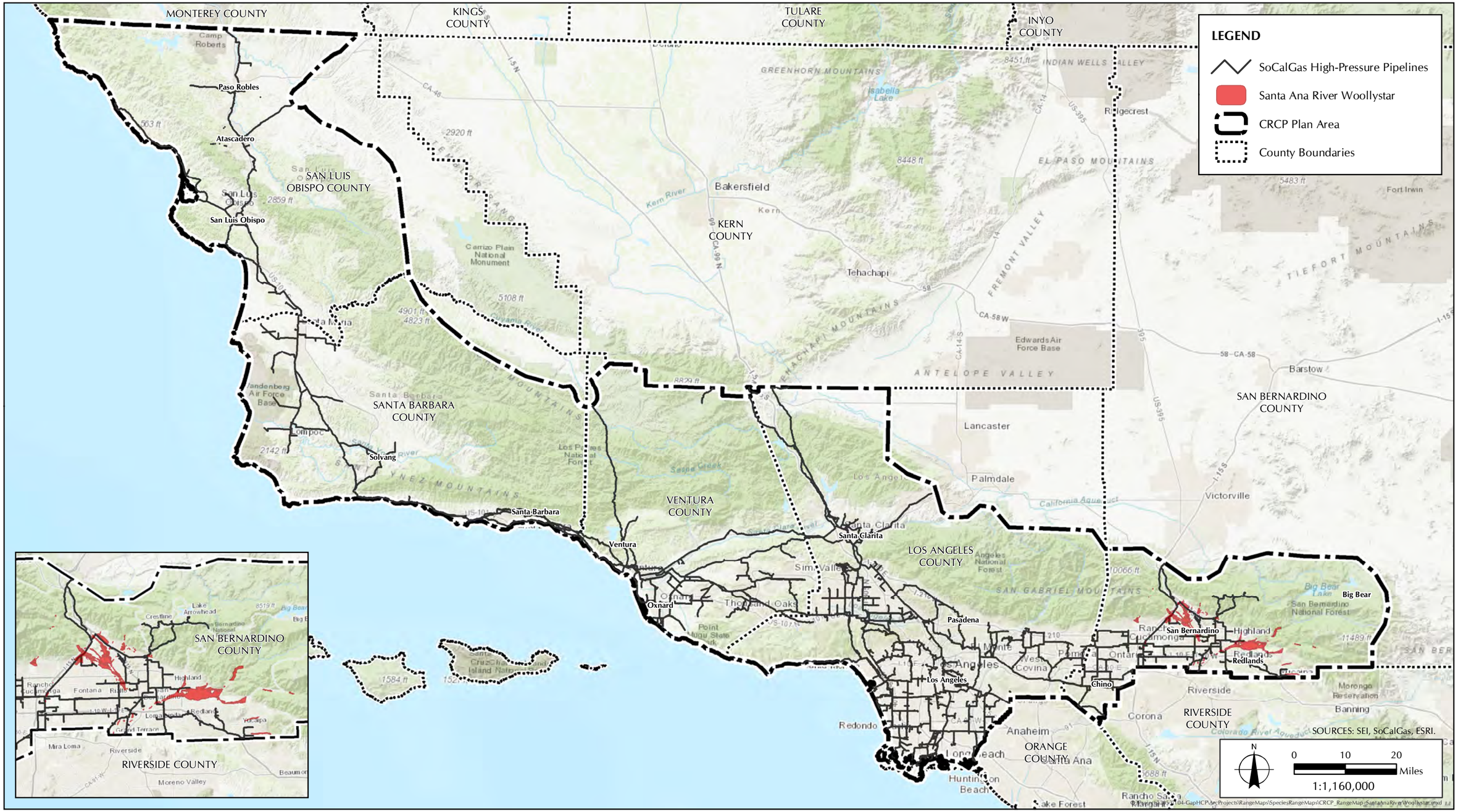

FIGURE B-35

Santa Ana River Woollystar Modeled Potential

FIGURE B-36

Santa Monica Mountains Dudleya Modeled Potential

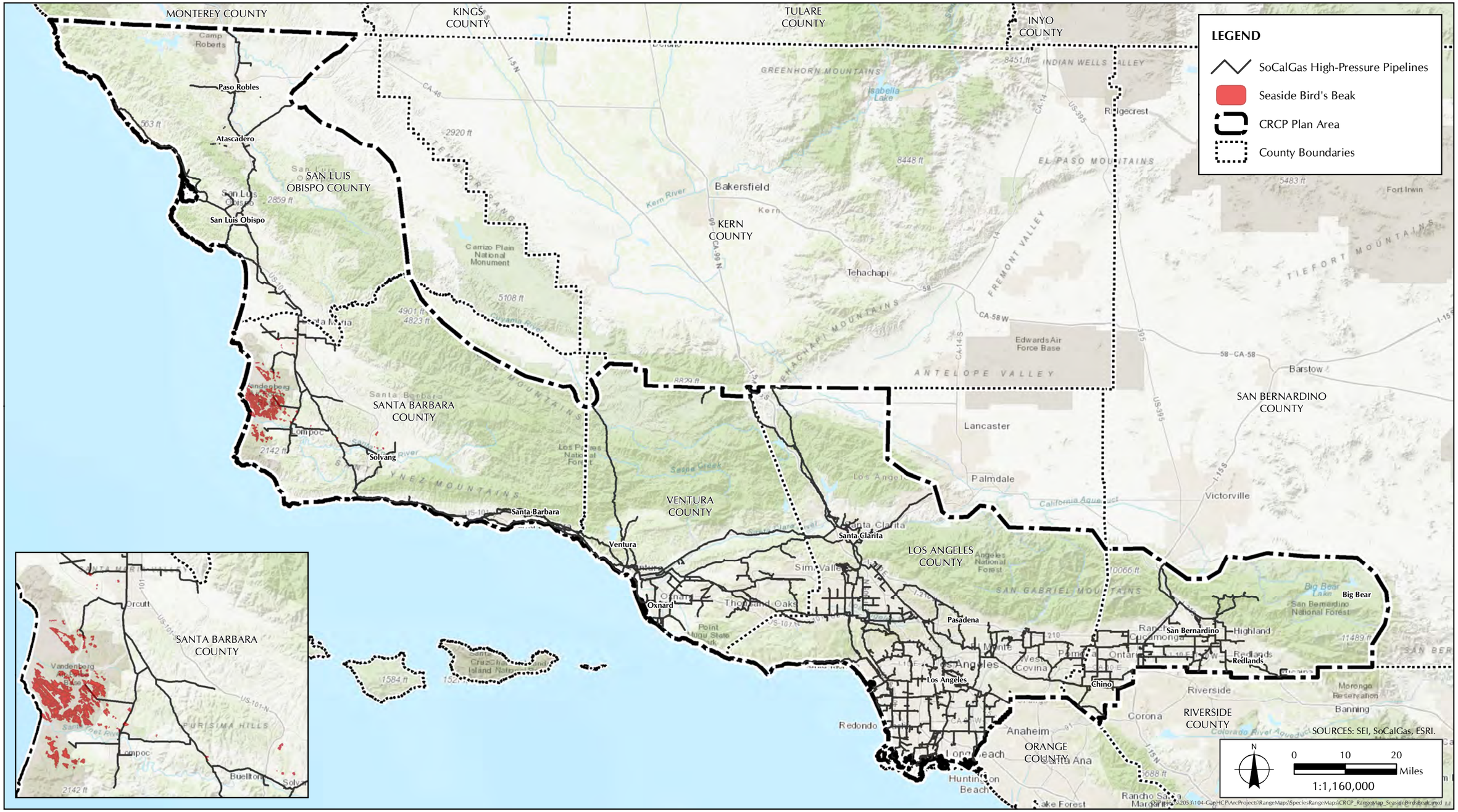

FIGURE B-37

Seaside Bird's Beak Modeled Potential

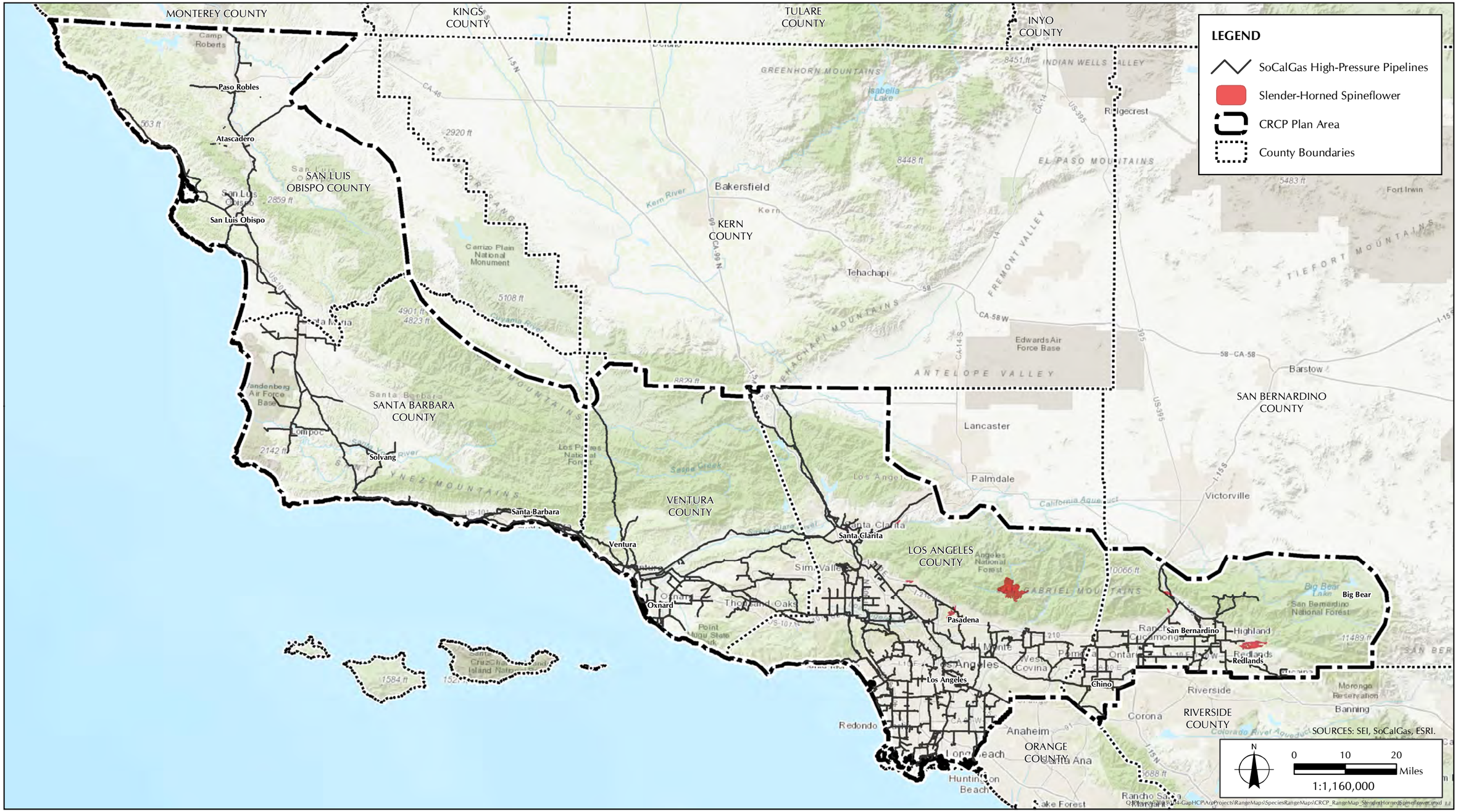

FIGURE B-38

Slender-Horned Spineflower Modeled Potential

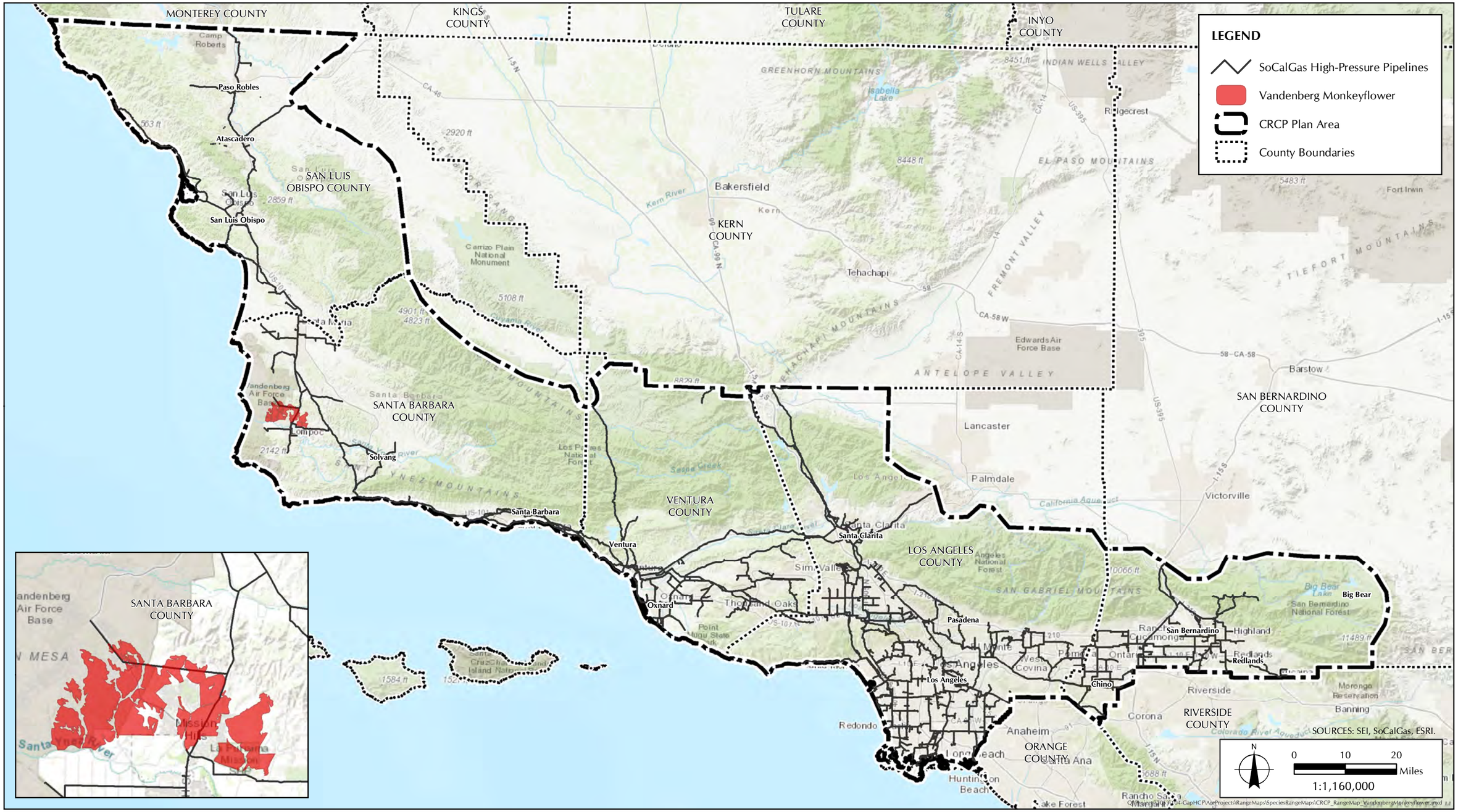

FIGURE B-39

Vandenberg Monkeyflower Modeled Potential

FIGURE B-40

Ventura Marsh Milk-Vetch Modeled Potential

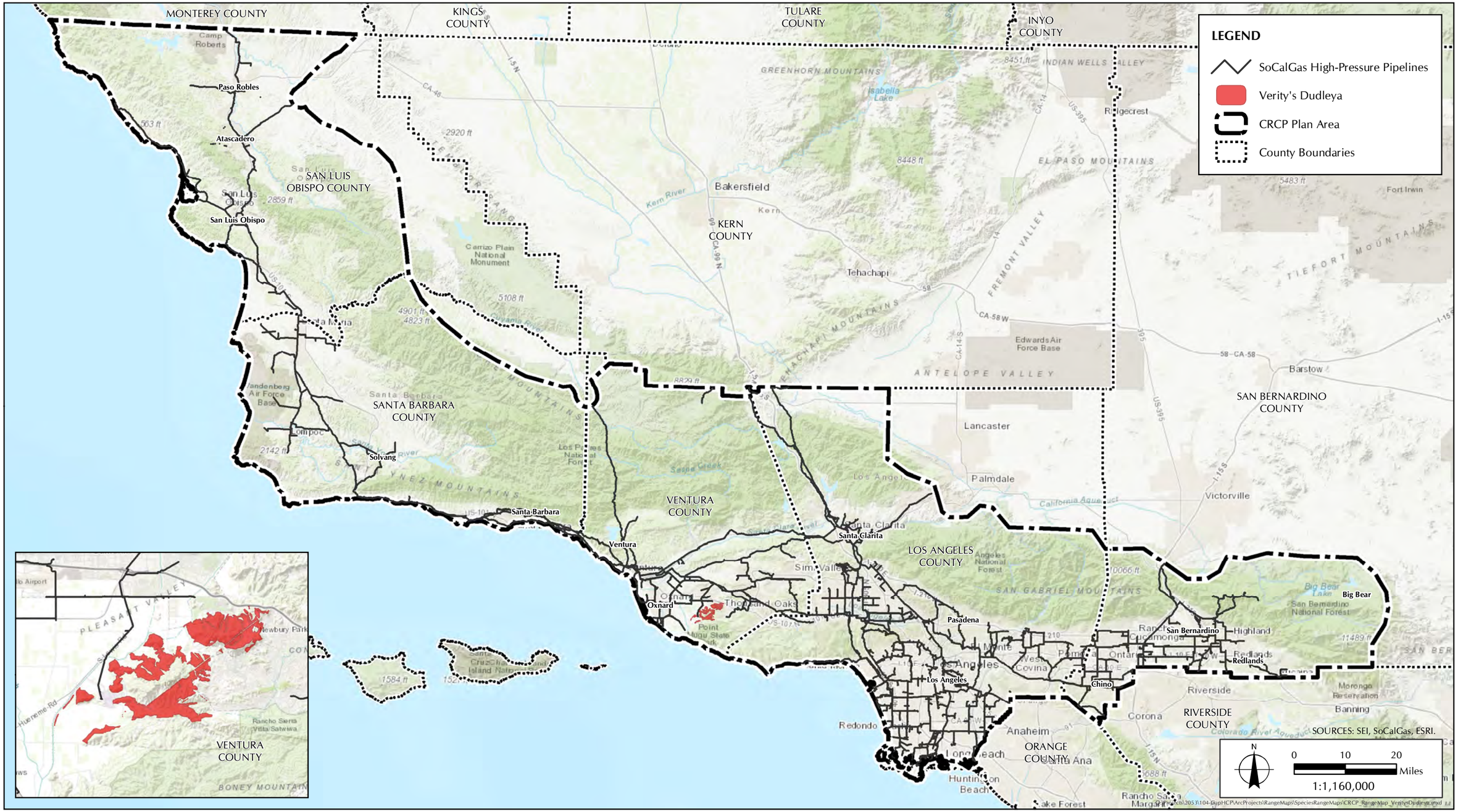

FIGURE B-41

Verity's Dudleya Modeled Potential

Appendix C
PROCESS FOR DETERMINING TARGET SPECIES

This MSHCP covers 41 species, including three invertebrates, one fish, four amphibians, two reptiles, six birds, three mammals, and 22 plant species. SoCalGas is requesting that each of the 19 covered wildlife species be listed on the 10(a)(1)(B) ITP. The ITP will not authorize incidental take of threatened and endangered plant species. However, the MSHCP covers 41 plant and wildlife species to provide "No Surprises" assurances under the ITP ("Covered Species"). An additional seven species occur in the CRCP Plan Area that are afforded "Fully Protected" status by the State of California, for which incidental take coverage is not being requested. SoCalGas has established SOPs and AMMs to avoid incidental take of these seven species.

The primary objective of this MSHCP is to ensure SoCalGas' compliance with the ESA and CESA during implementation of its O&M activities and limited new construction, while protecting and contributing to the conservation of the Covered Species and their habitat through the implementation of an effective and comprehensive conservation strategy. This strategy comprises a broad range of measures designed to avoid, minimize, and mitigate for impacts to Covered Species.

In determining which species to cover under this MSHCP, SoCalGas first developed an expansive list of plant and wildlife species to consider for coverage. This list was compiled using information from available data for the historic range of species that have the potential to be present in the Plan Area and for which incidental take may be required by the covered projects, including:

- Informal and formal consultations with the USFWS and CDFW
- Historical observations and survey results associated with SoCalGas activities within the CRCP Plan Area
- USFWS ECOS data for all threatened and endangered animals, plants, and critical habitat
- USFWS Carlsbad GIS species occurrence database (San Bernardino and Los Angeles Counties)
- CDFW CWHR Life History Account and Range Maps, BIOD, and CNDDB
- CNPS's Inventory of Rare and Endangered Vascular Plants of California (online edition, v8-03 0.39)
- USFS Pacific Southwest Division Vegetation Classification and Mapping System (CalVeg)
- Coordination with USDA Angeles National Forest, Los Padres National Forest, and San Bernardino National Forest
- Prior experience in the CRCP Plan Area of the approximately 20 biologists who participated in preparation of the MSHCP

Consideration of these data led to compilation of a species list comprising 125 species of plants and animals with potential to occur in the CRCP Plan Area. Additional information was then gathered on status, population trends, distribution, threats, and conservation and management efforts. SoCalGas proceeded to further refine the species list through evaluation of several criteria, such as

- Listing Status
- Availability of Legal Mechanism for Authorization for Take
- Historic and Extant Range
- Occurrence Data
- Potential Impact based on Proximity to Existing SoCalGas Facilities
- Lack of Existing Programmatic Coverage

I. Covered Species

Several criteria were used to determine which of the over 100 special status species of plants and animals with the potential to occur within the CRCP Plan Area that SoCalGas would include in the list of Covered Species:

- **Status:** The species is currently listed as rare, threatened, or endangered pursuant to the ESA or CESA. The species is in the process of being considered for listing or for which listing is reasonably foreseeable during the term of the requested permit, pursuant to the ESA or CESA. In addition, select California SSCs (CDFW's Special Animals List 2013), which may be regularly encountered by SoCalGas or its contractors, or may be reasonably expected to be listed within the term of the permit, were included.

- **Legal Mechanism for Authorization for Take:** At the time of preparation of the Application for Incidental Take, there is no mechanism available for legal authorization of "take" for those species that are afforded "fully protected" status in California (California Fish and Game Code Section 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians]); therefore, these species were not included in the list of covered species.

- **Range:** The species is known to occur or likely occurs within the CRCP Plan Area, based on credible evidence, and may potentially occur within or in relative close proximity to existing SoCalGas facilities.

- **Data:** Sufficient data exist on the species' life history, habitat requirements, and occurrence in the CRCP Plan Area to adequately evaluate impacts on the species and to develop conservation strategies to mitigate these impacts to meet regulatory standards, or limited data are available but important habitat for the species occurs in the CRCP Plan Area. A category of "low," "moderate," or "high" was designated for each species based on the relative availability of biological data.

- **Impact:** The species could be adversely affected by O&M activities and limited new construction. A category of "low," "moderate," or "high" was designated for each species based on the relative amount of anticipated impacts, per GIS desktop analysis and institutional knowledge of a given species' likelihood of occurrence based on past SoCalGas project experience.

- **Lack of Existing Programmatic Coverage:** There is not an existing HCP and/or NCCP that covers incidental take of the species.

As a result of the screening process, SoCalGas has identified 19 wildlife species for incidental take coverage, including three invertebrates, one fish, four amphibians, two reptiles, six birds, and three mammals. The ITP will not authorize incidental take of threatened and endangered plant species. However, the MSHCP covers 41 plant and wildlife species to provide "No Surprises" assurances under the ITP.

II. Special Status Species Evaluated for Coverage

A total of 125 sensitive species were evaluated for consideration for coverage. The 125 species included nine invertebrates, five fishes, seven amphibians, 12 reptiles, 22 birds, 22 mammals, and 48 plant species (Table C-1, *Special Status Plants and Animals with Potential to Occur within the CRCP Plan Area*).

TABLE C-1
SPECIAL STATUS PLANTS AND ANIMALS WITH POTENTIAL TO OCCUR WITHIN THE CRCP PLAN AREA

Common Name	Scientific Name	Federal Status*	State Status**	CNPS†	Criteria				Coverage Decision	Notes
					Status	Range/ Occurrence	Data††	Impact††		
Invertebrates (9)										
Delhi sands flower-loving fly	*Rhaphiomidas terminatus abdominalis*	E	-	-	Listed	Y	M	M	Covered	
El Segundo blue butterfly	*Euphilotes battoides allyni*	E	-	-	Listed	Y	M	M	Covered	
Kern primrose sphinx moth	*Euproserpinus euterpe*	T	-	-	Listed	N	M	L	Not covered	
Morro shoulderband (= banded dune) snail	*Helminthoglypta walkeriana*	E/CH	-	-	Listed	Y	M	L	Covered	
Palos Verdes blue butterfly	*Glaucopsyche lygdamus palosverdesensis*	E/CH	-	-	Listed	Y	L	L	Not covered	Not included due to coverage underlined in City of Rancho Palos Verdes Conservation Plan
Quino checkerspot butterfly	*Euphydryas editha quino*	E/CH	-	-	Listed	N	M	L	Not covered	
Riverside fairy shrimp	*Streptocephalus woottoni*	E/CH	-	-	Listed	N	L	L	Not covered	
San Diego fairy shrimp	*Branchinecta sandiegoensis*	E/CH	-	-	Listed	N	L	L	Not covered	
Vernal pool fairy shrimp	*Branchinecta lynchi*	T/CH	-	-	Listed	N	L	L	Not covered	
Fishes (5)										
Arroyo chub	*Gila orcutti*	-	SSC	-	-	Y	M	M	Not covered	
Santa Ana sucker	*Catostomus santaanae*	T/CH	-	-	Listed	Y	M	M	Covered	
Southern California steelhead trout	*Oncorhynchs mykiss irideus*	E/CH	SSC	-	Listed	Y	M	M	Covered	
Tidewater goby	*Eucyclogobius newberryi*	E/CH	SSC	-	Listed	Y	M	L	Not covered	Coastal species with a short upstream freshwater distance. Species not likely to be encountered during SoCalGas O&M activities
Unarmored threespine stickleback	*Gasterosteus aculeatus williamsoni*	E	E, FP	-	Listed	Y	M	M	Not Covered	Fully Protected Species within Plan Area
Amphibians (7)										
Arroyo toad	*Anaxyrus californicus*	E/CH‡	SSC	-	Listed	Y	M	M	Covered	
California red-legged frog	*Rana draytonii*	T/CH	SSC	-	Listed	Y	M	M	Covered	
California tiger salamander	*Ambystoma californiense*	E/CH	T/SSC	-	Listed	Y	M	M	Covered	
Coast range newt	*Taricha torosa torosa*	-	SSC	-	-	Y	L	L	Not covered	
Mountain yellow-legged frog	*Rana muscosa*	E/CH	SSC	-	Listed	Y	M	M	Covered	
Western spadefoot	*Spea hammondii*	-	SSC	-	-	Y	L	L	Not covered	
Yellow-blotched salamander	*Ensatina eschscholtzii croceator*	-	SSC	-	-	N	L	L	Not covered	
Reptiles (12)										
Coast horned lizard	*Phrynosoma coronatum*	-	SSC	-	-	Y	M	M	Not covered	
Coast patch-nosed snake	*Salvadora hexalepis virgultea*	-	SSC	-	-	Y	L	M	Not covered	
Coronado Island skink	*Plestiodon skiltonianus interparietalis*	-	WL	-	-	N	L	L	Not covered	
Orangethroat whiptail	*Aspidoscelis hyperythra*	-	WL	-	-	Y	M	M	Not covered	
Red-diamond rattlesnake	*Crotalus ruber*	-	SSC	-	-	Y	L	M	Not covered	
Northern Three-lined Boa	*Lichanura orcutt*	-	-	-	-	Y	L	M	Not covered	
Coast mountain kingsnake	*Lampropeltis zonata*	-	WL	-	-	Y	L	M	Not covered	Formerly split into subspecies
South coast garter snake	*Thamnophis sirtalis ssp.*	-	SSC	-	-	Y	L	L	Not covered	
Southern rubber boa	*Charina bottae umbratica*	-	T	-	Listed	Y	Y	L	Covered	
Two-striped garter snake	*Thamnophis hammondii*	-	SSC	-	-	Y	L	M	Not covered	
Southwestern pond turtle	*Actinemys pallida*	-	SSC	-	-	Y	M	M	Covered	Although SSC, CDFW reasonably predicts species will be listed within the term of the permit.
Birds (22)										
American peregrine falcon	*Falco peregrinus anatum*	-	FP	-	Delisted	Y	L	L	Not covered	Fully Protected Species within Plan Area
Belding's savannah sparrow	*Passerculus sandwichensis beldingi*	-	E	-	Listed	Y	H	L	Covered	
Burrowing owl	*Athene cunicularia*	BCC	SSC	-	-	Y	M	M	Covered	Frequently encountered species within the Plan Area
California black rail	*Laterallus jamaicensis coturniculus*	BCC	T	-	Listed	N	L	L	Not covered	

TABLE C-1
SPECIAL STATUS PLANTS AND ANIMALS WITH POTENTIAL TO OCCUR WITHIN THE CRCP PLAN AREA

Common Name	Scientific Name	Federal Status*	State Status**	CNPS†	Criteria				Coverage Decision	Notes
					Status	Range/ Occurrence	Data††	Impact††		
California brown pelican	*Pelecanus occidentalis californicus*	-	-		Delisted	Y	M	L	Not covered	
California condor	*Gymnogyps californianus*	E/CH	E, FP	-	Listed	Y	H	L	Not covered	Fully Protected Species within Plan Area
California least tern	*Sterna antillarum browni*	E	E, FP	-	Listed	Y	H	L	Not covered	Fully Protected Species within Plan Area
Coastal cactus wren	*Campylorhynchus brunneicapillus couesi*	BCC	SSC	-	-	N	M	M	Not covered	SSC only in San Diego and Orange counties
Coastal California gnatcatcher	*Polioptila californica californica*	T/CH	SSC	-	Listed	Y	M	H	Covered	
Golden eagle	*Aquila chrysaetos*	-	WL, FP	-	-	Y	L	L	Not covered	Fully Protected Species within Plan Area
Least Bell's vireo	*Vireo bellii pusillus*	E/CH	E	-	Listed	Y	M	M	Covered	
Light-footed clapper rail	*Rallus longirostris levipes*	E	E, FP	-	Listed	N	L	L	Not covered	Fully Protected Species outside of Plan Area
Loggerhead shrike	*Lanius ludovicianus*	BCC	SSC	-	-	Y	L	L	Not covered	
Long-eared owl	*Asio otus*	-	SSC	-	-	Y	L	L	Not covered	
Mountain plover	*Charadrius montanus*	BCC	SSC	-	-	Y	L	L	Not covered	
Northern harrier	*Circus cyaneus*	-	SSC	-	-	Y	L	L	Not covered	
Short-eared owl	*Asio flammeus*	-	SSC	-	-	N	L	L	Not covered	
Southwestern willow flycatcher	*Empidonax traillii extimus*	E/CH	E	-	Listed	Y	M	L	Covered	
Tricolored blackbird	*Agelaius tricolor*	BCC	CE	-	Candidate	Y	L	L	Not covered	Species was granted Emergency status under CESA in December 2015. Listing provided protection until June 2015. Species has been under review since. It is not clear if species will obtain State status above SSC.
Western snowy plover	*Charadrius alexandrinus nivosus*	T/BCC/CH	SSC	-	Listed	Y	H	L	Not covered	Shoreline species not likely to encounter SoCalGas facilities
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	T/BCC	E	-	Listed	N	M	L	Covered	Nesting not known within Plan Area since 1986
White-tailed kite	*Elanus leucurus*	-	FP	-	-	Y	L	L	Not covered	Fully Protected Species within Plan Area
Mammals (22)										
Dulzura pocket mouse	*Chaetodipus californicus femoralis*	-	SSC	-	-	Y	M	H	Not covered	
Fringed myotis	*Myotis thysanodes*	-	-	-	-	Y	L	L	Not covered	
Long-legged myotis	*Myotis volans*	-	-	-	-	Y	L	L	Not covered	
Los Angeles pocket mouse	*Perognathus longimembris brevinasus*	-	SSC	-	-	Y	M	H	Not covered	
Monterey dusky-footed woodrat	*Neotoma fuscipes luciana*	-	SSC	-	-	N	L	L	Not covered	
Morro Bay kangaroo rat	*Dipodomys heermanni morroensis*	E/CH	E, FP	-	Listed	Y	M	L	Not Covered	Fully Protected Species within Plan Area.
Northwestern San Diego pocket mouse	*Chaetodipus fallax fallax*	-	SSC	-	-	Y	M	L	Not covered	
Pallid bat	*Antrozous pallidus*	-	SSC	-	-	Y	L	L	Not covered	
Ring-tailed cat	*Bassariscus astutus*	-	-	-	-	N	L	L	Not covered	
San Bernardino kangaroo rat	*Dipodomys merriami parvus*	E/CH	SSC	-	Listed	Y	H	M	Covered	
San Diego black-tailed jackrabbit	*Lepus californicus bennettii*	-	SSC	-	-	Y	L	L	Not covered	
San Diego desert woodrat	*Neotoma lepida intermedia*	-	SSC	-	-	Y	M	L	Not covered	
San Joaquin kit fox	*Vulpes macrotis mutica*	E	T	-	Listed	Y	M	L	Covered	
South coast marsh vole	*Microtus californicus stephensi*	-	SSC	-	-	Y	M	L	Not covered	
Southern California saltmarsh shrew	*Sorex ornatus salicornicus*	-	SSC	-	-	Y	M	L	Not covered	
Southern grasshopper mouse	*Onychomys torridus ramona*	-	SSC	-	-	Y	M	L	Not covered	
Spotted bat	*Euderma maculatum*	-	SSC	-	-	Y	L	L	Not covered	
Stephens' kangaroo rat	*Dipodomys stephensi*	E	T	-	Listed	Y	L	L	Covered	
Tehachapi pocket mouse	*Perognathus alticolus inexpectatus*	-	SSC	-	-	Y	M	L	Not covered	
Western mastiff bat	*Eumops perotis californicus*	-	SSC	-	-	Y	L	L	Not covered	

TABLE C-1
SPECIAL STATUS PLANTS AND ANIMALS WITH POTENTIAL TO OCCUR WITHIN THE CRCP PLAN AREA

Common Name	Scientific Name	Federal Status*	State Status**	CNPS†	Criteria				Coverage Decision	Notes
					Status	Range/ Occurrence	Data††	Impact††		
Western red bat	*Lasiurus blossevillii*	-	SSC	-	-	Y	L	L	Not covered	
Western yellow bat	*Lasiurus xanthinus*	-	SSC	-	-	Y	L	L	Not covered	
Plants (48)										
Adobe sanicle	*Sanicula maritima*	-	R	1B.1	Listed	Y	L	M	Not covered	
Beach layia	*Layia carnosa*	E	E	1B.1	Listed	Y	L	L	Not covered	Species not likely to be encountered during SoCalGas O&M activities
Beach spectaclepod	*Dithyrea maritima*	-	T	1B.1	Listed	Y	L	L	Not covered	Species not likely to encouther SoCalGas O&M activities
Big-leaved crownbeard	*Verbesina dissita*	T	T	1B.1	Listed	N	L	L	Not covered	
Braunton's milk-vetch	*Astragalus brauntonii*	E/CH	-	1B.1	Listed	Y	L	M	Covered	
California Orcutt grass	*Orcuttia californica*	E	E	1B.1	Listed	Y	L	L	Not covered	Species not likely to be encountered during SoCalGas O&M activities
California seablite	*Suaeda californica*	E	-	1B.1	Listed	Y	L	M	Covered	
California taraxacum	*Taraxacum californicum*	E/CH	-	1B.1	Listed	N	L	L	Not covered	
Chorro Creek bog thistle	*Cirsium fontinale var. obispoense*	E	E	1B.2	Listed	Y	L	M	Covered	
Coachella Valley milk-vetch	*Astragalus lentiginosus var. coachellae*	E	-	1B.2	Listed	N	M	L	Not covered	
Conejo buckwheat	*Eriogonum crocatum*	-	R	1B.2	Listed	Y	L	M	Not covered	
Conejo dudleya	*Dudleya abramsii spp. parva*	T	-	1B.2	Listed	Y	L	M	Covered	
Cuesta Pass checkerbloom	*Sidalcea hickmanii ssp. anomala*	-	R	1B.2	Listed	Y	L	M	Not covered	
Gambel's water cress	*Nasturtium gambelii*	E	T	1B.1	Listed	Y	L	M	Covered	
Gaviota tarplant	*Deinandra increscens ssp. villosa*	E/CH	E	1B.1	Listed	Y	L	M	Covered	
Hearst's manzanita	*Arctostaphylos hookeri ssp. hearstiorum*	-	E	1B.2	Listed	N	L	L	Not covered	
Indian Knob mountainbalm	*Eriodictyon altissimum*	E	E	1B.1	Listed	Y	L	M	Covered	
La Graciosa thistle	*Cirsium scariosum var. loncholepis*	E/CH	T	1B.1	Listed	Y	L	L	Not covered	Species not likely to be encountered during SoCalGas O&M activities
Laguna Beach dudleya	*Dudleya stolonifera*	T	T	1B.1	Listed	N	L	L	Not covered	
Lompoc yerba santa	*Eriodictyon capitatum*	E/CH	R	1B.2	Listed	Y	L	M	Covered	
Lyon's pentachaeta	*Pentachaeta lyonii*	E/CH	E	1B.1	Listed	Y	L	M	Covered	
Marcescent dudleya	*Dudleya cymosa ssp. marcescens*	T	R	1B.2	Listed	Y	L	M	Covered	
Marsh sandwort	*Arenaria paludicola*	E	E	1B.1	Listed	Y	L	L	Not covered	Species not likely to be encountered during SoCalGas O&M activities
Mojave tarplant	*Deinandra mohavensis*	-	E	1B.3	Listed	N	L	L	Not covered	
Morro manzanita	*Arctostaphylos morroensis*	T	-	*1B.1*	Listed	Y	L	M	Covered	
Munz's onion	*Allium munzii*	E/CH	T	1B.1	Listed	N	L	L	Not covered	
Nevin's barberry	*Berberis nevinii*	E/CH	E	1B.1	Listed	Y	L	L	Covered	
Nipomo Mesa lupine	*Lupinus nipomensis*	E	E	1B.1	Listed	Y	L	M	Covered	
Parish's checkerbloom	*Sidalcea hickmanii ssp. parishii*	-	R	1B.2	Listed	Y	L	L	Not covered	Species not likely to be encountered during SoCalGas O&M activities
Pismo clarkia	*Clarkia speciosa ssp. immaculata*	E	R	1B.1	Listed	Y	L	M	Covered	
Salt marsh bird's-beak	*Cordylanthus maritimus ssp. maritimus*	E	E	1B.2	Listed	Y	L	L	Not covered	Species not likely to be encountered during SoCalGas O&M activities
San Bernardino bluegrass	*Poa atropurpurea*	E/CH	-	1B.2	Listed	N	L	L	Not covered	
San Diego button-celery	*Eryngium aristulatum var. parishii*	E	E	1B.1	Listed	N	L	L	Not covered	
San Fernando Valley spineflower	*Chorizanthe parryi var. fernandina*	-	E	1B.1	Listed	Y	L	M	Covered	
San Jacinto Valley crownscale	*Atriplex coronata var. notatior*	E	-	1B.1	Listed	N	L	L	Not covered	
San Joaquin woollythreads	*Monolopia congdonii*	E	-	1B.2	Listed	N	L	L	Not covered	
Santa Ana River woollystar	*Eriastrum densifolium ssp. sanctorum*	E	E	1B.1	Listed	Y	M	M	Covered	

TABLE C-1
SPECIAL STATUS PLANTS AND ANIMALS WITH POTENTIAL TO OCCUR WITHIN THE CRCP PLAN AREA

Common Name	Scientific Name	Federal Status*	State Status**	CNPS†	Criteria				Coverage Decision	Notes
					Status	Range/ Occurrence	Data††	Impact††		
Santa Monica Mountains dudleya	*Dudleya cymosa ssp. ovatifolia*	T	-	1B.2	Listed	Y	M	M	Covered	
Santa Susana tarplant	*Deinandra minthornii*	-	R	1B.2	Listed	Y	M	M	Not covered	
Santa Ynez false lupine	*Thermopsis macrophylla var. angina*	-	R	1B.3	Listed	Y	L	L	Not covered	Species not likely to be encountered during SoCalGas O&M activities
Seaside bird's-beak	*Cordylanthus rigidus ssp. littoralis*	-	E	1B.1	Listed	Y	L	L	Not covered	Species not likely to be encountered during SoCalGas O&M activities
Slender-horned spineflower	*Dodecahema leptoceras*	E	E	1B.1	Listed	Y	M	M	Covered	
Spreading navarretia	*Navarretia fossalis*	T/CH‡	-	1B.1	Listed	N	L	L	Not covered	
Thread-leaved brodiaea	*Brodiaea filifolia*	T/CH	E	1B.1	Listed	N	L	L	Not covered	
Triple-ribbed milk-vetch	*Astragalus tricarinatus*	E	-	1B.2	Listed	N	L	L	Not covered	
Vail Lake ceanothus	*Ceanothus ophiochilus*	T/CH	E	1B.1	Listed	N	L	L	Not covered	
Ventura Marsh milk-vetch	*Astragalus pycnostachyus var. lanosissimus*	E/CH	E	1B.1	Listed	Y	L	M	Covered	
Verity's dudleya	*Dudleya verityi*	T	-	1B.2	Listed	Y	L	M	Covered	

NOTE:
* Federal Status: Endangered (E); Threatened (T); Federal Candidate (FC); Proposed Threatened (PT); Bird of Conservation Concern (BCC); Federally Delisted (FD); Critical Habitat (CH).
** State Status: Fully Protected (FP); Endangered (E); Threatened (T); Candidate Endangered (CE); Rare (R); Species of Special Concern (SSC); State Delisted (SD).
† California Native Plant Society (CNPS): List 1B: Plants rare, threatened, or endangered in California and elsewhere; List 2: Plants rare, threatened, or endangered in California but more common elsewhere; Threat 0.1: Seriously threatened in California (high degree/immediacy of threat); Threat 0.2: Fairly threatened in California (moderate degree/immediacy of threat); Threat 0.3: Not very threatened in California (low degree/immediacy of threats or no current threats known).
†† L = low; M = moderate; H = high.

Wildlife

As a result of the screening process, SoCalGas is requesting take coverage for 19 wildlife species listed as threatened or endangered pursuant to ESA or CESA. In addition, SoCalGas is seeking coverage for one wildlife species (burrowing owl) identified as an SSC by the CDFW.

Invertebrates

- DSFF (*Rhaphiomidas terminatus abdominalis*)
- ESBB (*Euphilotes battoides allyni*)
- MSS (*Helminthoglypta walkeriana*)

Fish

- SAS (*Catostomus santaanae*)

Amphibians

- Arroyo toad (*Anaxyrus californicus*)
- CRLF (*Rana draytonii*)
- CTS (*Ambystoma californiense*)
- MYLF (*Rana muscosa*)

Reptiles

- SRB (*Charina bottae umbratica*)
- SWPT (*Actinemys pallida*)

Birds

- BSS (*Passerculus sandwishensis beldingi*)
- Burrowing owl (*Athene cunicularia*)
- CAGN (*Polioptila californica californica*)
- LBV (*Vireo bellii pusillus*)
- SWF (*Empidonax traillii extimus*)
- WYBC (*Coccyzus americanus occidentalis*)

Mammals

- SBKR (*Dipodomys merriami parvus*)
- SJKT (*Vulpes macrotis mutica*)
- SKR (*Dipodomys stephensi*)

Plants

In addition to the 19 identified wildlife species, SoCalGas has identified 22 plant species that would benefit from the conservation efforts under this MSHCP.

- BMV (*Astragalus brauntonii*)
- California seablite (*Suaeda californica*)
- CCBT (*Cirsium fontinale var. obispoense*)
- Conejo dudleya (*Dudleya abramsii* ssp. *Parva*)
- GWC (*Nasturtium gambelii*)
- Gaviota tarplant (*Deinandra increscens* ssp. *Villosa*)
- IKM (*Eriodictyon altissimum*)
- LYS (*Eriodictyon capitatum*)
- Lyon's pentachaeta (*Pentachaeta lyonii*)
- Marcescent dudleya (*Dudleya cymosa* ssp. *Marcescens*)
- Morro manzanita (*Arctostaphylos morroensis*)
- Nevin's barberry (*Berberis nevinii*)
- NML (*Lupinus nipomensis*)
- Pismo clarkia (*Clarkia speciosa* ssp. *Immaculate*)
- SFVS (*Chorizanthe parryi var. Fernandina*)
- SARW (*Eriastrum densifolium* ssp. *Sanctorum*)
- SMMD (*Dudleya cymosa* ssp. *Ovatifolia*)
- SBB (*Cordylanthus rigidus ssp. littoralis*)
- SHS (*Dodecahema leptoceras*)
- VMF (*Diplacus vandenbergensis*)
- VMMV (*Astragalus pycnostachyus var. lanosissimus*)
- Verity's dudleya (*Dudleya verity*)

III. Fully Protected Species

In addition to the 41 identified wildlife and plant species, SoCalGas has identified an additional seven species that are afforded "fully protected" status by the State of California, that have the potential to be present within the CRCP Plan Area, for which SOPs and AMMs have been suitable for avoiding take since the listing of the respective species.

Fish

- UTS (*Gasterosteus aculeatus williamsoni*)

Birds

- APF (*Falco peregrinus anatum*)
- California condor (*Gymnogyps californianus*)
- CLT (*Sterna antillarum browni*)
- Golden eagle (*Aquila chrysaeto*)
- WTK (*Elanus leucurus*)

Mammals

- MBKR (*Dipodomys heermanni morrensis*)

Appendix D
EFFECTS ANALYSIS METHODS

I. Introduction

Throughout the 30-year permit term of the CRCP MSHCP, implementation of SoCalGas' Covered Activities may occur at currently unknown locations along the SoCalGas pipeline network and associated facilities within the CRCP Plan Area. Therefore, in order to complete an effects analysis in support of the permit, SoCalGas developed a robust approach to estimating future impacts, which is described within this appendix. The methodology that was developed relies on the following components: an historical analysis of past activities documented by SoCalGas during the period 2003–2009[550] and 2013–2015[551] from its GEARS database for all projects involving issues related to biological resources in the CRCP Plan Area; empirical data for impacts associated with the construction of roads in the San Joaquin Valley Plan Area, in support of the Pipeline Safety and Enhancement Plan (PSEP);[552] a summary of SoCalGas' formal and informal consultations with the Ventura Field Office of the USFWS between 1995 and 2017;[553] and input provided by SoCalGas O&M personnel and the PSEP program manager, which aided in the determination of the expected magnitude of impacts, including the proportion of temporary versus permanent, with a probabilistic analysis to determine the likely effects on each Covered Species.

The effects analysis was also informed by species locality data compiled in a GIS database, and on the distribution of potential habitat based on the results of GIS-based predicted species distribution models, as augmented by more detailed site- specific data provided by the USFWS for California tiger salamander (CTS) and California red-legged frog (CRLF). Using the proportion of SoCalGas facilities and pipeline system which intersected predicted habitat for a particular species, and estimated future effects, it is possible to calculate the proportion of habitat (and therefore the acres) likely to be impacted for each species over the life of the permit.

II. Data Sources Incorporated into the CRCP MSHCP

The CRCP Plan Area comprises approximately 6,785,892 acres. SoCalGas facilities within the CRCP Plan Area include pipelines, 28 stations, four storage fields, and eight telecommunications sites (Table D-1, *SoCalGas Facilities in CRCP Plan Area*).

[550] SoCalGas. March 2016. Preliminary CRCP HCP 2013 draft. Data provided to Sapphos Environmental, Inc.

[551] SoCalGas. 10 August 2017. 2013-2015 Project List. Data provided to Sapphos Environmental, Inc.

552 Rodgers, Derek, Southern California Gas Company, Los Angeles, CA. E-mail to Marie Campbell, Sapphos Environmental, Inc., Pasadena, CA. Subject: CRCP Permanent Impacts.

553 U.S. Fish and Wildlife Service. 31 July 2017. USFWS Completed SoCalGas Projects, VFWO and CFWO. Data provided to Sapphos Environmental, Inc.

TABLE D-1
SOCALGAS FACILITIES IN CRCP PLAN AREA

Facility Type	Total Linear Miles within CRCP Plan Area
Gas Pipelines	2,434.6
Stations by County	**Acres of Stations**
San Bernardino (2)	2.4
Los Angeles (19)	13.6
Ventura (5)	9.3
Santa Barbara (2)	7.1
San Luis Obispo (0)	0.0
TOTAL (28)	32.4
Storage Fields	**Total Acres of Storage Fields**
Aliso Canyon	3,221.6
Montebello*	31.4
Playa Del Rey	43.0
Honor Rancho	695.4
Goleta	272.0
TOTAL (5)	4,263.4
Telecommunication Sites	**Total Sites in Points**
San Bernardino County (1)	1
Los Angeles County (5)	5
Santa Barbara County (2)	2
TOTAL (8)	8

SOURCE: SoCalGas. n.d. Data provided to Sapphos Environmental, Inc.
NOTE: *There is no long-term plan for O&M projects at Montebello. SoCalGas is currently in the process of idling the field, which includes evacuating all gas/liquids from vessels, tanks, pipelines. Therefore, there would be no likely impact area coverage needed for Montebello.

Comprehensive Baseline Data

Comprehensive baseline data was developed using geospatial data listed in Table D-2, *Data Sources Used to Develop Comprehensive Baseline Data*, for the following: (1) SoCalGas Facilities, (2) Land Use/Cover Type, and (3) Ecological Features.

Numerous data sources were used to categorize the CRCP Plan Area into three broad categories: SoCalGas facilities; urban, and open space (Table D-2*, Data Sources Used to Characterize CRCP Plan Area Baseline Conditions*). The Land Use/Cover type data was developed by using 2002 Fire and Resource Assessment Program (FRAP) land cover data[554] as an initial base and updated using data from 2016 Urbanized Areas Boundaries,[555] 2016 Farmland Mapping and Monitoring Program (FMMP),[556] various CDFW datasets containing significant ecological features, and ESRI geospatial roads data. Thorough research was performed on types of roadways and their corresponding lane widths based on Caltrans Highway Performance Monitoring System (HPMS) and DOT Federal Highway Administration data.[557] Roadway features were classified as urban, whereas the agriculture and ecological features were classified as open space (Table D-2).

554 Data developed by California Department of Forestry and Fire Protection and the USFS.

555 Data developed by the U.S. Census Bureau.

556 Data developed by the California Department of Conservation.

557 U.S. Department of Transportation, Federal Highway Administration. N.d. Mitigation Strategies For Design Exceptions. Available at: https://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/chapter3/3_lanewidth.cfm. Accessed 12 September 2017.

TABLE D-2
DATA SOURCES USED TO CHARACTERIZE CRCP PLAN AREA BASELINE CONDITIONS

Category of Data	Data	Data Source	Date	Baseline Classification
Facility Data	High-Pressure Gas Pipelines	SoCalGas	March 2016	**FACILITIES**
	Stations (valves, compressors, etc.)			
	Storage Fields			
	Telecommunication Sites	SoCalGas	April 2018	
Land Use / Cover Type	Urban/ Developed Areas	USDA Forest Service and California Department of Forestry and Fire Protection: Fire Resource Assessment Program (FRAP)	2002	**URBAN**
	Urbanized Area Boundary	US Census Bureau	2016	
	Roads	ESRI Cartographic StreetMap Premium, Smart Data Compression	2012/2013	
	Farmland (Agriculture)	California Department of Conservation Farmland Mapping and Monitoring Program (FMMP)	2016	**OPEN SPACE**
	Grazing Land			
	Other Land (Open Space, Water)*			
Ecological	California Lakes	CDFW GIS Clearinghouse	Downloaded October 2017	
	California Marine Life Refuges	CDFW Marine Biogeographic Information and Observation System		
	California Marine Protected Areas			
	Ecological Reserve, Fish Hatchery, Wildlife Area, Conservation Easement, Public Fishing Access Areas	CDFW Owned and Operated Lands and Conservation Easements		
	California State Parks	California Department of Parks and Recreation	July 2017	
	National Parks	National Park Service	June 2014	

NOTE: Data sources are incorporated into GEARs database and used as a preliminary screening tool for proposed projects in the CRCP Plan Area. The GEARs database is used conjointly with SoCalGas other standard operating procedures, such as conducting site visits for all undeveloped areas within or near historic and suitable range of Covered Species to assess physical absence or presence.

* Areas within Other Land that are smaller than 40 acres are captured within this category and include the following: low density rural developments, brush, timber, wetland, and riparian areas not suitable for livestock grazing, confined livestock, poultry, or other aquaculture facilities, strip mines, borrow pits, water bodies, vacant and nonagricultural land surrounded by urban development.

The "facilities area" refers to the range where SoCalGas O&M activities will potentially occur. A buffer distance was given to each facility type based on SoCalGas O&M personnel feedback (Table D-3, *Development of Baseline Facilities Area*). The total potential area within the facilities area is 14,812.8 acres; where 4,101.5 of those acres consist of open space. "Open space" includes agriculture, grazing land, and the ecological features described in Table D-2. Any impacts to protected lands, either under a CE, state, or federal, will be avoided when feasible, and any construction in these areas should be approved of individually. Additionally, impacts to these areas will be mitigated at an appropriate ratio. Mitigation for permanent impacts to CE will need to include current impacts.

TABLE D-3
DEVELOPMENT OF BASELINE FACILITIES AREA

SoCalGas Facility	Facilities Area Buffer	Acres of Land Cover Type in Baseline Areas		Total Acres for Baseline Facilities Area
		Open Space (including agriculture, grazing land, natural lands and water)	Urban (including roads)	
Gas Pipelines	25 feet from centerline	**4,101.5**	**10,711.3**	**14,812.8**
Stations	50 feet from perimeter			
Storage Fields	Based on feedback from O&M personnel			
Telecom Sites	100 feet from point			

Approximately 95 percent of SoCalGas O&M activities would be expected to occur within the facilities area. The remaining 5 percent of SoCalGas O&M activities have the potential to occur outside the facilities area. The "non-facilities area" refers to the range outside of the facilities area, where no SoCalGas facilities currently exist (Table D-4, *Characterization of Baseline Conditions for Non-Facilities Area*).

TABLE D-4
CHARACTERIZATION OF BASELINE CONDITIONS FOR NON-FACILITIES AREA

Acres of Land Cover Type in Baseline Areas		Acres for Total Baseline Non-Facilities Area
Open Space (including agriculture, grazing land, natural lands and water)	Urban (including roads)	
5,372,004.7	**1,399,074.0**	**6,771,078.7**

Biological Resource Data

Predicted species distribution models were developed using biological geospatial data (Table D-5, *Biological Resource Data Used to Define Predicted Species Distribution Models*).

TABLE D-5
BIOLOGICAL RESOURCE DATA USED
TO DEFINE PREDICTED SPECIES DISTRIBUTION MODELS

Category of Data	Data	Data Source	Date
Physical	Vegetation type	CALVEG (USFS) and California Department of Forestry and Fire Protection: FRAP	Received 2016
	Soil type	NRCS SSURGO	Downloaded April 2017
	Hydrologic features	USGS National Hydrography Dataset and USFW National Wetlands Inventory	Downloaded April 2017
	Ecoregion	EPA	Downloaded April 2017
Biological	Proposed and Final Critical Habitat	USFWS	Downloaded July 2017
	CNDDB	CDFW	Downloaded July 2017
	CWHR	CDFW	Downloaded July 2017
	Expert Advice	Sapphos Environmental, AMEC Foster Wheeler, Rincon Consultants, Sage Institute, USFWS and CDFW experts, and scientific literature.	August-November 2016

III. Predicted Range for Covered Species

Predicted Species Distribution Models

Predicted species distribution modeling is not a replacement for field data; however, this approach is an important part of the conservation planning process because of the infeasibility of conducting site-specific surveys for the entirety of the CRCP Plan Area, data gaps for the distribution of some species within the CRCP Plan Area, difficulty of conducting surveys on private land, the need for prediction and extrapolation in areas lacking adequate data, and the need for synthesis and analysis of multiple data sources across the entire CRCP Plan Area. Predicted species distribution modeling and analysis are used to extrapolate biological data in a consistent and comprehensive manner across the CRCP Plan Area. Therefore, predicted species distribution models, used in parallel with field data for known species locations, can be an important tool to guide habitat conservation planning analysis, decisions, and implementation.

Four modeling approaches were used in the development of these predicted species distribution models: Matrix Modeling, Range Refinement of Matrix Modeling, Restricted Range Modeling, and Expert Modeling. The model approach used for a given species depended on the unique life history and distribution characteristics of that species relative to the ability to predict its distribution with available GIS data. Each model's accuracy and precision depend on the availability of high-quality GIS data layers. The modeling methods for each type of species model are discussed below.

Matrix Modeling

The Matrix Model for predicted species distributions is a vector-based GIS model that incorporates the available datasets listed in Table D-5. It uses species-habitat association factors to assess whether the species is likely to occur within a certain area. These factors initially included vegetation type, elevation, tree density, topographic slope, aspect, soil type, hydrologic features, and ecoregion (contiguous areas of similar biogeographic conditions). Several factors were not utilized after the first round of modeling due to excessive limiting of the species ranges. These discarded factors were raster-based datasets including elevation, tree density, slope, and aspect. The remaining criteria—vegetation type, soil type, hydrologic features, and ecoregion—served as the basis for Matrix Modeling.

The availability of high-quality GIS data layers facilitated characterization of suitable data for each of these factors to be utilized in the model. Each factor can be selected as being associated with the habitat of a given species (e.g., vegetation types include riparian scrub, annual grassland, coastal scrub, and mixed chaparral, as well as several others). The selected set of parameters across all factors determines the resulting distribution of predicted habitat. The selected set of biological and physical parameters expected to best predict the distribution of a species was identified for each species. Each of the 41 Covered Species and seven fully protected species within the CRCP Plan Area were initially modeled with this approach. From all species, 13 Covered Species and two fully protected species did not require additional refinement after the first phase of Matrix Modeling (Table D-6, Covered *Species Not Requiring Refinement after Matrix Modeling* and Table D-7, *Fully Protected Species Not Requiring Refinement after Matrix Modeling*). The remaining 31 Covered Species required additional refinement to best reflect current and relevant species' habitat conditions.

TABLE D-6
COVERED SPECIES NOT REQUIRING
REFINEMENT AFTER MATRIX MODELING

Species Class	Species Common Name
Invertebrates	• Delhi sands flower-loving fly • El Segundo blue butterfly
Amphibians	• Mountain yellow-legged frog
Reptiles	• Southern rubber boa
Birds	• Burrowing owl • Coastal California gnatcatcher • Southwestern willow flycatcher
Mammals	• San Bernardino kangaroo rat • San Joaquin kit fox
Plants	• Conejo dudleya • Lyon's pentachaeta • Slender-horned spineflower • Vandenberg Monkey flower

TABLE D-7
FULLY PROTECTED SPECIES NOT REQUIRING
REFINEMENT AFTER MATRIX MODELING

Species Class	Species Common Name
Fish	• Unarmored threespine stickleback*
Mammals	• Morro Bay kangaroo rat*

NOTE: * Fully Protected species for which SoCalGas has defined avoidance measures.

Range Refinement of Matrix Modeling

Five of the Covered Species had known distribution ranges that were more restricted than could be achieved with the initial approach of Matrix Modeling (Table D-8, *Covered Species Requiring Range Refinement of Matrix Modeling*). Therefore, additional steps were included in the modeling process to better align model outputs with the species' known range. Biologists familiar with the species' life history and distribution reviewed available species occurrence data, life history and distribution data, and consulted with other species experts in order to refine predicted model results. Based on this information range refinement boundaries were delineated in GIS and used to select the predicted species distribution model results only within the refined range boundary. These selected areas were then included as the final species model results for the five species that required range refinement of the matrix modeling.

TABLE D-8
COVERED SPECIES
REQUIRING RANGE REFINEMENT OF MATRIX MODELING

Species Class	Species Common Name
Invertebrates	• Morro shoulderband (banded dune) snail
Birds	• Belding's savannah sparrow • Western yellow-billed cuckoo
Mammals	• Stephens' kangaroo rat
Plants	• Seaside Bird's Beak

Five species' distribution ranges were based solely on the CDFW's CWHR. These vector datasets are based on each species' life history, management status, geographic distribution, and habitat relationships within the State of California. These species are fully protected species for which SoCalGas has SOPs and AMMs (Table D-9, *Fully Protected Species Requiring Range Refinement of Matrix Modeling*).

TABLE D-9
FULLY PROTECTED SPECIES
REQUIRING RANGE REFINEMENT OF MATRIX MODELING

Species Class	Species Common Name
Birds	• American peregrine falcon* • California condor* • California least tern* • Golden eagle* • White-tailed kite*

NOTE: * Fully Protected species for which SoCalGas has defined avoidance measures.

Restricted Range Modeling

Narrow endemic plant species required a finely targeted modeling approach due to their highly restricted distribution. Covered Species that fall into the category of narrow endemic plant species, as defined in the CRCP Plan Area, are those species that are restricted to a specific geographic region, soil type, and/or habitat. Seventeen sensitive plant Covered Species were identified as narrow endemic species occurring in the CRCP Plan Area (Table D-10, *Covered Species Requiring Restricted Range Modeling*). These narrow endemic plant Covered Species were modeled using a combination of occurrence data and predicted habitat distribution models, including CDFW's CNDDB, USFWS Critical Habitat, and CNPS USGS 7.5-quadrangles. Occurrence data for each species were provided to identify focal areas within the CRCP Plan Area where there is a higher probability of occurrence for each narrow endemic species. Within the focal areas the vector-based predicted species distribution model was clipped to just the focal areas to create the final model for each narrow endemic species. There are 17 narrow endemic plant Covered Species modeled using restricted range modeling methods and two that required range refinements.

TABLE D-10
COVERED SPECIES REQUIRING RESTRICTED RANGE MODELING

***Plants* - Species Common Name**
• Braunton's milk-vetch • California seablite • Chorro Creek bog thistle • Gambel's water cress • Gaviota tarplant • Indian Knob mountainbalm • Lompoc yerba santa* • Marcescent dudleya • Morro manzanita* • Nevin's barberry • Nipomo Mesa lupine • Pismo clarkia • San Fernando Valley spineflower • Santa Ana River woollystar • Santa Monica Mountains dudleya • Ventura Marsh milk-vetch • Verity's dudleya

NOTE: * These Covered Species predicted distribution models required range refinements of matrix modeling and restricted range methods.

Expert Modeling

Individual expert models were developed for the remaining six species for which there are experts actively working on modeling to support conservation and recovery efforts (Table D-11, *Covered Species Requiring Expert Input to Modeling*).

TABLE D-11
COVERED SPECIES REQUIRING EXPERT INPUT TO MODELING

Species Class	Species Common Name
Fishes	• Santa Ana sucker
Amphibians	• Arroyo toad • California red-legged frog • California tiger salamander
Reptiles	• Western Pond turtle*
Birds	• Least Bell's vireo

NOTE: * At the time of preparation of the MSHCP, the status for this species was under consideration for listing as threatened under the Federal Endangered Species Act. The Covered Species' predicted distribution model required range remnants of matrix modeling and expert modeling methods.

The expert model approach is based on specific knowledge of each species' unique habitat requirements, life histories, spatial patterns (e.g., distance to certain habitat features), and occurrence data. In some cases, the species' habitat was initially modeled using the Matrix Model approach and then supplemented with the expert model approach. The expert knowledge used to create these models was confirmed in published research papers and/or consultation with species experts.

The species locality database used in the above modeling approaches included data from known GIS-based species databases covering the CRCP Plan Area, including CNDDB, USFWS' listed species localities, the USFWS, USFS species database, the CNPS Rare Plant Inventory, and data from independent species experts and other sources. In addition, the current USFWS designated critical habitat boundaries were acquired for all species for which it is designated.

IV. Impact Modeling for Covered Species

The exact location of impacts to Covered Species is not known at the time of the SoCalGas application for an ITP, as annual O&M activities are prioritized based on the results of biannual line inspections, and in response to unanticipated issues such as detected leaks or compromised pipeline reliability as a result of natural disasters (such as fires or floods) or anthropogenic factors (such as vandalism or changes in technology). In any given year, O&M activities may affect a relatively minor proportion of the total facilities within the CRCP Plan Area. Therefore, potential impacts to Covered Species over the 30-year permit term were modeled based on documented impacts (from SoCalGas' GEARS database) to Covered Species within the CRCP Plan Area; empirical data from BOs issued by the USFWS in the CRCP Plan Area; empirical data for PSEP projects undertaken in San Joaquin Valley; the minimum required facilities area; the potential need to build access roads to facilitate access to facilities located in remote areas; and other small projects that might be required in the CRCP Plan Area.

Historical SoCalGas Project Activity Analysis

GEARS

SoCalGas conducted an historical analysis of past O&M and construction activities documented during the periods 2003–2009 and 2013–2015 for which a review of potential impacts to natural resources was conducted by SoCalGas biologists (Table D-12, *SoCalGas O&M Activities in CRCP Plan Area*). The historical data was collected from activity reports in the SoCalGas GEARS database and other internal information regarding O&M activities, then sorted to differentiate the regularly reoccurring O&M activities (e.g., routine road maintenance, trimming or clearing of vegetation away from existing structures) from other "non-recurring" O&M activities (e.g., below grade inspections, pipeline repairs) or new construction. Separating the activities in this manner was necessary in order to assess those activities with the greatest potential to impact suitable habitat for one or more of the Covered Species. The historical activity analysis concluded that an average of approximately 60 projects per year was performed over the 10 years for which records were compiled for this document.

TABLE D-12
SOCALGAS O&M ACTIVITIES IN CRCP PLAN AREA

Period of Record		Total
2003–2009 (7 years)	2013–2015 (3 years)	602 (~60 per year)
371 (53 per year)	231 (77 per year)	

- During the period 2013 to 2015, approximately 90.5 percent of 231 activities occurred in areas where there was no suitable habitat for listed species. Nineteen projects involved potentially suitable habitat for six listed species available[558] (Table D-13, *Impacts to Covered Species Habitat for CRCP Plan Area SoCalGas 2013 to 2015 Activities*).

558 These 19 projects primarily consisted of minor vegetation trimming to allow pipeline inspection personnel to conduct leak surveys on-foot along pipeline ROWs. During the activity, avoidance and minimization measures, such as preconstruction clearance surveys, biological monitoring, equipment cleaning, etc. were implemented to avoid impacts to listed species.

- The acres of impacts to species during the period of 2013 to 2015 were averaged and multiplied over a 30-year period to develop a historical impact override. This historical override applies only to the six Covered Species identified in Table D-13. However, the historical override was not applied to the CRLF due to the development of a USFWS expert-guided comprehensive analysis.

- During the period of 2003 to 2009, approximately 98.6 percent of the activities occurred within upland areas, while approximately 1.4 percent occurred within riparian and/or aquatic habitats.

- During the period of 2003 to 2009, an average of 37 acres of suitable habitat for listed species was impacted each year as a result of regularly re-occurring O&M activities, all of which were temporary impacts.[559]

- A total of 9.254 acres of temporary impacts (99.9 percent of total impacts) per year and 0.02 acre of permanent impacts (0.02 percent of total impacts) per year occurred between 2013 and 2015, in the CRCP Plan Area.

559 The higher impact numbers in the 2003-2009 dataset compared to the 2013-2015 dataset can be attributed to a larger CRCP Plan Area considered in the initial phases of the project which included extensive areas of desert tortoise habitat in eastern San Bernardino and Riverside Counties that are no longer being considered as part of the CRCP MSHCP. Road maintenance is a regularly re-occurring activity that may occur within suitable habitat for desert tortoise.

TABLE D-13
IMPACTS TO COVERED SPECIES HABITAT FOR CRCP PLAN AREA SOCALGAS 2013 TO 2015 ACTIVITIES

Species	Number of Activities	Impacts (Acres)						Historic Impact Area Override			
		Temporary (2013-2015)	Permanent (2013-2015)	Temporary (per year)	Permanent (per year)	Temporary (30 years)	Permanent (30 years)	Expected Acres of Impacts within 30-Year Term Period in Facilities Area (95%)		Expected Acres of Impacts within 30-Year Term Period in Non-Facilities Area (5%)	
		[A]	[B]	[C] = [A] / 3 years	[D] = [B] / 3 years	[E] = [C] × 30 years	[F] = [D] × 30 years	Temporary [G] = [E] × 0.95	Permanent [H] = [F] × 0.95	Temporary [I] = [E] × 0.05	Permanent [J] = [F] × 0.05
Invertebrates											
El Segundo blue butterfly	1	3.630		1.210		36.300	0.000	**34.485***	**0.000**	**1.815**	**0.000**
Amphibians											
California red-legged frog	16	9.292	0.006	3.097	0.002	92.920	0.060	**88.274**	**0.057**	**4.646**	**0.003**
Reptiles											
Western pond turtle	1	0.160		0.053		1.600	0.000	**1.520**	**0.000**	**0.080**	**0.000**
Birds											
Least Bell's vireo	1	0.160		0.053		1.600	0.000	**1.520**	**0.000**	**0.080**	**0.000**
Plants											
Seaside bird's beak	1	3.630		1.210		36.300	0.000	**34.485***	**0.000**	**1.815**	**0.000**
Vandenberg monkey flower	1	3.630		1.210		36.300	0.000	**34.485***	**0.000**	**1.815**	**0.000**

NOTE: SoCalGas periodically (every 3 to 5 years) undertakes 34.485 acres for vegetation maintenance within the Burton Mesa Ecological Reserve. There are no temporary or permanent impacts to suitable habitat as a result of these activities.

In recognition that some O&M activities may not have been appropriately tracked and therefore not represented in these data, while other activities may have been deferred due to a need for one or more regulatory authorizations (e.g., ITPs pursuant to ESA/CESA), estimated future annual impacts have been based on an average of the higher 2003–2009 dataset and the lower 2013–2015 dataset. Using an average of the lower temporary impact number for 2013 to 2015 period and the higher number for the 2003 to 2009 period results in an average of 20.7 acres of temporary impacts per year and 1.03 acres of permanent impacts per year for O&M activities, exclusive of PSEP.

USFWS BOs and ITPs

A list of SoCalGas completed assignments (BOs and ITPs) with the Ventura Field Office and Carlsbad Field Office of the USFWS between 1995 and 2017 was provided by USFWS and assessed to evaluate effects to Covered Species. A summary of the evaluated assignments determined that of the total 24 assignments (Table D-14, *USFWS Completed SoCalGas Projects*), only three projects described relevant information that applies to areas within the CRCP Plan Area and Covered Species. The three projects were in 2007, 2011, and 2016, respectively, and affected the CRLF and, in one instance, the CTS. In 2016, a five-year ITP for CRLF and CTS was completed and conservation credits were purchased in La Purisima Conservation Bank.[560] The remainder of the assignments were either in areas outside of the CRCP Plan Area, were not likely to result in impacts to Covered Species, or affected species that are not being considered for take in the CRCP Plan Area, such as the desert tortoise.

TABLE D-14
USFWS COMPLETED SOCALGAS PROJECTS

Year	1995	2006	2007	2008	2009	2010	2011	2012	2013	2014	2016	2017	Total
Number of Projects	1	1	1	1	5	5	4	2	1	1	1	1	**24**

SOURCE: U.S. Fish and Wildlife Service. 31 July 2017. USFWS Completed SoCalGas Projects, VFWO and CFWO. Data provided to Sapphos Environmental, Inc.

Access Roads

A total of 24.3 percent of the pipeline facilities within the CRCP Plan Area are located in natural open space areas (Table D-15, *Percent of SoCalGas Pipelines in Open Space and Urban Areas*).[561] Based on feedback from the PSEP and Gas Transmission operating groups, SoCalGas has estimated the need to construct up to 17 acres of new access roads in natural habitats or other open space (including agriculture) to support O&M projects over the 30-year term of the permit. This figure equates to 0.23 mile or 0.57 acres per year of additional permanent direct impacts. The permanent indirect impacts to the construction of new access roads is approximately 34 acres within the 30-year permit term. This figure equates to 1.13 acres per year.

560 U.S. Fish and Wildlife Service. 31 July 2017. USFWS Completed SoCalGas Projects, VFWO and CFWO. Data provided to Sapphos Environmental, Inc.

561 Sapphos Environmental, Inc. November 2017. GIS Data Analysis. Pasadena, CA.

TABLE D-15
PERCENT OF SOCALGAS PIPELINES IN OPEN SPACE AND URBAN AREAS

Description	Length (miles)	Percentage
Pipelines within Open Space area	591.1	24.3%
Pipelines within Urban area	1,843.5	75.7%
All Pipelines in CRCP Plan Area	**2,434.6**	**100.0%**

Permanent Direct Impacts

Permanent direct impacts were derived from the assumption that new access roads contain a width of approximately 20 feet and given a length of up to 0.23 miles annually. Over the 30-year term of the permit, SoCalGas may construct up to 7.01 miles of new access roads, contributing to approximately 17 acres of permanent direct impacts to natural habitats and other open space, such as agriculture. (Table D-16, *Formula for Estimating Permanent Direct Impacts*).

TABLE D-16
FORMULA FOR ESTIMATING PERMANENT DIRECT IMPACTS

Formula for Permanent Direct Impacts						
			Length of Roads		Width of Roads	
Years	Acres	Square Feet	Miles	Feet	Miles	Feet
30	17.00	740,520.00	7.01	37,026.00	0.00	20.00
1	**0.57**	24,684.00	0.23	1,234.20	0.00	20.00

Permanent Indirect Impacts

Permanent indirect impacts are a secondary effect to permanent direct impacts that result from the construction of access roads. SoCalGas provides an additional 20-foot buffer on each side of the access road, a 40-foot area total, to account for indirect impacts, such as noise and vibrations that may be caused during the construction. Over the 30-year permit term, approximately 34 acres of permanent indirect impacts may result from the construction of access roads. This figure equates to 1.13 acres per year. (Table D-17, *Formula for Estimating Permanent Indirect Impacts*).

TABLE D-17
FORMULA FOR ESTIMATING PERMANENT INDIRECT IMPACTS

Formula for Permanent Indirect Impacts						
			Length of Roads		Width of Roads	
Years	Acres	Square Feet	Miles	Feet	Miles	Feet
30	34.00	1,481,040.00	7.01	37,026.00	0.00	40.00
1	**1.13**	49,368.00	0.23	1,234.20	0.00	40.00

Vegetation and habitat communities in the Plan Area may be permanently impacted due to the construction of access roads. SoCalGas has evaluated the percentage of habitat communities in the Plan Area and calculated the acres that would be impacted over a 30-year period. (Table D-18, *Impacts to Vegetation Communities in the Plan Area*).

TABLE D-18
IMPACTS TO VEGETATION COMMUNITIES IN THE PLAN AREA

Vegetation Communities		Acres in the Plan Area	Percent in the Plan Area	Acres for Building New Access Roads over 30-Year Permit Term	
				Permanent Direct Impacts (assuming 20-ft width and 0.234-mile access road per year)	Permanent Indirect Impacts (assuming 40-ft width and 0.234-mile access road per year)
Agriculture	Cropland	25,845.87	0.38%	0.06	0.13
	Deciduous Orchard	89,756.45	1.32%	0.22	0.45
	Dryland Grain Crops	11,089.05	0.16%	0.03	0.06
	Evergreen Orchard	2,673.04	0.04%	0.01	0.01
	Irrigated Grain Crops	2,079.03	0.03%	0.01	0.01
	Irrigated Hayfield	6,246.00	0.09%	0.02	0.03
	Irrigated Row and Field Crops	26,117.00	0.38%	0.07	0.13
	Orchard - Vineyard	12.49	0.00%	0.00	0.00
	Rice	1,832.06	0.03%	0.00	0.01
	Vineyard	75,306.19	1.11%	0.19	0.38
	Agriculture Total	**240,957.17**	**3.55%**		
Barren/ Other	Barren	106,984.27	1.58%	0.27	0.54
	Barren/Other Total	**106,984.27**	1.58%		
Conifer Forest	Closed-Cone Pine-Cypress	9,020.68	0.13%	0.02	0.05
	Eastside Pine	39,093.60	0.58%	0.10	0.20
	Jeffrey Pine	61,246.88	0.90%	0.15	0.31
	Lodgepole Pine	6.65	0.00%	0.00	0.00
	Montane Hardwood-Conifer	66,358.05	0.98%	0.17	0.33
	Ponderosa Pine	1,835.80	0.03%	0.00	0.01
	Sierran Mixed Conifer	104,107.71	1.53%	0.26	0.52
	Subalpine Conifer	9,383.14	0.14%	0.02	0.05
	White Fir	298.17	0.00%	0.00	0.00
	Conifer Forest Total	**291,350.68**	**4.29%**		
Conifer Woodland	Juniper	9,722.31	0.14%	0.02	0.05
	Pinyon-Juniper	151,858.72	2.24%	0.38	0.76
	Conifer Woodland Total	**161,581.03**	**2.38%**		
Desert Shrub	Alkali Desert Scrub	137.70	0.00%	0.00	0.00
	Desert Scrub	15,319.70	0.23%	0.04	0.08
	Desert Wash	25,407.51	0.37%	0.06	0.13
	Desert Shrub Total	**40,864.90**	**0.60%**		
Desert Woodland	Desert Riparian	413.40	0.01%	0.00	0.00
	Joshua Tree	5,112.68	0.08%	0.01	0.03
	Palm Oasis	3.27	0.00%	0.00	0.00
	Desert Woodland Total	**5,529.34**	**0.08%**		
Hardwood Forest	Montane Hardwood	165,315.60	2.44%	0.41	0.83
	Montane Riparian	12,297.41	0.18%	0.03	0.06
	Hardwood Forest Total	**177,613.01**	**2.62%**		
	Blue Oak Woodland	119,035.86	1.75%	0.30	0.60

TABLE D-18
IMPACTS TO VEGETATION COMMUNITIES IN THE PLAN AREA

Vegetation Communities		Acres in the Plan Area	Percent in the Plan Area	Acres for Building New Access Roads over 30-Year Permit Term	
				Permanent Direct Impacts (assuming 20-ft width and 0.234-mile access road per year)	Permanent Indirect Impacts (assuming 40-ft width and 0.234-mile access road per year)
Hardwood Woodland	Blue Oak-Foothill Pine	31,214.41	0.46%	0.08	0.16
	Coastal Oak Woodland	476,579.57	7.02%	1.19	2.39
	Eucalyptus	5,566.58	0.08%	0.01	0.03
	Valley Foothill Riparian	47,427.38	0.70%	0.12	0.24
	Valley Oak Woodland	15,733.43	0.23%	0.04	0.08
	Hardwood Woodland Total	**695,557.23**	**10.25%**		
Herbaceous	Annual Grassland	906,944.11	13.37%	2.27	4.54
	Pasture	141,190.23	2.08%	0.35	0.71
	Perennial Grassland	3,900.67	0.06%	0.01	0.02
	Herbaceous Total	**1,052,035.01**	**15.50%**		
Shrub	Alpine-Dwarf Shrub	17.91	0.00%	0.00	0.00
	Bitterbrush	9.64	0.00%	0.00	0.00
	Chamise-Redshank Chaparral	212,883.49	3.14%	0.53	1.07
	Coastal Scrub	676,657.01	9.97%	1.70	3.39
	Mixed Chaparral	1,789,204.33	26.37%	4.48	8.97
	Montane Chaparral	84,077.38	1.24%	0.21	0.42
	Sagebrush	91,199.87	1.34%	0.23	0.46
	Shrub Total	**2,854,049.63**	**42.06%**		
Urban	Urban	1,109,540.63	16.35%	2.78	5.56
	Urban Total	**1,109,540.63**	**16.35%**		
Water	Estuarine	24.09	0.00%	0.00	0.00
	Lacustrine	35,861.11	0.53%	0.09	0.18
	Marsh	988.09	0.01%	0.00	0.00
	Riverine	6,144.17	0.09%	0.02	0.03
	Water Total	**43,017.46**	**0.63%**		
Wetland	Fresh Emergent Wetland	2,372.78	0.03%	0.01	0.01
	Saline Emergent Wetland	2,484.46	0.04%	0.01	0.01
	Wet Meadow	1,293.03	0.02%	0.00	0.01
	Wetland Total	**6,150.27**	**0.09%**		
Grand Total		**6,785,230.62**	**100.00%**	**17.00**	**34.00**

NOTE: Margin of error is 0.01% due to the data conversion from raster to vector polygons using ArcGIS.

Other Projects

Additionally, in order to conservatively address smaller projects that may be needed and were not captured in the 2013–2015 historical project analysis, one acre per year of temporary or permanent impact is anticipated for appurtenant facilities including replacement and upgrade of existing gas transmission and storage facilities, or O&M activities that may occur in the non-facilities area.

Using the analysis described above, SoCalGas estimates that *temporary and permanent impacts within the CRCP Plan Area will be 20.7 and 2.7 acres per year, respectively*.

IV. Assumptions to Calculate Potential Effects

Impacts to Potentially Suitable Habitat

In order to calculate the potential effects to the Covered Species and their habitat, SoCalGas assumed that all non-recurring O&M activities and limited new construction taking place within natural areas have the potential to impact suitable habitat for one or more of the 41 Covered Species. SoCalGas also assumed that the regularly reoccurring O&M activities (e.g., routine road maintenance) would not occur within suitable habitat, as these activities recur annually or at other regular intervals within the same predisturbed footprints. Although the regularly reoccurring activities would not be expected to result in habitat loss, they could result in other forms of take (e.g. vehicle strikes), particularly in the absence of appropriate AMMs. Under the CRCP, all Covered Activities taking place within a natural area, or otherwise occurring within an area known to be occupied or likely to be occupied by a Covered Species, will be subject to the implementation of a comprehensive set of AMMs.

Based on an analysis of the historical data and anticipated work in support of PSEP, it's reasonable to expect that at least approximately 23 acres of potentially suitable habitat would be impacted annually, including approximately 21 acres of temporary impacts and approximately 1.0 acre of permanent impacts for non-recurring O&M activities, approximately 0.6 acre of permanent impacts for new roads to support PSEP and 1.1 acres to support indirect permanent impacts from PSEP, and up to approximately 1.0 acre for appurtenant facilities including replacement and upgrade of existing gas transmission and storage facilities. The impact acreage calculations include an estimate of the potential impacts over the 30-year life of the program. Note that only the permanent impacts are calculated cumulatively over the 30-year period, as it is anticipated that any natural habitat temporarily disturbed will recover within five years or less. Maximum impacts to potentially suitable habitat are as follows:

- 1,100 acres of reoccurring impacts in roads, pipeline transmission areas, and existing developed areas for storage fields, compressor stations, and valves
- 621 acres of temporary impacts over the 30-year permit term in areas not subject to regularly reoccurring activities (facilities area)
- 82 acres of permanent impacts[562] from road construction, upgrade and replacement of existing facilities, and PSEP support projects over the 30-year permit term in the Plan Area

Temporary and Permanent Impacts

The historical activity analysis concluded that approximately 99 percent of the impacts associated with unplanned O&M activities or new construction were temporary, while less than approximately 1 percent were permanent. The effects calculations under the CRCP MSHCP apply conservative assumptions of 96 percent temporary impacts and 4 percent permanent impacts. Maximum temporary and permanent impacts to potentially suitable habitat are as follows:

562 The 48 acres of permanent impacts within the 30-year term are a sum of 18 acres of permanent impacts that could take place in the Facilities Area and 30 acres in the Non-Facilities Area.

TABLE D-19
TEMPORARY AND PERMANENT IMPACTS

Activity		Annual Impacts (acres)		Impacts over 30-year Permit Term (acres)	
		Temporary	Permanent	Temporary	Permanent
O&M	Reoccurring	20.70	0.03	621.00	1.00
	Non-reoccurring	-	1.00	-	30.00
PSEP	PSEP - Direct	-	0.57	-	17.00
	PSEP - Indirect	-	1.13	-	34.00
Total		**20.70**	**2.73**	**621.00**	**82.00**

Plan Area:

- Approximately 621 acres temporary impacts per 30-year permit term
- Approximately 82 acres permanent impacts per 30-year permit term, which include Direct and Indirect impacts (Table D-20, Formula for Estimating Impacts over 30-Year Permit).
- The minimum impact area override of 0.115 acre was applied to temporary impacts within the Non-Facilities Area for all Covered Species as a conservative base value.

TABLE D-20
FORMULA FOR ESTIMATING IMPACTS OVER 30-YEAR PERMIT

Impact Analysis Formula		
	Permanent Impacts	
Temporary Impacts	*Direct*	*Indirect*
[Expected acres of impacts to suitable habitat] = [% of suitable habitat in Plan Area] x **[621 acres]**	[Expected acres of impacts to suitable habitat] = [% of suitable habitat in Plan Area] x **[48 acres]**	[Expected acres of impacts to suitable habitat] = [% of suitable habitat in Plan Area] x **[34 acres]**

Impact Area Overrides

Minimum Impact Area Override

The above sample calculations were made by assuming a random probability of the location of impacts. However, it is possible that impacts may be unevenly distributed and may affect some species and habitats more than others over the 30-year permit term. To account for a disproportionate distribution of impacts, the effects analysis for certain species also includes a conservative impact area override based on SoCalGas' standard project footprint. SoCalGas established a standard project footprint of 100 feet by 50 feet (0.115 acre) for the minimum override. An override of 0.115 acre was used for those Covered Species whose estimated impacts were at the minimum impact level (below 0.115 acre for temporary and permanent impacts).

In summary, if the suitability model identified no suitable habitat or only a very limited amount of suitable habitat within the potential impact area, a "minimum impact area override" was applied.

- Minimum impact area override: 0.115 acre

Historical Impact Area Override

For six Covered Species, a historical evaluation from SoCalGas projects during the period of 2013 to 2015 was conducted to serve as the basis for impacts where the suitability model identified no suitable habitat or only a very limited amount of suitable habitat within the potential impact area, the historical impact area "override" was applied. SoCalGas established a historical impact override over a 30-year period for ESBB, CRLF,[563] SWPT, LBV, SBB, and VMF (Table D-21, *Historical Impact Override for Covered Species*). (Historical evaluation analysis explained in Table D-13, above.)

TABLE D-21
HISTORICAL IMPACT OVERRIDE FOR COVERED SPECIES

Species	Historic Impact Area Override			
	Expected Acres of Impacts within 30-Year Term Period in Facilities Area (95%)		Expected Acres of Impacts within 30-Year Term Period in Non-Facilities Area (5%)	
	Temporary [G] = [E] × 0.95	Permanent [H] = [F] × 0.95	Temporary [I] = [E] × 0.05	Permanent [J] = [F] × 0.05
Invertebrates				
ESBB	34.485**	0.000	1.815	0.000
Amphibians				
CRLF*	88.274	0.057	4.646	0.003
Reptiles				
SWPT	1.520	0.000	0.080	0.000
Birds				
LBV	1.520	0.000	0.080	0.000
Plants				
SBB	34.485**	0.000	1.815	0.000
VMF	34.485**	0.000	1.815	0.000

NOTE: *The historical override was not applied to the CRLF due to the development of an USFWS expert-guided comprehensive analysis.
** These acres primarily consisted of minor vegetation trimming within the Burton Mesa Ecological Reserve to allow pipeline inspection personnel to conduct leak surveys on-foot along pipeline ROWs. During the activity, avoidance and minimization measures, such as preconstruction clearance surveys, biological monitoring, equipment cleaning, etc. were implemented to avoid impacts to listed species. There are no temporary or permanent impacts to suitable habitat as a result of these activities.

Assumptions Regarding Location of Impacts

While it is not possible to determine the location and timeframe that activities would occur, estimates to the proportion of those impacts expected that will be either temporary or permanent (as shown above) are can be estimated. By assuming a random probability for the location of activities, the proportion of the CRCP Plan Area covered by a species habitat can be used in combination with the estimated acres of impact in the CRCP Plan Area to calculate the expected acres of impact for each species. For purposes of estimating the potential effects to Covered Species and their habitat, SoCalGas has established that natural areas within buffer[564] of SoCalGas facility are considered a potential impact area. Under the CRCP, the total potential impact area is 4,101.5 acres within the

563 The historical override was not applied to the CRLF due to the development of an USFWS expert-guided comprehensive analysis.

564 Buffer distances for potential impact areas vary based on type of SoCalGas facility. Refer to Table D-3, *Development of Baseline Facilities Area*.

facilities area where 95 percent of O&M activities would be expected to occur (Table D-3). The remaining 5 percent of O&M activities can potentially occur within 5,372,004.7 acres in the non-facilities area (Table D-4).

Sample Evaluation: Mountain Yellow-Legged Frog Potential Impact Calculation

Facilities Area (95%)

- Total potential impact area (total area within buffer[565] of SoCalGas facilities): approximately 4,101.5 acres
- Area of MYLF habitat in potential impact area (based on predicted species distribution model): approximately **2.091** acres
- Percentage of MYLF habitat within the potential impact area: (**2.091** ÷ 4,101.5 × 100 = 0.1%)
- Expected temporary impacts over a 30-year period (based on the historical data and conservative assumptions): 0.1% × 621 acres = approximately 0.317 acre
- Expected *direct* permanent impacts over 30-year period (based on the historical data and conservative assumptions): 0.1% × 48 acres = approximately 0.024 acre
- Expected *indirect* permanent impacts over 30-year period (based on the historical data and conservative assumptions): 0.1% × 34 acres = approximately 0.017 acre
- Basis of Take Permit expected acres for temporary impacts (surpasses minimum impact area overrides if greater than 0.115 acre and SoCalGas historical impact override does not apply to this species) for MYLF over a 30-year period: approximately 0.317 acre
- Basis of Take Permit expected acres for permanent impacts (surpasses minimum impact area overrides if greater than 0.115 acre and SoCalGas historical impact override does not apply to this species) for MYLF over a 30-year period: approximately 0.115 acre

Non-Facilities Area (5%)

- Total potential impact area (SoCalGas facilities not present): approximately 5,372,004.7 acres
- Area of MYLF habitat in potential impact area (based on predicted species distribution model): approximately **31,659.069** acres
- Percentage of MYLF habitat within the potential impact area: (**31,659.069** ÷ 5,372,004.7 × 100 = 0.6%)

565 Buffer distances for potential impact areas vary based on type of SoCalGas facility. Refer to Table D-3, *Development of Baseline Facilities Area*.

- Expected temporary impacts over a 30-year period (based on the historical data and conservative assumptions): 0.6% × 621 acres = approximately 3.660 acre

- Expected *direct* permanent impacts over 30-year period (based on the historical data and conservative assumptions): 0.6% × 48 acres = approximately 0.283 acre

- Expected *indirect* permanent impacts over 30-year period (based on the historical data and conservative assumptions): 0.6% × 34 acres = approximately 0.200 acre

- Basis of Take Permit expected acres for temporary impacts (surpasses minimum impact area overrides if greater than 0.115 acre and SoCalGas historical impact override does not apply to this species) for MYLF over a 30-year period: approximately 3.660 acre

- Basis of Take Permit expected acres for permanent impacts (surpasses minimum impact area overrides if greater than 0.115 acre and SoCalGas historical impact override does not apply to this species) for MYLF over a 30-year period: approximately 0.483 acre

Effects Analysis Results

The effects analysis for 41 Covered Species within the SoCalGas potential impact area have been estimated using the above-mentioned approach (Table D-22, *Illustration of Effects Analysis*). A separate analysis was developed for the CRLF consistent with USFWS expert guidance and modeling approach (Table D-23, *Effects Analysis for CRLF*).

California Red-Legged Frog

Upon coordination and collaboration with members of the CRCP team and the USFWS (Dr. Dou Yang), the CRLF entailed an environmental impact analysis using the permanent and temporary impacts' criteria initially determined, and further modified to a formula adhering to recommendations provided by USFWS expert Dr. Dou Yang. (Table D-23, *Effects Analysis for CRLF*). USFWS requires that SoCalGas characterize the anticipated impacts for breeding and dispersal habitat in eight categories that serve as the basis for determining compensatory mitigation requirement. The formula in table D-23 was modified to substantiate the USFWS requirements (Table D-24, *Formula for Estimating Impacts over 30-Year Permit for the CRLF*) and the eight categories are shown as [D1] through [D8] in the columns of Table D-23. The criteria in Table D-23 was divided by two to account for the 180 months contained in the dry season and in the wet season over a 30-year period. Per year, there are six months considered the dry season (May to October) and six months considered the Wet Season (November through April).

SoCalGas' historical impact override was not applied to this species due to the development of an expert-guided comprehensive analysis.

California Tiger Salamander

Upon coordination and collaboration with members of the CRCP team and the USFWS (Ms. Rachel Henry), the CTS entailed an environmental impact analysis using the permanent and temporary impacts' criteria determined in the CRCP effects analysis, where the CTS suitability species model range included both the species' aquatic (breeding) and dispersal habitat. A GIS Mitigation Tool for the CTS was provided by Ms. Rachel Henry. The CTS Mitigation tool was deliberately tested with the most relevant datasets available, which included USFWS CTS Breeding Ponds, CRCP Plan Area and Land-Use/Cover data. However, due to the nature of the CTS Mitigation Tool (currently undergoing USFWS vetting), retrieving significant outputs from running the tool was unsuccessful based on technical errors that could be a result of the impossibility to determine the location that activities would occur within the CRCP Plan Area.

TABLE D-22
ILLUSTRATION OF EFFECTS ANALYSIS

Common Name	Scientific Name	Total Suitable Habitat within Baseline Areas (acres)		Total Acres of Open Space (including agriculture, grazing land, natural lands and water) in Baseline Areas	Percentage of Suitable Habitat within Area	Expected Acres of Habitat Impacts				Impact Area Override				Expected Acres for Temporary Impacts within 30-Year Period	Expected Acres for Permanent Impacts within 30-Year Period
						Temporary Impacts	Permanent Impacts			Minimum: 100 Feet by 50 Feet (0.115 acre)		Historic: SoCalGas Projects 2013-2015			
							Permanent Direct Impacts	Permanent Indirect Impacts from Access Roads	Total Permanent Impacts	[H or I] = If [D or G] < 0.115 Acres, Then [H or I] Expected Acres of Impacts Defaults to 0.115 Acre		[J or K] = If [G or H] < Historic Impacts, Then [I] Expected Acres of Impacts Defaults to Historic Evaluation (selected species)			
		[A]		[B]	[C] = [A/B]	[D] = [C × temp acres]	[E] = [C × perm acres]	[F] = [A × indirect impact acres/CRCP Plan Area acres]	[G] = [E + F]	Temporary [H]	Permanent [I]	Temporary [J]	Permanent [K]	[L]	[M]
Invertebrates (3)															
DSFF	*Rhaphiomidas terminatus abdominalis*	Facilities Area	6.704	4,101.5	0.2%	1.015	0.078	0.056	0.134	1.015	0.134	1.015	0.134	**1.015**	**0.134**
		Non-Facilities Area	2,503.139	5,372,004.7	0.0%	0.289	0.022	0.016	0.038	0.289	0.115	0.289	0.115	**0.289**	**0.115**
		Total Impact												***1.304***	***0.249***
ESBB	*Euphilotes battoides allyni*	Facilities Area	0.000[a]	4,101.5	0.0%	0.000	0.000	0.000	0.000	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Non-Facilities Area	20,790.464	5,372,004.7	0.4%	2.403	0.186	0.132	0.317	2.403	0.317	2.403	0.317	**2.403**	**0.317**
		Total Impact												***2.518***	***0.432***
MSS	*Helminthoglypta walkeriana*	Facilities Area	1.203	4,101.5	0.0%	0.182	0.014	0.010	0.024	0.182	0.115	0.182	0.115	**0.182**	**0.115**
		Non-Facilities Area	1,238.952	5,372,004.7	0.0%	0.143	0.011	0.008	0.019	0.143	0.115	0.143	0.115	**0.143**	**0.115**
		Total Impact												***0.325***	***0.230***
Fish (1)															
SAS	*Catostomus santaanae*	Facilities Area	0.000[a]	4,101.5	0.0%	0.000	0.000	0.000	0.000	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Non-Facilities Area	4,419.845	5,372,004.7	0.1%	0.511	0.039	0.028	0.067	0.511	0.115	0.511	0.115	**0.511**	**0.115**
		Total Impact												***0.626***	***0.230***
Amphibians (4)*															
Arroyo toad	*Anaxyrus californicus*	Facilities Area	25.624	4,101.5	0.6%	3.880	0.300	0.212	0.512	3.880	0.512	3.880	0.512	**3.880**	**0.512**
		Non-Facilities Area	48,563.727	5,372,004.7	0.9%	5.614	0.434	0.307	0.741	5.614	0.741	5.614	0.741	**5.614**	**0.741**
		Total Impact												***9.494***	***1.253***
CTS	*Ambystoma californiense*	Facilities Area	180.301	4,101.5	4.4%	27.299	2.110	1.495	3.605	27.299	3.605	27.299	3.605	**27.299**	**3.605**
		Non-Facilities Area	144,568.397	5,372,004.7	2.7%	16.712	1.292	0.915	2.207	16.712	2.207	16.712	2.207	**16.712**	**2.207**
		Total Impact												***44.011***	***5.812***
MYLF	*Rana muscosa*	Facilities Area	2.091	4,101.5	0.1%	0.317	0.024	0.017	0.042	0.317	0.115	0.317	0.115	**0.317**	**0.115**
		Non-Facilities Area	31,659.069	5,372,004.7	0.6%	3.660	0.283	0.200	0.483	3.660	0.483	3.660	0.483	**3.660**	**0.483**
		Total Impact												***3.977***	***0.598***
Reptiles (2)															
SRB	*Charina bottae umbratica*	Facilities Area	12.364	4,101.5	0.3%	1.872	0.145	0.102	0.247	1.872	0.247	1.872	0.247	**1.872**	**0.247**
		Non-Facilities Area	79,874.675	5,372,004.7	1.5%	9.233	0.714	0.506	1.219	9.233	1.219	9.233	1.219	**9.233**	**1.219**
		Total Impact												***11.105***	***1.466***

TABLE D-22
ILLUSTRATION OF EFFECTS ANALYSIS

Common Name	Scientific Name	Total Suitable Habitat within Baseline Areas (acres)		Total Acres of Open Space (including agriculture, grazing land, natural lands and water) in Baseline Areas	Percentage of Suitable Habitat within Area	Expected Acres of Habitat Impacts: Temporary Impacts	Expected Acres of Habitat Impacts: Permanent Impacts: Permanent Direct Impacts	Expected Acres of Habitat Impacts: Permanent Impacts: Permanent Indirect Impacts from Access Roads	Expected Acres of Habitat Impacts: Permanent Impacts: Total Permanent Impacts	Impact Area Override: Minimum: 100 Feet by 50 Feet (0.115 acre)		Impact Area Override: Historic: SoCalGas Projects 2013-2015		Expected Acres for Temporary Impacts within 30-Year Period	Expected Acres for Permanent Impacts within 30-Year Period
										[H or I] = If [D or G] < 0.115 Acres, Then [H or I] Expected Acres of Impacts Defaults to 0.115 Acre		[J or K] = If [G or H] < Historic Impacts, Then [I] Expected Acres of Impacts Defaults to Historic Evaluation (selected species)			
		[A]		[B]	[C] = [A/B]	[D] = [C × temp acres]	[E] = [C × perm acres]	[F] = [A × indirect impact acres/CRCP Plan Area acres]	[G] = [E + F]	Temporary [H]	Permanent [I]	Temporary [J]	Permanent [K]	[L]	[M]
SWPT	*Emys marmorata*	Facilities Area	169.461	4,101.5	4.1%	25.658	1.983	1.405	3.388	25.658	3.388	25.658	3.388	**25.658**	**3.388**
		Non-Facilities Area	193,205.706	5,372,004.7	3.6%	22.334	1.726	1.223	2.949	22.334	2.949	22.334	2.949	**22.334**	**2.949**
		Total Impact												***47.992***	***6.337***
Birds (6)															
BSS	*Passerculus sandwichensis beldingi*	Facilities Area	1.959	4,101.5	0.0%	0.297	0.023	0.016	0.039	0.297	0.115	0.297	0.115	**0.297**	**0.115**
		Non-Facilities Area	1,116.378	5,372,004.7	0.0%	0.129	0.010	0.007	0.017	0.129	0.115	0.129	0.115	**0.129**	**0.115**
		Total Impact												***0.426***	***0.230***
Burrowing owl	*Athene cunicularia*	Facilities Area	934.205	4,101.5	22.8%	141.446	10.933	7.744	18.677	141.446	18.677	141.446	18.677	**141.446**	**18.677**
		Non-Facilities Area	529,096.055	5,372,004.7	9.8%	61.163	4.728	3.349	8.076	61.163	8.076	61.163	8.076	**61.163**	**8.076**
		Total Impact												***202.609***	***26.753***
CAGN	*Polioptila californica californica*	Facilities Area	892.216	4,101.5	21.8%	135.088	10.442	7.396	17.838	135.088	17.838	135.088	17.838	**135.088**	**17.838**
		Non-Facilities Area	379,605.080	5,372,004.7	7.1%	43.882	3.392	2.403	5.794	43.882	5.794	43.882	5.794	**43.882**	**5.794**
		Total Impact												***178.970***	***23.632***
LBV	*Vireo bellii pusillus*	Facilities Area	30.179	4,101.5	0.7%	4.569	0.353	0.250	0.603	4.569	0.603	4.569	0.603	**4.569**	**0.603**
		Non-Facilities Area	59,209.147	5,372,004.7	1.1%	6.845	0.529	0.375	0.904	6.845	0.904	6.845	0.904	**6.845**	**0.904**
		Total Impact												***11.414***	***1.507***
SWF	*Empidonax traillii extimus*	Facilities Area	14.706	4,101.5	0.4%	2.227	0.172	0.122	0.294	2.227	0.294	2.227	0.294	**2.227**	**0.294**
		Non-Facilities Area	25,183.437	5,372,004.7	0.5%	2.911	0.225	0.159	0.384	2.911	0.384	2.911	0.384	**2.911**	**0.384**
		Total Impact												***5.138***	***0.678***
WYBC	*Coccyzus americanus occidentalis*	Facilities Area	0.000[a]	4,101.5	0.0%	0.000	0.000	0.000	0.000	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Non-Facilities Area	322.911	5,372,004.7	0.0%	0.037	0.003	0.002	0.005	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Total Impact												***0.230***	***0.230***
Mammals (3)															
SBKR	*Dipodomys merriami parvus*	Facilities Area	68.158	4,101.5	1.7%	10.320	0.798	0.565	1.363	10.320	1.363	10.320	1.363	**10.320**	**1.363**
		Non-Facilities Area	20,606.405	5,372,004.7	0.4%	2.382	0.184	0.130	0.315	2.382	0.315	2.382	0.315	**2.382**	**0.315**
		Total Impact												***12.702***	***1.678***
SJKF	*Vulpes macrotis mutica*	Facilities Area	22.118	4,101.5	0.5%	3.349	0.259	0.183	0.442	3.349	0.442	3.349	0.442	**3.349**	**0.442**
		Non-Facilities Area	102,900.673	5,372,004.7	1.9%	11.895	0.919	0.651	1.571	11.895	1.571	11.895	1.571	**11.895**	**1.571**
		Total Impact												***15.244***	***2.013***

TABLE D-22
ILLUSTRATION OF EFFECTS ANALYSIS

Common Name	Scientific Name	Total Suitable Habitat within Baseline Areas (acres)		Total Acres of Open Space (including agriculture, grazing land, natural lands and water) in Baseline Areas	Percentage of Suitable Habitat within Area	Expected Acres of Habitat Impacts				Impact Area Override				Expected Acres for Temporary Impacts within 30-Year Period	Expected Acres for Permanent Impacts within 30-Year Period
						Temporary Impacts	Permanent Impacts			Minimum: 100 Feet by 50 Feet (0.115 acre)		Historic: SoCalGas Projects 2013-2015			
							Permanent Direct Impacts	Permanent Indirect Impacts from Access Roads	Total Permanent Impacts	[H or I] = If [D or G] < 0.115 Acres, Then [H or I] Expected Acres of Impacts Defaults to 0.115 Acre		[J or K] = If [G or H] < Historic Impacts, Then [I] Expected Acres of Impacts Defaults to Historic Evaluation (selected species)			
		[A]		[B]	[C] = [A/B]	[D] = [C × temp acres]	[E] = [C × perm acres]	[F] = [A × indirect impact acres/CRCP Plan Area acres]	[G] = [E + F]	Temporary [H]	Permanent [I]	Temporary [J]	Permanent [K]	[L]	[M]
SKR	*Dipodomys stephensi*	Facilities Area	5.704	4,101.5	0.1%	0.864	0.067	0.047	0.114	0.864	0.115	0.864	0.115	**0.864**	**0.115**
		Non-Facilities Area	4,604.507	5,372,004.7	0.1%	0.532	0.041	0.029	0.070	0.532	0.115	0.532	0.115	**0.532**	**0.115**
		Total Impact												***1.396***	***0.230***
Plants (22)															
BMV	*Astragalus brauntonii*	Facilities Area	60.864	4,101.5	1.5%	9.215	0.712	0.505	1.217	9.215	1.217	9.215	1.217	**9.215**	**1.217**
		Non-Facilities Area	31,587.431	5,372,004.7	0.6%	3.651	0.282	0.200	0.482	3.651	0.482	3.651	0.482	**3.651**	**0.482**
		Total Impact												***12.866***	***1.699***
California seablite	*Suaeda californica*	Facilities Area	0.691	4,101.5	0.0%	0.105	0.008	0.006	0.014	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Non-Facilities Area	421.793	5,372,004.7	0.0%	0.049	0.004	0.003	0.006	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Total Impact												***0.230***	***0.230***
CCBT	*Cirsium fontinale var. obispoense*	Facilities Area	0.321	4,101.5	0.0%	0.049	0.004	0.003	0.006	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Non-Facilities Area	159.610	5,372,004.7	0.0%	0.018	0.001	0.001	0.002	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Total Impact												***0.230***	***0.230***
Conejo dudleya	*Dudleya abramsii spp. parva*	Facilities Area	2.353	4,101.5	0.1%	0.356	0.028	0.020	0.047	0.356	0.115	0.356	0.115	**0.356**	**0.115**
		Non-Facilities Area	11,165.779	5,372,004.7	0.2%	1.291	0.100	0.071	0.170	1.291	0.170	1.291	0.170	**1.291**	**0.170**
		Total Impact												***1.647***	***0.285***
GWC	*Nasturtium gambelii*	Facilities Area	0.000[a]	4,101.5	0.0%	0.000	0.000	0.000	0.000	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Non-Facilities Area	144.119	5,372,004.7	0.0%	0.017	0.001	0.001	0.002	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Total Impact												***0.230***	***0.230***
Gaviota tarplant	*Deinandra increscens ssp. villosa*	Facilities Area	29.677	4,101.5	0.7%	4.493	0.347	0.246	0.593	4.493	0.593	4.493	0.593	**4.493**	**0.593**
		Non-Facilities Area	57,312.670	5,372,004.7	1.1%	6.625	0.512	0.363	0.875	6.625	0.875	6.625	0.875	**6.625**	**0.875**
		Total Impact												***11.118***	***1.468***
IKM	*Eriodictyon altissimum*	Facilities Area	0.000[a]	4,101.5	0.0%	0.000	0.000	0.000	0.000	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Non-Facilities Area	70.670	5,372,004.7	0.0%	0.008	0.001	0.000	0.001	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Total Impact												***0.230***	***0.230***
LYS	*Eriodictyon capitatum*	Facilities Area	39.344	4,101.5	1.0%	5.957	0.460	0.326	0.787	5.957	0.787	5.957	0.787	**5.957**	**0.787**
		Non-Facilities Area	90,364.106	5,372,004.7	1.7%	10.446	0.807	0.572	1.379	10.446	1.379	10.446	1.379	**10.446**	**1.379**
		Total Impact												***16.403***	***2.166***
Lyon's pentachaeta	*Pentachaeta lyonii*	Facilities Area	15.200	4,101.5	0.4%	2.301	0.178	0.126	0.304	2.301	0.304	2.301	0.304	**2.301**	**0.304**
		Non-Facilities Area	24,964.674	5,372,004.7	0.5%	2.886	0.223	0.158	0.381	2.886	0.381	2.886	0.381	**2.886**	**0.381**
		Total Impact												***5.187***	***0.685***

TABLE D-22
ILLUSTRATION OF EFFECTS ANALYSIS

Common Name	Scientific Name	Total Suitable Habitat within Baseline Areas (acres)		Total Acres of Open Space (including agriculture, grazing land, natural lands and water) in Baseline Areas	Percentage of Suitable Habitat within Area	Expected Acres of Habitat Impacts				Impact Area Override				Expected Acres for Temporary Impacts within 30-Year Period	Expected Acres for Permanent Impacts within 30-Year Period
						Temporary Impacts	Permanent Impacts			Minimum: 100 Feet by 50 Feet (0.115 acre)		Historic: SoCalGas Projects 2013-2015			
							Permanent Direct Impacts	Permanent Indirect Impacts from Access Roads	Total Permanent Impacts	[H or I] = If [D or G] < 0.115 Acres, Then [H or I] Expected Acres of Impacts Defaults to 0.115 Acre		[J or K] = If [G or H] < Historic Impacts, Then [I] Expected Acres of Impacts Defaults to Historic Evaluation (selected species)			
		[A]		[B]	[C] = [A/B]	[D] = [C × temp acres]	[E] = [C × perm acres]	[F] = [A × indirect impact acres/CRCP Plan Area acres]	[G] = [E + F]	Temporary [H]	Permanent [I]	Temporary [J]	Permanent [K]	[L]	[M]
Marcescent dudleya	*Dudleya cymosa ssp. marcescens*	Facilities Area	0.000[a]	4,101.5	0.0%	0.000	0.000	0.000	0.000	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Non-Facilities Area	65.315	5,372,004.7	0.0%	0.008	0.001	0.000	0.001	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Total Impact												***0.230***	***0.230***
Morro manzanita	*Arctostaphylos morroensis*	Facilities Area	1.576	4,101.5	0.0%	0.239	0.018	0.013	0.032	0.239	0.115	0.239	0.115	**0.239**	**0.115**
		Non-Facilities Area	5,176.189	5,372,004.7	0.1%	0.598	0.046	0.033	0.079	0.598	0.115	0.598	0.115	**0.598**	**0.115**
		Total Impact												***0.837***	***0.230***
Nevin's barberry	*Berberis nevinii*	Facilities Area	1.374	4,101.5	0.0%	0.208	0.016	0.011	0.027	0.208	0.115	0.208	0.115	**0.208**	**0.115**
		Non-Facilities Area	7,161.612	5,372,004.7	0.1%	0.828	0.064	0.045	0.109	0.828	0.115	0.828	0.115	**0.828**	**0.115**
		Total Impact												***1.036***	***0.230***
NML	*Lupinus nipomensis*	Facilities Area	0.000[a]	4,101.5	0.0%	0.000	0.000	0.000	0.000	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Non-Facilities Area	3,825.266	5,372,004.7	0.1%	0.442	0.034	0.024	0.058	0.442	0.115	0.442	0.115	**0.442**	**0.115**
		Total Impact												***0.557***	***0.230***
Pismo clarkia	*Clarkia speciosa ssp. immaculata*	Facilities Area	45.162	4,101.5	1.1%	6.838	0.529	0.374	0.903	6.838	0.903	6.838	0.903	**6.838**	**0.903**
		Non-Facilities Area	79,287.326	5,372,004.7	1.5%	9.166	0.708	0.502	1.210	9.166	1.210	9.166	1.210	**9.166**	**1.210**
		Total Impact												***16.004***	***2.113***
SFVS	*Chorizanthe parryi var. fernandina*	Facilities Area	6.904	4,101.5	0.2%	1.045	0.081	0.057	0.138	1.045	0.138	1.045	0.138	**1.045**	**0.138**
		Non-Facilities Area	2,613.802	5,372,004.7	0.0%	0.302	0.023	0.017	0.040	0.302	0.115	0.302	0.115	**0.302**	**0.115**
		Total Impact												***1.347***	***0.253***
SARW	*Eriastrum densifolium ssp. sanctorum*	Facilities Area	7.443	4,101.5	0.2%	1.127	0.087	0.062	0.149	1.127	0.149	1.127	0.149	**1.127**	**0.149**
		Non-Facilities Area	8,972.472	5,372,004.7	0.2%	1.037	0.080	0.057	0.137	1.037	0.137	1.037	0.137	**1.037**	**0.137**
		Total Impact												***2.164***	***0.286***
SMMD	*Dudleya cymosa ssp. ovatifolia*	Facilities Area	0.000[a]	4,101.5	0.0%	0.000	0.000	0.000	0.000	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Non-Facilities Area	3,889.665	5,372,004.7	0.1%	0.450	0.035	0.025	0.059	0.450	0.115	0.450	0.115	**0.450**	**0.115**
		Total Impact												***0.565***	***0.230***
SBB	*Cordylanthus rigidus ssp. Littoralis*	Facilities Area	6.392	4,101.5	0.2%	0.968	0.075	0.053	0.128	0.968	0.128	0.968	0.128	**0.968**	**0.128**
		Non-Facilities Area	10,145.228	5,372,004.7	0.2%	1.173	0.091	0.064	0.155	1.173	0.155	1.815	0.155	**1.815**	**0.155**
		Total Impact												***2.783***	***0.283***
SHS	*Dodecahema leptoceras*	Facilities Area	1.219	4,101.5	0.0%	0.185	0.014	0.010	0.024	0.185	0.115	0.185	0.115	**0.185**	**0.115**
		Non-Facilities Area	8,324.709	5,372,004.7	0.2%	0.962	0.074	0.053	0.127	0.962	0.127	0.962	0.127	**0.962**	**0.127**
		Total Impact												***1.147***	***0.242***

TABLE D-22
ILLUSTRATION OF EFFECTS ANALYSIS

Common Name	Scientific Name	Total Suitable Habitat within Baseline Areas (acres)		Total Acres of Open Space (including agriculture, grazing land, natural lands and water) in Baseline Areas	Percentage of Suitable Habitat within Area	Expected Acres of Habitat Impacts				Impact Area Override				Expected Acres for Temporary Impacts within 30-Year Period	Expected Acres for Permanent Impacts within 30-Year Period
						Temporary Impacts	Permanent Impacts			Minimum: 100 Feet by 50 Feet (0.115 acre)		Historic: SoCalGas Projects 2013-2015			
							Permanent Direct Impacts	Permanent Indirect Impacts from Access Roads	Total Permanent Impacts	[H or I] = If [D or G] < 0.115 Acres, Then [H or I] Expected Acres of Impacts Defaults to 0.115 Acre		[J or K] = If [G or H] < Historic Impacts, Then [I] Expected Acres of Impacts Defaults to Historic Evaluation (selected species)			
		[A]		[B]	[C] = [A/B]	[D] = [C × temp acres]	[E] = [C × perm acres]	[F] = [A × indirect impact acres/CRCP Plan Area acres]	[G] = [E + F]	Temporary [H]	Permanent [I]	Temporary [J]	Permanent [K]	[L]	[M]
Vandenberg monkeyflower	*Diplacus vendenbergensis*	Facilities Area	21.640	4,101.5	0.5%	3.277	0.253	0.179	0.433	3.277	0.433	3.277	0.433	**3.277**	**0.433**
		Non-Facilities Area	9,567.465	5,372,004.7	0.2%	1.106	0.085	0.061	0.146	1.106	0.146	1.815	0.146	**1.815**	**0.146**
		Total Impact												***5.092***	***0.579***
VMMV	*Astragalus pycnostachyus var. lanosissimus*	Facilities Area	136.787	4,101.5	3.3%	20.711	1.601	1.134	2.735	20.711	2.735	20.711	2.735	**20.711**	**2.735**
		Non-Facilities Area	26,632.184	5,372,004.7	0.5%	3.079	0.238	0.169	0.407	3.079	0.407	3.079	0.407	**3.079**	**0.407**
		Total Impact												***23.790***	***3.142***
Verity's dudleya	*Dudleya verityi*	Facilities Area	0.000[a]	4,101.5	0.0%	0.000	0.000	0.000	0.000	0.115	0.115	0.115	0.115	**0.115**	**0.115**
		Non-Facilities Area	2,533.787	5,372,004.7	0.0%	0.293	0.023	0.016	0.039	0.293	0.115	0.293	0.115	**0.293**	**0.115**
		Total Impact												***0.408***	***0.230***

NOTE: *A separate analysis was developed for the CRLF consistent with USFWS expert guidance and modeling approach (Table D-22, *Effects Analysis for CRLF*).
a. Range does not intersect service area.

TABLE D-23
EFFECTS ANALYSIS FOR CRLF

		[A]			[B]	[C]		[D]										[E]			
						Dispersal Habitat	Aquatic or Upland Habitat (Breeding)	Expected Acres of Habitat Impacts										Basis of Take Permit Expected Acres of Impacts within 30-Year Period (both seasons)			
								Dispersal Habitat				Aquatic or Upland Habitat (Breeding)									
		Total Suitable Habitat within Baseline Areas (acres)			Total Acres of Open Space (including agriculture, grazing land, natural lands and water) in Baseline Areas			Dry Season (May 1-Nov 15)		Wet Season (Nov 16-Apr 30)		Dry Season (May 1-Nov 15)			Wet Season (Nov 16-Apr 30)			Dispersal Habitat		Aquatic or Upland Habitat (Breeding)	
													Permanent Impacts (6)*			Permanent Impacts (8)*					
Common Name	Scientific Name	Baseline Area	Dispersal Habitat	Aquatic or Upland Habitat (Breeding)		Percentage of Suitable Habitat within Area	Percentage of Suitable Habitat within Area	Temp. (1)	Perm. (2)*	Temp. (3)	Perm. (4)*	Temp. Impacts (5)*	Direct Perm. (6.a)	Indirect Perm. (6.b)	Temp. (7)*	Direct Perm. (8.a)	Indirect Perm. (8.b)	Temp. (1)	Perm. (2)	Temp. (3)	Perm. (4)
		[A]	[A1]	[A2]	[B]	[C1] = [A1/B]	[C2] = [A2/B]	[D1] = [C1 × temp acres]	[D2] = [C1 × temp acres]	[D3] = [C1 × temp acres]	[D4] = [C1 × temp acres]	[D5] = [C2 × temp acres]	[D6] = [C2 × temp acres]	[D7] = [C2 × indirect impact acres]	[D7] = [C2 × temp acres]	[D8] = [C2 × temp acres]	[D9] = [C2 × indirect impact acres]	[E1] = [D1] + [D3]	[E2] = [D2] + [D4]	[E3] = [D5] + [D7]	[E4] = [D6] + [D8]
CRLF	*Rana draytonii*	Facilities Area	**2,775.1**	**534.4**	4,101.5	**67.7%**	**13.0%**	210.088	16.239	210.088	16.239	40.459	3.127	2.215	40.459	3.127	2.215	**420.176**	**32.477**	**80.917**	**10.685**
		Non-Facilities Area	**4,319,529.0**	**625,320.0**	5,372,004.7	**80.4%**	**11.6%**	249.667	19.298	249.667	19.298	36.143	2.794	1.979	36.143	2.794	1.979	**499.335**	**38.596**	**72.287**	**9.545**
		Total Impact																***919.511***	***71.073***	***153.204***	***20.230***

NOTE: SoCalGas Historical Impact Overide does not apply due to comprehensive analysis.
*Compensatory mitigation for CRLF Dispersal and Breeding habitat includes only columns (2), (4), (5), (6) and (8) due to Mitigation measures specific to O&M activities performed during the dry and wet season.

TABLE D-24
FORMULA FOR ESTIMATING IMPACTS OVER 30-YEAR PERMIT FOR THE CRLF

	Dispersal Habitat				Aquatic or Upland Habitat (Breeding)			
	Dry Season	Wet	Dry Season	Wet	Dry Season	Wet	Dry Season	Wet
	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent
Facilities Area	[D1] = [C1 **× 310.5** acres]	[D2] = [C1 **× 9** acres]	[D3] = [C1 **× 310.5** acres]	[D4] = [C1 **× 9** acres]	[D5] = [C2 **× 310.5** acres]	[D6] = [C2 **× 9** acres]	[D7] = [C2 **× 310.5** acres]	[D8] = [C2 **× 9** acres]
Non-Facilities Area	-	[D2]= [C1 **× 15** acres)	-	[D4] = [C1 **× 15** acres)	-	[D6] = [C2 **× 15** acres)	-	[D8] = [C2 **× 15** acres)
	30-year term		30-year term		30-year term		30-year term	

Appendix E
ANTICIPATED HERBICIDE AND RODENTICIDE USE

I. Herbicides

SoCalGas requires the use of herbicides to maintain access to pipeline facilities. Covered activities include the use of herbicides within portions of SoCalGas facilities. Herbicide applications typically occur on right-of-way (ROW) areas that are 0.25 acre or greater in size. Application is conducted either by SoCalGas personnel or a contractor. Prior to application, a site- and product-specific recommendation is obtained from a State Certified Pest Control Advisor, which is then reviewed by the employees and contractors. Herbicides are used minimally, in accordance with the manufacturer's product label and as recommended by a State Certified Pest Control Advisor per SoCalGas Company Operations Standard No. 104.0250, Pesticide Management. All pesticides and herbicides are applied per manufacturer instructions and restrictions. There are three herbicides with the potential to be used during the life of the permit:

- GlyStar® Original (Glyphosate), manufactured by ALBAUGH, LLC
- DuPont ™ Oust ® XP (Sulfometuron methyl), manufactured by DU PONT
- Roundup Pro® Concentrate (Glyphosate), manufactured by MONSANTO COMPANY[566]

Manufacturing information for these three herbicides appears in the following pages. All potential herbicides have been approved for use by the U.S. Department of Agriculture. In the event additional herbicides are need for use within the Plan Area, SoCalGas shall amend this MSHCP.

II. Rodenticides

SoCalGas utilizes pest control services whenever inspections detect signs of rodent infestation within facilities. Rodents damage facilities and equipment by chewing holes in walls and other structures including electrical wires and components and accumulate nesting materials like paper strands and cardboard and therefore are a potential fire risk. Commercial grade rodenticide bait containers made with durable materials, like metal and plastic, containing difethialone or similar second-generation anticoagulant bait are utilized on the exterior of facilities whenever there is confirmation that rodents are entering a building from the exterior. The above ground bait containers are installed and maintained by professional pest control applicators and secured in place adjacent to exterior access

[566] Subject to EPA approval.

points of a facility in which rodents have the potential to enter the interior of a building. The bait station material and placement, within 50 feet of buildings, along with the safeguard of affixing the station in place reduces the likelihood of accidental poisoning of non-targeted animals. Pest control contractors remove bait stations after rodent control treatments are completed in which rodents are no longer detected within facilities.

SPECIMEN LABEL

GROUP 9 HERBICIDE

GlyStar® Original

AVOID CONTACT OF HERBICIDE WITH FOLIAGE, GREEN STEMS, EXPOSED NON-WOODY ROOTS OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, BECAUSE SEVERE INJURY OR DESTRUCTION MAY RESULT.

Read the "CONDITIONS OF SALE AND WARRANTY" statement at the end of the label before buying or using this product. If terms are not acceptable, return at once unopened.

ACTIVE INGREDIENT:

*Glyphosate, N-(phosphonomethyl)glycine, in the form of its isopropylamine salt	41.0%
OTHER INGREDIENTS	59.0%
TOTAL	100.0%

*Contains 480 grams per litre or 4 pounds per U.S. gallon of the active ingredient, glyphosate, in the form of its isopropylamine salt. Equivalent to 356 grams per litre or 3 pounds per U.S. gallon of the acid, glyphosate.

EPA Reg. No. 42750-60 EPA Est. No. 42750-MO-001

KEEP OUT OF REACH OF CHILDREN

CAUTION

FIRST AID

IF IN EYES:	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.

HOT LINE NUMBER

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-424-9300 for emergency medical treatment information.

See Inside Booklet for Additional PRECAUTIONARY STATEMENTS

Manufactured by:

ALBAUGH, LLC

1525 NE 36th Street
Ankeny, Iowa 50021

FOR CHEMICAL SPILL, LEAK, FIRE, OR EXPOSURE, CALL CHEMTREC 1-800-424-9300

AD110216

Albaugh®
Your Alternative™

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3.0 – PRECAUTIONARY STATEMENTS

3.1 – HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling.

DOMESTIC ANIMALS: This product is considered to be relatively nontoxic to dogs and other domestic animals; however, ingestion of this product or large amounts of freshly sprayed vegetation may result in temporary gastrointestinal irritation (vomiting, diarrhea, colic, etc.). If such symptoms are observed, provide the animal with plenty of fluids to prevent dehydration. Call a veterinarian if symptoms persist for more than 24 hours.

3.2 – PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and other handlers must wear:

1. Long-sleeved shirt and long pants
2. Shoes plus socks

Follow manufacturer's instructions for cleaning/maintaining PPE (Personal Protective Equipment). If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

USER SAFETY RECOMMENDATIONS

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing or PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

3.3 – ENVIRONMENTAL HAZARDS

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters or rinsate.

3.4 – PHYSICAL OR CHEMICAL HAZARDS

Spray solutions of this product must be mixed, stored and applied using only stainless steel, aluminum, fiberglass, plastic or plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

Read the entire label before using this product. Use only according to label instructions.

Read the "CONDITIONS OF SALE AND WARRANTY" statement at the end of the label before buying or using. If terms are not acceptable, return at once unopened.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in any manner inconsistent with its labeling.

This product can only be used in accordance with the Directions for Use on this label or in separately published Albaugh, LLC supplemental labeling.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulations.

3.5 – AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 4 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

1. Coveralls
2. Waterproof gloves
3. Shoes plus socks

3.6 – NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries or greenhouses.

Keep people and pets off treated areas until spray solution has dried.

3.7 – SEED POTATO PRECAUTION

Potatoes grown for seed are very sensitive to glyphosate at extremely low concentrations. Exposure of the seed potato crop can cause germination failure or deformities. Daughter tuber damage may occur at levels where mother crop symptoms are not visible. Multiple sprouting from eyes, weak and distorted stems, "little potato syndrome", cauliflower sprouts, root distortions, excessive root growth, suppressed tuber initiation and bulking, failure or delay in opening of eyes, and rotting of tubers in the field or store can result. Subsequent plantings of seed pieces from the exposed mother crop can result in delayed or no emergence or produce lower than normal yields.

Glyphosate can contaminate seed potato crops through carryover residue in application equipment or drift from applying glyphosate to nearby crops.

Always follow good wash-out procedures using detergents or other suitable cleaning agents to remove all residual traces of glyphosate from application equipment that may be used to apply other products to seed potato crops.

To avoid contamination from spray drift follow the directions and precautions in the "Spray Drift Management" section of the label.

4.0 – STORAGE AND DISPOSAL

Do not contaminate water, foodstuffs, feed or seed by storage or disposal.

PESTICIDE STORAGE: Keep container closed to prevent spills and contamination. Store above 10ºF (-12ºC) to keep product from crystallizing. Crystals will settle to the bottom. If allowed to crystallize, place in a warm room 68ºF (20ºC) for several days to redissolve and roll or shake container or recirculate in mini-bulk or bulk container to mix well before using.

PESTICIDE DISPOSAL: Wastes resulting from the use of this product that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticide disposal or in accordance with applicable Federal, state or local procedures. Emptied container retains vapor and product residue. Observe all labeled safeguards until container is cleaned, reconditioned, or destroyed.

CONTAINER HANDLING: (See the Net Contents section on the container to determine if it is non-refillable or refillable.) APPROPRIATE BOX MUST BE CHECKED.
Non-refillable containers (1 and 2.5 gallon): Do not reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times.

Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

Offer for recycling, if available, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

Non-refillable containers (>5 gallon): Do not reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times.

Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

Offer for recycling, if available, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

Refillable containers: Refillable container. Refill this container with glyphosate only. Do not reuse this container for any other purpose.

When this container is empty, replace the cap and seal all openings that have been made during usage and return the container to the point of purchase, or to an alternate location designated by the manufacturer at the time of purchase of this product. If not returned, clean the empty container and offer for recycling, if available.

Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller.

To clean the container before final disposal, empty the remaining contents from the container into application equipment or mix tank. Fill the container about 10 percent full with water. Agitate vigorously or re-circulate water with the pump for 2 minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing process two more times.

If the container cannot be refilled, offer for recycling, if available, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

5.0 – USE INFORMATION (Mode of Action)

PRODUCT DESCRIPTION: This product is a post-emergent, systemic herbicide with no soil residual activity. It is generally non-selective and gives broad-spectrum control of many annual weeds, perennial weeds, woody brush and trees. It is formulated as a water-soluble liquid. It may be applied through most standard industrial or field-type sprayers after dilution and thorough mixing with water or other carriers according to label instructions.

Ammonium sulfate, drift control additives, or dyes and colorants may be used. See the "MIXING" section of this label for instructions.

TIME TO SYMPTOMS: This product moves through the plant from the point of foliage contact to and into the root system. Visible effects on most annual weeds occur within 2 to 4 days, but on most perennial weeds may not occur for 7 days or more. Extremely cool or cloudy weather following treatment may slow activity of this product and delay development of visual symptoms. Visible effects are a gradual wilting and yellowing of the plant which advances to complete browning of aboveground growth and deterioration of underground plant parts.

STAGE OF WEEDS: Annual weeds are easiest to control when they are small. Best control of most perennial weeds is obtained when treatment is made at late growth stages approaching maturity. Refer to the annual, perennial, woody brush and trees rate tables for Use Directions for specific weeds.

Always use the higher rate of this product per acre within the labeled rate range when weed growth is heavy or dense or weeds are growing in an undisturbed (non-cultivated) area.

Do not treat weeds under poor growing conditions such as drought stress, disease or insect damage, as reduced weed control may result. Reduced results may also occur when treating weeds heavily covered with dust.

CULTURAL CONSIDERATIONS: Reduced control may result when applications are made to annual or perennial weeds that have been mowed, grazed, or cut, and have not been allowed to regrow to the recommended stage for treatment.

RAINFASTNESS: Heavy rainfall soon after application may wash this product off of the foliage and a repeat application may be required for adequate control.

SPRAY COVERAGE: For best results, spray coverage should be uniform and complete. Do not spray weed foliage to the point of runoff.

MODE OF ACTION: The active ingredient in this product inhibits an enzyme found only in plants that is essential to formation of specific amino acids.

NO SOIL ACTIVITY: Weeds must be emerged at the time of application to be controlled by this product. Weeds germinating from seed after application will not be controlled. Unemerged plants arising from unattached underground rhizomes or root stocks of perennials will not be affected by the herbicide and will continue to grow.

BIOLOGICAL DEGRADATION: Degradation of this product is primarily a biological process carried out by soil microbes.

TANK MIXING: This product does not provide residual weed control. For subsequent residual weed control, follow a label-approved herbicide program. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive label directions for each product in the mixture.

To the extent consistent with applicable law, buyer and all users are responsible for all loss or damage in connection with the use or handling of mixtures of this product with herbicides or other materials that are not expressly recommended in this label. Mixing this product with herbicides or other materials not recommended on this label may result in reduced performance.

ANNUAL MAXIMUM USE RATE: Except as otherwise specified in a food crop section of this label, the combined total of all treatments must not exceed 8 quarts of this product per acre per year. For non-food/non-crop uses, the combined total of all treatments must not exceed 10.6 quarts of this product per acre per year. The maximum use rates stated throughout this product's labeling apply to this product combined with the use of all other herbicides containing glyphosate or sulfosate as the active ingredient, whether applied as mixtures or separately. Calculate the application rates and ensure that the total use of this and other glyphosate or sulfosate containing products does not exceed stated maximum use rate.

NOTE: Use of this product in any manner not consistent with this label may result in injury to persons, animals or crops, or other unintended consequences. Keep container closed to prevent spills and contamination.

6.0 – WEED RESISTANCE MANAGEMENT

Glyphosate, the active ingredient in this product, is a Group 9 herbicide. Target site resistance to Group 9 herbicides is rare. Any weed population may contain plants naturally resistant to Group 9 herbicides. Weed species resistant to Group 9 herbicides may be effectively managed utilizing another herbicide from a different Group or using other cultural practices or mechanical practices.

6.1 – WEED MANAGEMENT DIRECTIONS

To minimize the occurrence of glyphosate-resistant biotypes, observe the following weed management strategies:

- Scout your fields before and after herbicide applications.
- Start with a clean field, use either a burndown herbicide application or tillage.
- Control weeds early when they are relatively small.
- Add other herbicides (e.g., a selective and/or a residual herbicide) and cultural practices (e.g., tillage or crop rotation) where appropriate.
- One method of adding other herbicides into a continuous Roundup Ready system is to rotate to other Roundup Ready crops.
- Utilize the labeled rate for the most difficult-to-control weed in your field. Avoid tank mixtures with other herbicides that reduce this product's efficacy (through antagonism), or tank mixture recommendations that encourage application rates of this product below the labeled rate.
- Control weed escapes and prevent weeds from setting seeds.
- Clean equipment before moving from field to field to minimize the spread of weed seed or plant parts.
- Use new commercial seed that is as free of weed seed as possible.
- Report any incidence of repeated non-performance of this product on a particular weed to your Albaugh, LLC representative, local retailer, or county extension agent.

6.2 – MANAGEMENT DIRECTIONS FOR GLYPHOSATE RESISTANCE BIOTYPES

NOTE: Appropriate testing is critical in order to determine if a weed is resistant to glyphosate. Contact your Albaugh, LLC representative to determine if resistance has been confirmed to any particular weed biotype in your area, or visit on the Internet www.weedresistancemanagement.com or www.weedscience.org. For more information see the "ANNUAL WEEDS RATE" section and "PERENNIAL WEEDS RATE" section of this label.

Control directions for biotypes confirmed as resistant to glyphosate are made available on separately published supplemental labeling or fact sheets for this product and can be obtained from your local retailer or Albaugh, LLC representative.

Since the occurrence of new glyphosate-resistant weeds cannot be determined until after product use and scientific confirmation, Albaugh, LLC is not responsible for any losses that may result from the failure of this product to control glyphosate-resistant weed biotypes.

The following good agronomic practices are imperative to reducing the spread of confirmed glyphosate resistant biotypes:

- If a naturally-occurring resistant biotype is present in your field, this product should be tank-mixed or applied sequentially with an appropriately labeled herbicide with a different mode of action to achieve control.
- Cultural and mechanical control practices (e.g., crop rotation or tillage) may also be used as appropriate.
- One method for adding other herbicides into a continuous Roundup Ready system is to rotate to other Roundup Ready crops.
- Scout treated fields after herbicide applications and control escaping weeds including resistant biotypes before they set seed.
- Thoroughly clean equipment before leaving fields known to contain resistant biotypes.

7.0 – MIXING

Clean sprayer parts immediately after using this product by thoroughly flushing with water.

NOTE: REDUCED RESULTS MAY OCCUR IF WATER CONTAINING SOIL IS USED, SUCH AS VISIBLY MUDDY WATER OR WATER FROM PONDS AND DITCHES THAT IS NOT CLEAR.

7.1 – MIXING WITH WATER

This product mixes readily with water. Mix spray solutions of this product as follows: Fill the mixing or spray tank with the required amount of water. Add the labeled amount of this product near the end of the filling process and mix well. Use caution to avoid siphoning back into the carrier source. Use approved anti-back-siphoning devices where required by state or local regulations. During mixing and application, foaming of the spray solution may occur. To prevent or minimize foam, avoid the use of mechanical agitators, terminate by-pass and return lines at the bottom of the tank and, if needed, use an approved anti-foam or de-foaming agent.

7.2 – TANK MIXING PROCEDURE

Mix labeled tank mixtures of this product with water as follows:

1. Place a 20- to 35-mesh screen or wetting basket over filling port.
2. Through the screen, fill the spray tank one-half full with water and start agitation.
3. If ammonium sulfate is used add it slowly through the screen into the tank. Continue agitation. Ensure that dry ammonium sulfate is completely dissolved in the spray tank before adding other products.
4. If a wettable powder is used, make a slurry with the water carrier, and add it SLOWLY through the screen into the tank. Continue agitation.
5. If a flowable formulation is used, premix one part flowable with one part water. Add diluted mixture SLOWLY through the screen into the tank. Continue agitation.
6. If an emulsifiable concentrate formulation is used, premix one part emulsifiable concentrate with two parts water. Add diluted mixture slowly through the screen into the tank. Continue agitation.
7. Continue filling the spray tank with water and add the required amount of this product near the end of the filling process.
8. Add individual formulations to the spray tank as follows: wettable powder, flowable, emulsifiable concentrate, drift control additive and water soluble liquid.

Maintain good agitation at all times until the contents of the tank are sprayed. If the spray mixture is allowed to settle, thorough agitation is required to resuspend the mixture before spraying is resumed.

Keep by-pass line on or near the bottom of the tank to minimize foaming. Screen size in nozzle or line strainers should be no finer than 50 mesh.

Always predetermine the compatibility of labeled tank mixtures of this product with water carrier by mixing small proportional quantities in advance.

Refer to the "TANK MIXING" section of "USE INFORMATION" for additional precautions.

7.3 – MIXING FOR HAND-HELD SPRAYERS

Prepare the desired volume of spray solution by mixing the amount of this product in water as shown in the following table:

Spray Solution

Desired Volume	Amount of GlyStar® Original					
	1/2%	1%	1-1/2%	2%	5%	10%
1 Gal. 25 Gals. 100 Gals.	2/3 fl. oz. 1 pt. 2 qts.	1-1/3 fl. oz. 1 qt. 1 gal.	2 fl.oz. 1-1/2 qts. 1-1/2 gals.	2-2/3 fl. oz. 2 qts. 2 gals.	6-1/2 fl. oz. 5 qts. 5 gals.	13 fl. oz. 10 qts. 10 gals.

2 tablespoons = 1 fluid ounce

For use in knapsack sprayers, it is suggested that the labeled amount of this product be mixed with water in a larger container. Fill sprayer with the mixed solution.

7.4 – SURFACTANTS

Additional surfactants labeled for use with herbicides may be used. Do not reduce application rates of this herbicide when adding surfactants. When adding additional surfactant, use 0.5 percent surfactant concentration (2 quarts per 100 gallons of spray solution) when using surfactants which contain at least 70 percent active ingredient or a 1 percent surfactant concentration (4 quarts per 100 gallons of spray solution) for those surfactants containing less than 70 percent active ingredient.

Read and carefully observe cautionary statements and other information appearing on the additives label.

7.5 – AMMONIUM SULFATE

The addition of 1 to 2 percent dry ammonium sulfate by weight or 8.5 to 17 pounds per 100 gallons of water may increase the performance of this product, and this product plus 2,4-D, Albaugh Dicamba DMA Salt, Banvel® or residual herbicide tank mixtures on annual and perennial weeds. The improvement in performance may be apparent where environmental stress is a concern. Low-quality ammonium sulfate may contain material that will not readily dissolve, which could result in nozzle tip plugging. To determine quality, perform a jar test by adding 1/3 cup of ammonium sulfate to 1 gallon of water and agitate for 1 minute. If undissolved sediment is observed, predissolve the ammonium sulfate in water and filter prior to addition to the spray tank. If ammonium sulfate is added directly to the spray tank, add slowly with agitation. Adding too quickly may clog outlet line. Ensure that ammonium sulfate is completely dissolved in the spray tank before adding herbicides or surfactant. Thoroughly rinse the spray system with clean water after use to reduce corrosion.

NOTE: The use of ammonium sulfate as an additive does not preclude the need for additional surfactant. When using ammonium sulfate, apply this product at rates specified in this label. Lower rates will result in reduced performance.

7.6 – COLORANTS OR DYES

Agriculturally approved colorants or marking dyes may be added to this product. Colorants or dyes used in spray solutions of this product may reduce performance, especially at lower rates or dilutions. Use colorants or dyes according to the manufacturer's directions.

7.7 – DRIFT CONTROL ADDITIVES

Drift control additives may be used with all equipment types, except wiper applicators, sponge bars and CDA equipment. When a drift control additive is used, read and carefully observe the cautionary statements and all other information appearing on the additive label.

NOTE: The use of drift control additives can affect spray coverage which may result in reduced performance.

8.0 – APPLICATION EQUIPMENT AND TECHNIQUES

Do not apply this product through any type of irrigation system.

This product may be applied with the following application equipment:

- Aerial – Fixed Wing and Helicopter
- Ground Broadcast Spray – Boom or boomless systems, pull-type sprayer, floaters, pick-up sprayers, spray coupes and other ground broadcast equipment.
- Hand-Held or High-Volume Spray Equipment – Knapsack and backpack sprayers, pump-up pressure sprayers, handguns, handwands, mistblowers*, lances and other hand-held and motorized spray equipment used to direct the spray onto weed foliage.
- Selective Equipment – Shielded and hooded sprayers, wiper applicators and sponge bars.
- Injection Systems – Aerial or ground injection sprayers.
- Controlled Droplet Applicator (CDA) – Hand-held or boom-mounted applicators which produce a spray consisting of a narrow range of droplet sizes.

*This product is not registered in California or Arizona for use in mistblowers.

APPLY THESE SPRAY SOLUTIONS IN PROPERLY MAINTAINED AND CALIBRATED EQUIPMENT CAPABLE OF DELIVERING DESIRED VOLUMES.

8.1 – DRIFT PRECAUTION

Do not allow the herbicide solution to mist, drip, drift, or splash onto desirable vegetation. Extreme care must be exercised to avoid contact of spray with foliage, green stems or fruit of desirable crops, plants, trees or other desirable vegetation since minute quantities of this product can cause severe damage or destruction to the crop, plants or other areas on which treatment was NOT intended. Examples of, but not limited to, crop types that may be sensitive to glyphosate exposure include rice, small grain cereals, peanuts, potatoes, vegetables, fruits and ornamentals.

Applicators should be aware of any potentially sensitive crops near application zone before making application. To prevent injury to adjacent desirable vegetation, appropriate buffer zones must be maintained.

1. Do not apply within 100 feet of any desirable vegetation or crops.
2. If wind up to 5 miles per hour is blowing toward desirable vegetation or crops, do not apply within 500 feet upwind of the desirable vegetation or crops.
3. Winds blowing from 5 to 10 miles per hour toward desirable vegetation or crops will likely require buffer zones in excess of 500 feet.

If unsure of appropriate buffer zone, contact your local Extension Agent for advice.

8.2 – AERIAL EQUIPMENT

DO NOT APPLY THIS PRODUCT USING AERIAL SPRAY EQUIPMENT EXCEPT UNDER CONDITIONS AS SPECIFIED WITHIN THIS LABEL. FOR AERIAL APPLICATION IN CALIFORNIA AND ARKANSAS, REFER TO INSTRUCTIONS SPECIFIC TO THOSE STATES.

This product plus dicamba tank mixtures may not be applied by air in California.

Use the specified rates of this herbicide in 3 to 15 gallons of water per acre unless otherwise specified on this label. Unless otherwise specified, do not exceed 1 quart per acre. Aerial applications of this product may be made in annual cropping conventional tillage systems, fallow and reduced tillage systems and preharvest applications. Refer to the individual use area sections of this label for labeled volumes and application rates.

Ensure uniform application – To avoid streaked, uneven or overlapped application, use appropriate marking devices.

AERIAL SPRAY DRIFT MANAGEMENT

AVOIDING SPRAY DRIFT AT THE APPLICATION SITE IS THE RESPONSIBILITY OF THE APPLICATOR. The interaction of many equipment- and weather-related factors determine the potential for spray drift. The applicator is responsible for considering all these factors when making decisions.

The following drift management requirements must be followed to avoid off-target movement from aerial applications to agricultural field crops. These requirements do not apply to forestry applications, public health uses or to applications using dry formulations.

1. The distance of the outermost nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor.
2. Nozzles must always point backward parallel with the airstream and never be pointed downwards more than 45 degrees.

Where states have more stringent regulations, they must be observed.

INFORMATION ON DROPLET SIZE

The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see “Wind”, “Temperature and Humidity”, and “Temperature Inversions” sections of this label).

CONTROLLING DROPLET SIZE

- **Volume –** Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- **Pressure –** Do not exceed the nozzle manufacturer’s specified pressures. For many nozzle types lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of Nozzles –** Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle Orientation –** Orient nozzles so that the spray is released parallel to the airstream, which produces larger droplets than other orientations. Significant deflection from horizontal will reduce droplet size and increase drift potential.
- **Nozzle Type –** Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift.
- **Boom Length –** For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.
- **Application Height –** Applications must not be made at a height greater than 10 feet above the top of the target plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.

SWATH ADJUSTMENT

When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance must increase with increasing drift potential (higher wind, smaller drops, etc.).

WIND

Drift potential is lowest between wind speeds of 2–10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given speed. Application must be avoided below 2 mph due to variable wind direction and high inversion potential. **NOTE:** Local terrain can influence wind patterns. Every applicator must be familiar with local wind patterns and how they affect spray drift.

TEMPERATURE AND HUMIDITY

When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

TEMPERATURE INVERSIONS

Applications must not occur during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

SENSITIVE AREAS

The pesticide must only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

Do not allow direct application to any body of water.

Aircraft Maintenance –

Thoroughly wash aircraft, especially landing gear, after each day of spraying to remove residues of this product accumulated during spraying or from spills. PROLONGED EXPOSURE OF THIS PRODUCT TO UNCOATED STEEL SURFACES MAY RESULT IN CORROSION AND POSSIBLE FAILURE OF THE PART. LANDING GEAR ARE MOST SUSCEPTIBLE. The maintenance of an organic coating (paint), which meets aerospace specification MIL-C-38413, may prevent corrosion.

FOR AERIAL APPLICATION IN CALIFORNIA ONLY

Aerial applications of this product are allowed in the following situations:

1. In fallow and reduced tillage systems prior to the emergence or transplanting of labeled crops.
2. In alfalfa and pasture renovation applications.
3. Over-the-top applications in Roundup Ready® corn and cotton.
4. Preharvest in alfalfa, corn, cotton, wheat, Roundup Ready® corn and Roundup Ready® cotton.

Do not plant subsequent crops other than those listed in the label booklet for 30 days following application.

When tank mixing this product with 2,4-D for aerial applications, only 2,4-D amine formulations may be used. This tank mixture may be used for fallow and reduced tillage systems and alfalfa and pasture renovation applications only.

DO NOT EXCEED A MAXIMUM RATE OF 2 QUARTS PER ACRE OF THIS PRODUCT WHEN MAKING APPLICATIONS BY AIR IN FALLOW AND REDUCED TILLAGE SYSTEMS AND ALFALFA AND PASTURE RENOVATION APPLICATIONS.

DO NOT EXCEED A MAXIMUM RATE OF 1 QUART PER ACRE OF THIS PRODUCT WHEN MAKING APPLICATIONS BY AIR IN ALFALFA, CORN, COTTON, WHEAT, ROUNDUP READY® CORN AND ROUNDUP READY® COTTON PRIOR TO HARVEST. THIS RESTRICTION ALSO APPLIES TO OVER-THE-TOP APPLICATIONS IN ROUNDUP READY® CORN AND COTTON.

Aerial Equipment

Use the labeled rates of this product in 3 to 15 gallons of water per acre.

Use the following guidelines when aerial applications are made near crops or desirable perennial vegetation after bud break and before total leaf drop, and/or near other desirable vegetation or annual crops.

1. Do not apply within 100 feet of all desirable vegetation or crop(s).
2. If wind up to 5 miles per hour is blowing toward desirable vegetation or crop(s), do not apply within 500 feet of the desirable vegetation or crop(s).
3. Winds blowing from 5 to 10 miles per hour toward desirable vegetation or crop(s) may require buffer zones in excess of 500 feet.
4. Do not apply when winds are in excess of 10 miles per hour or when inversion conditions exist.

FOR AERIAL APPLICATION IN FRESNO COUNTY, CALIFORNIA (Only From February 15 through March 31 Only)

Applicable Area:

The area contained inside the following boundaries within Fresno County, California.

North:	Fresno County line
South:	Fresno County line
East:	State Highway 99
West:	Fresno County line

Use Information:

Always read and follow the label directions and precautionary statements for all products used in the aerial application.

Observe the following directions to minimize off-site movement during aerial application of this product. Minimization of off-site movement is the responsibility of the grower, Pest Control Advisor and aerial applicator.

Written Directions:

A written direction MUST be submitted by or on behalf of the applicator to the Fresno County Agricultural Commissioner 24 hours prior to the application. This written direction MUST state the proximity of surrounding crops, and that conditions of each manufacturer's product label and this label have been satisfied.

Aerial Applicator Training and Equipment:

Aerial application of this product is limited to pilots who have successfully completed a Fresno County Agricultural Commissioner and California Department of Pesticide Regulation approved training program for aerial application of herbicides. All aircraft must be inspected, critiqued in flight and certified at a Fresno County Agricultural Commissioner approved fly-in. Test and calibrate spray equipment at intervals sufficient to ensure that proper rates of herbicides and adjuvants are being applied during commercial use. Applicator must document such calibrations and testing. Demonstration of performance at Fresno County Agricultural Commissioner approved fly-ins constitutes such documentation, or other written records showing calculations and measurements of flight and spray parameters acceptable to the Fresno County Agricultural Commissioner.

Applications at Night:

Do not apply this product by air earlier than 30 minutes prior to sunrise and/or later than 30 minutes after sunset without prior permission from the Fresno County Agricultural Commissioner.

NOTE: For aerial application from April 1 through February 14, refer to the "For Aerial Application in California Only" section of this label.

FOR AERIAL APPLICATION IN ARKANSAS ONLY

AVOID DRIFT. DO NOT APPLY INTO STILL AIR WHERE THERE IS A TEMPERATURE INVERSION LAYER LOW ENOUGH FOR FINE SPRAY PARTICLES TO BECOME SUSPENDED AND MOVE OUTSIDE THE TARGET AREA WHEN THE INVERSION LAYER MOVES. DO NOT APPLY WHEN WINDS ARE GUSTY OR UNDER ANY OTHER CONDITION THAT FAVORS DRIFT. DRIFT IS LIKELY TO CAUSE DAMAGE TO ANY VEGETATION CONTACTED. TO PREVENT INJURY TO ADJACENT DESIRABLE VEGETATION, APPROPRIATE BUFFER ZONES MUST BE MAINTAINED.

(continued)

Use the specified rate of this product in 3 to 15 gallons of water per acre. Use sufficient carrier volume and appropriate equipment set-up to form droplets large enough to avoid drift potential. Coarse droplets in the 300 to 500 (VMD) micron range are recommended.

Applications should typically be made with the nozzle release point at 8 to 15 feet above the top of the target plants unless a greater height is required for aircraft safety. The distance of the outermost nozzles on the boom must not exceed 75% of the length of the wingspan or rotor. In many cases, reducing this distance to 65% of the length of the wingspan or rotor will improve drift control without affecting the swath width.

Nozzles must always discharge backward parallel with the airstream and never discharge downwards more than 45 degrees on fixed wing aircraft or forward of the prevailing airflow on rotary winged aircraft. Avoid the use of nozzles with wide-angle discharge.

Do not apply this product when wind speeds are in excess of 10 miles per hour.

Do not apply when there is a low-level inversion where fine spray particles could be suspended in still air and move outside the target area when the inversion layer moves. These conditions may occur when wind speeds are less than 2 mph.

Use the following guidelines when applications are made near crops or other desirable vegetation:
1. Do not apply within 100 feet of any desirable vegetation or crops.
2. If wind up to 5 miles per hour is blowing toward desirable vegetation or crops, do not apply within 500 feet upwind of the desirable vegetation or crops.
3. Winds blowing from 5 to 10 miles per hour toward desirable vegetation or crops will likely require buffer zones in excess of 500 feet.

8.3 – GROUND BROADCAST EQUIPMENT

Use the specified rates of this product in 3 to 40 gallons of water per acre as a broadcast spray unless otherwise specified. As density of weeds increases, spray volume should be increased within the labeled range to ensure complete coverage. Carefully select proper nozzles to avoid spraying a fine mist. For best results with ground application equipment, use flat fan nozzles. Check for even distribution of spray droplets.

8.4 – HAND-HELD AND HIGH-VOLUME EQUIPMENT

Apply to foliage of vegetation to be controlled. For applications made on a spray-to-wet basis, spray coverage must be uniform and complete. Do not spray to the point of runoff. Use coarse sprays only. For labeled rates and timing, refer to the “ANNUAL WEEDS – HAND-HELD OR HIGH-VOLUME EQUIPMENT” section of this label.

8.5 – SELECTIVE EQUIPMENT

This product may be applied through shielded applicators, hooded sprayers, wiper applicators or sponge bars after dilution and thorough mixing with water to listed weeds growing in any non-crop site specified on this label.

In cropping systems, hooded sprayers, shielded sprayers, and wipers may be used in row middles (in between rows of crop plants) where any dripping or leaking will not contact crop foliage. Such equipment must be capable of preventing all crop contact with herbicide solutions and operated without leakage of spray mists or dripping onto crop. Wipers over-the-top of crops may be used only when specifically labeled in this product’s labeling.

AVOID CONTACT OF HERBICIDE WITH DESIRABLE VEGETATION.

Contact of the herbicide solution with desirable vegetation may result in damage or destruction. Applicators used above desirable vegetation must be adjusted so that the lowest spray stream or wiper contact point is at least 2 inches above the desirable vegetation. Droplets, mist, foam or splatter of the herbicide solution settling on desirable vegetation may result in discoloration, stunting or destruction.

Applications made above the crops should be made when the weeds are a minimum of 6 inches above the desirable vegetation. Better results may be obtained when more of the weed is exposed to the herbicide solution. Weeds not contacted by the herbicide solution will not be affected. This may occur in dense clumps, severe infestations or when the height of the weeds varies so that not all weeds are contacted. In these instances, repeat treatment may be necessary.

Shielded and Hooded Applicators

When applied under the conditions described in the following paragraphs for shielded and hooded applications, this product at labeled rates will control those weeds listed in the “ANNUAL WEEDS RATE TABLE” and “PERENNIAL WEEDS RATE TABLE” sections of this label. A hooded sprayer is a type of shielded applicator where the spray pattern is fully enclosed including top, sides, front and back, thereby shielding the crop from the spray solution. Keep shields on these sprayers adjusted to protect desirable vegetation. When applying to crops grown on raised beds, ensure that the hood is designed to completely enclose the spray solution. If necessary, extend the front and rear flaps of the hoods to reach the ground in deep furrows. EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF HERBICIDE WITH DESIRABLE VEGETATION.

This equipment must be set up and operated in a manner that avoids bouncing or raising the hoods off the ground in any way. If the hoods are raised, spray particles may escape and come into contact with the crop, causing damage or destruction of the crop. Avoid operation on rough or sloping ground where the spray hoods might be raised off the ground.

Use hoods designed to minimize excessive dripping or run-off down the insides of the hoods. Use a single, low pressure/low drift flat-fan nozzle with an 80 to 95 degree spray angle positioned at the top center of the hood. Minimum spray volume must be 20 to 30 gallons per acre.

These procedures will reduce the potential for crop injury:

- The spray hoods must be operated on the ground or skimmed across the ground.
- Leave at least an 8 inch untreated strip over the drill row. For example, if the crop row width is 38 inches, the maximum width of the spray hood should be 30 inches.
- Maximum tractor speed: 5 miles per hour to avoid bouncing of the spray hoods.
- Maximum wind speed: 10 miles per hour.
- Use low-drift nozzles that provide uniform coverage within the treated area.

Crop injury may occur when the foliage of treated weeds comes into direct contact with leaves of the crop. Do not apply this product when the leaves of the crop are growing in direct contact with weeds to be treated. Droplets, mist, foam or splatter of the herbicide solution may contact the crop and cause discoloration, stunting or destruction.

EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF HERBICIDE WITH DESIRABLE VEGETATION.

WIPER APPLICATORS

When applied under the conditions described in the following paragraphs, this product CONTROLS many weeds, including volunteer corn, Texas panicum, common rye, shattercane, sicklepod, Spanish needles and bristly starbur: and SUPPRESSES many weeds including Florida beggarweed, Bermuda grass, hemp dogbane, dogfennel, guineagrass, johnsongrass, milkweed, silverleaf nightshade, redroot pigweed, giant ragweed, smutgrass, sunflower, Canada thistle, musk thistle, vaseygrass and velvetleaf.

Wiper applicators are devices that physically wipe appropriate amounts of this product directly onto the weed.

Equipment must be designed, maintained and operated to prevent the herbicide solution from contacting desirable vegetation. Operate this equipment at ground speeds no greater than 5 mph. Performance may be improved by reducing speed in areas of heavy weed infestations to ensure adequate wiper saturation. Better results may be obtained if 2 applications are made in opposite directions.

Avoid leakage or dripping onto desirable vegetation. Adjust height of applicator to ensure adequate contact with weeds. Keep wiping surfaces clean. Be aware that, on sloping ground, the herbicide solution may migrate, causing dripping on the lower end and drying of the wicks on the upper end of a wiper applicator.

Do not use wiper equipment when weeds are wet.

Mix only the amount of solution to be used during a 1-day period, as reduced activity may result from use of leftover solutions. Clean wiper parts immediately after using this product by thoroughly flushing with water.

Do not add surfactant to the herbicide solution.

For Rope or Sponge Wick Applicators – Mix 1 gallon of this product in 2 gallons of water to prepare a 33 percent solution. Apply this solution to weeds listed above in this section.

For Panel Applicators – Solutions ranging from 33 to 100 percent of this product in water may be used in panel wiper applicators.

8.6 – INJECTION SYSTEMS

This product may be used in aerial or ground injection spray systems. It may be used as a liquid concentrate or diluted prior to injecting into the spray stream. Do not mix this product with the concentrate of other products when using injection systems.

8.7 – CONTROLLED DROPLET APPLICATION (CDA) EQUIPMENT

The rate of this product applied per acre by vehicle-mounted CDA equipment must not be less than the amount labeled in this label when applied by conventional broadcast equipment. For vehicle-mounted CDA equipment, apply 3 to 20 gallons of water per acre.

For the control of annual weeds with hand-held CDA units, apply a 20 percent solution of this product at a flow rate of 2 fluid ounces per minute and a walking speed of 1.5 mph (1 quart per acre). For the control of perennial weeds, apply a 20 to 40 percent solution of this product at a flow rate of 2 fluid ounces per minute and a walking speed of 0.75 mph (2 to 4 quarts per acre).

Controlled droplet application equipment produces a spray pattern which is not easily visible. Extreme care must be exercised to avoid spray or drift contacting the foliage or any other green tissue of desirable vegetation, as damage or destruction may result.

9.0 – ANNUAL AND PERENNIAL CROPS (Alphabetical)

This section is organized alphabetically by crop category. There may be several labeled crops listed in a crop category.

SEE THE INDIVIDUAL CROP CATEGORIES FOR SPECIFIC INSTRUCTIONS, PREHARVEST INTERVALS, AND ADDITIONAL PRECAUTIONS AND RESTRICTIONS.

See the “ROUNDUP READY CROPS” section of this label or separately published Albaugh supplemental labeling for instructions for treating Roundup Ready crops.

TYPES OF APPLICATIONS

Chemical fallow, Pre-plant fallow beds, Pre-plant, Pre-emergence, At-Planting, Hooded Sprayers in Row-Middles, Shielded Sprayers in Row-Middles, Wiper Applications in Row-Middles, and Post-Harvest Treatments.

Additional application types may be specified or allowed in individual Crop Categories.

USE DIRECTIONS

Apply this product during fallow intervals preceeding planting, prior to planting or transplanting, at planting, or pre-emergent to annual and perennial crops listed in this label, except where specifically limited. For any crop NOT listed in this label, applications must be made at least 30 days prior to planting. UNLESS OTHERWISE SPECIFIED, WEED CONTROL APPLICATIONS MAY BE MADE ACCORDING TO THE RATES LISTED IN “ANNUAL WEEDS”, “PERENNIAL WEEDS”, AND “WOODY BRUSH AND TREES RATE TABLES” IN THIS LABEL. Repeat applications may be made up to a maximum of 8 quarts per acre per year.

Post-directed hooded sprayers and wiper equipment capable of preventing all crop contact with herbicide solutions may be used in mulched or un-mulched row middles after crop establishment. Where specifically noted below, wipers may also be used above certain crops to control tall weeds. Refer to the “SELECTIVE EQUIPMENT” section of this label for essential precautions when using hooded sprayers or wipers to avoid crop injury caused by leakage of spray mists or dripping onto crops. Crop injury is possible with these applications and shall be the sole responsibility of the applicator.

The maximum use rates stated throughout this product’s labeling apply to this product combined with the use of all other herbicides containing glyphosate or sulfosate as the active ingredient, whether applied as mixtures or separately. Calculate the application rates and ensure that the total use of this and other glyphosate- or sulfosate-containing products does not exceed stated maximum use rate.

PRECAUTIONS

- Avoid contact of herbicide with foliage, green shoots or stems, bark, exposed roots (including those emerging from plastic mulch), or fruit of crops because severe injury or destruction may result.
- Apply before seed germination in coarse sandy soils to further minimize the risk of injury.

RESTRICTIONS

- Unless otherwise specified in this product's labeling, treatments with selective equipment including wipers and hooded sprayers must be made at least 14 days prior to harvest.
- In crops where spot treatments are allowed, do not treat more than 10 percent of the total field to be harvested. The crop receiving spray in treated area will be killed. Do not allow drift or spray outside the target area for the same reason.
- When making pre-emergence and at-planting applications, applications must be made before crop emergence to avoid severe crop injury. Broadcast applications made at emergence will result in injury or death to emerged seedlings.
- Post-harvest or fallow applications must be made at least 30 days prior to planting any non-labeled crop.
- For broadcast post-emergent treatments, do not harvest or feed treated vegetation for 8 weeks following application, unless otherwise specified.

9.1 – CEREAL & GRAIN CROPS		
LABELED CROPS: Barley, Buckwheat, Millet (Pearl and Proso), Oats, Rice, Rye, Quinoa, Teff, Teosinte, Triticale, Wheat (All), Wild rice		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
See Section 9.0 Pre-Plant, Pre-Emergence, At-Planting	See Use Directions in Section 9.0. This product may be applied before, during or after planting of cereal crops. Applications must be made prior to emergence of the crop.	See Section 9.0 Do not treat rice fields or levees when the field contains floodwater.
Red Rice Control (Prior to Planting Rice)	Apply 1.5 quarts of this product in 5 to 10 gallons of water per acre. Flush fields prior to application to obtain uniform germination and stand of red rice. Make application when the majority of the red rice plants are in the 2-leaf stage and no more than 4 inches tall. Red rice plants with less than 2 true leaves may only be partially controlled. PRECAUTION: Avoid spraying during low humidity conditions, as reduced control may result.	DO NOT TREAT RICE FIELDS OR LEVEES WHEN THE FIELDS CONTAIN FLOOD WATER. DO NOT RE-FLOOD TREATED FIELDS FOR 8 DAYS FOLLOWING APPLICATION.
Spot Treatment (Except Rice)	This product may be applied as a spot treatment in cereal crops. Apply this product before heading in small grains.	Do not treat more than 10 percent of the total field area to be harvested. The crop receiving spray in the treated area will be killed. Do not allow drift or spray outside target area for the same reason.
Over-the-Top Wiper Applications (Feed Barley and Wheat Only)	Wiper applications may be used in wheat. To control common rye or cereal rye, apply after the weeds have headed and achieved maximum growth, when the rye is at least 6 inches above the wheat crop.	Allow at least 35 days between application and harvest. Do not use roller applicators.
Pre-Harvest (Feed Barley and Wheat Only)	This product provides weed control when applied prior to harvest of wheat. Apply after the hard-dough stage of grain (30% or less grain moisture) and at least 7 days prior to harvest. Wheat stubble may be grazed immediately after harvest. This product may be applied using either aerial or ground spray equipment. For ground applications, apply this product in 10 to 20 gallons of water per acre. For aerial applications, apply this product in 3 to 10 gallons of water per acre.	Do not apply more than 1 quart of this product per acre. Do not apply to wheat or barley grown for seed, as a reduction in germination or vigor may occur. Allow 7 days between application and harvest or grazing.
Post-Harvest	This product may be applied after harvest of cereal crops. Higher rates may be required for control of large weeds which were growing in the crop at the time of harvest. Tank mixtures with 2,4-D or dicamba may be used.	For any crop not listed on this label, applications must be made at least 30 days prior to planting the next crop. Allow a minimum of 7 days between treatment and harvest or feeding of treated vegetation.

9.2 – CORN (Non-Roundup Ready)		
LABELED CROPS: Field corn, Seed corn, Silage corn, Sweet corn and Popcorn		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
See Section 9.0 Pre-Plant, Pre-Emergence, At-Planting	See Use Directions in Section 9.0 This product may be applied before, during or after planting corn. Applications must be made prior to emergence of the crop. TANK MIXTURES: Apply these tank mixtures in 10 to 20 gallons of water or 10 to 60 gallons of nitrogen solution per acre. 2,4-D, Aim, Atrazine, Axiom, Balance, Bicep Magnum, Bicep II Magnum, Bullet, Degree, Degree Xtra, Distinct, Dual Magnum, Dual II Magnum, Epic, Frontier/Outlook, Fultime, Guardsman/Leadoff, Harness, Harness Xtra, Harness Xtra 5.6L, Lariat, Intro, Linex/Lorox, Marksman, Micro-Tech, Prowl, Python, simazine, Topnotch For difficult-to-control annual weeds such as fall panicum, barnyardgrass, crabgrass, shattercane and broadleaf signal grass up to 2 inches tall and Pennsylvania smartweed up to 6 inches tall, apply this product at 2 pints per acre in these tank mixtures. For other labeled weeds, apply 1.5 to 2 pints of this product per acre when weeds are less than 6 inches tall, 2 to 3 pints when weeds are over 6 inches tall. When using nitrogen solutions as the carrier, use rate may need to be increased for acceptable weed control.	See Section 9.0 Applications of 2,4-D or dicamba must be made at least 7 days prior to planting corn. For Southern states, do not apply in nitrogen solutions to tough-to-control grasses such as barnyardgrass, fall panicum, broadleaf signalgrass, annual ryegrass and any perennial weeds. The area covered by these directions includes from Route 50 South in Illinois and Indiana and the following states: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, New Jersey, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia.
Spot Treatment	For spot treatments, apply this product prior to silking of corn.	Do not treat more than 10 percent of the total field area to be harvested. The crop receiving spray in the treated area will be killed. Do not allow drift or spray outside target area for the same reason.
Hooded Sprayers	This product may be used through hooded sprayers for weed control between the rows of corn. Only hooded sprayers that completely enclose the spray pattern may be used. See additional instructions for the use of hooded sprayers in the "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label. PRECAUTIONS: Contact of this product in any manner to any vegetation to which treatment is not intended may cause damage. Such damage shall be the sole responsibility of the applicator.	Corn must be at least 12 inches tall, measured without extending leaves. Do not apply more than 1 quart of this product per acre for each application and no more than 3 quarts per acre per year for hooded sprayer applications.
Pre-Harvest	Make applications at 35 percent grain moisture or less. Ensure that maximum kernel fill is complete and the corn is physiologically mature (black layer formed). For ground applications, apply up to 3 quarts of this product per acre. For aerial applications, apply up to 2 quarts of this product per acre.	Allow a minimum of 7 days between application and harvest. Do not make applications to corn grown for seed because a reduction in germination or vigor may occur.
Post-Harvest	This product may be applied after harvest of corn. Higher rates may be required for control of large weeds which were growing in the crop at the time of harvest. Tank mixtures with 2,4-D or dicamba may be used.	Allow a minimum of 7 days between treatment and harvest or feeding of treated vegetation.

9.3 – COTTON		
LABELED CROPS: Cotton (non-Roundup Ready)		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
See Section 9.0 Pre-Plant, Pre-Emergence, At-Planting	See Use Directions in Section 9.0 This product may be applied before, during or after planting cotton.	See Section 9.0 Applications must be made prior to emergence of the crop.
Hooded Sprayer, Selective Equipment	This product may be applied through hooded sprayers, shielded applicators or wiper applicators in cotton.	See the "SELECTIVE EQUIPMENT" part of the "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label for information on proper use and calibration of this equipment, application and harvest. Allow at least 7 days between application and harvest.
Spot Treatment	For spot treatments, apply this product prior to boll opening of cotton.	Do not treat more than 10 percent of the total field area to be harvested. The crop receiving spray in treated area will be killed. Do not allow drift or spray outside target area for the same reason.
Pre-Harvest	This product provides weed control and cotton regrowth inhibition when applied prior to harvest of cotton. For weed control, apply at rates given in the annual, perennial and woody brush tables. Apply 1 pint to 2 quarts of this product per acre for cotton regrowth inhibition. Up to 2 quarts of this product may be applied using either aerial or ground spray equipment. Apply after sufficient bolls have developed to produce the desired yield of cotton. Applications made prior to this time could affect maximum yield potential. TANK MIXTURES: This product may be tank mixed with DEF® 6, Folex®, Ginstar or Prep™ to provide additional enhancement of cotton leaf drop.	Allow at least 7 days between application and harvest. Do not apply to cotton grown for seed, as a reduction in germination or vigor may occur. THE USE OF ADDITIVES OTHER THAN THOSE LISTED ON THIS LABEL FOR PREHARVEST APPLICATION TO COTTON IS PROHIBITED.

9.4 – FALLOW SYSTEMS		
LABELED CROPS: This product may be applied during the fallow period prior to planting or emergence of any crop on this label.		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
Chemical Fallow	See Use Directions in Section 9.0 This product may be applied during the fallow period prior to planting or emergence of any crop listed on this label. This product may be used as a substitute for tillage to control annual weeds in fallow fields. Also, broadcast or spot treatments will control or suppress many perennial weeds in fallow fields. Ground or aerial application equipment may be used. Tank mixtures with 2,4-D and dicamba may be used. Applications up to 2 quarts per acre may be made by aerial application in fallow sites where there is sufficient buffer to prevent injury due to drift onto adjacent crops.	See Section 9.0 For any crop not listed on this label, applications must be made at least 30 days prior to planting. DO NOT APPLY DICAMBA TANK MIXTURES BY AIR IN CALIFORNIA. Refer to the specific product labels for crop rotation restrictions and cautionary statements of all products used in tank mixtures.
Pre-Plant Fallow Beds	This product may be applied to fallow beds prior to planting or emergence of any crop listed on this label. This product will control weeds listed in the annual, perennial and woody brush tables. TANK MIXTURES: In addition, 12 fluid ounces of this product plus 2 to 3 oz. of Goal® 2XL (or generic equivalent) per acre will control the following weeds with the maximum height or length indicated: 3" – common cheeseweed, chickweed, groundsel; 6" – London rocket, shepherdspurse. 16 fluid ounces of this product plus 2 to 3 oz. of Goal® 2XL (or generic equivalent) per acre will control the following weeds with the maximum height or length indicated: 6"– common cheeseweed, groundsel, marestail *(Conyza canadensis),* 12" – chickweed, London rocket, shepherdspurse. PRECAUTIONS: Some crop injury may occur if dicamba is applied within 45 days of planting.	
Aid-to-Tillage	This product may be used in conjunction with tillage practices in fallow systems or pre-plant to labeled crops to control downy brome, cheat, volunteer wheat, tansy mustard and foxtail. Apply 12 fluid ounces of this product in 3 to 10 gallons of water per acre. Make applications before weeds are 6 inches in height. Application must be followed by conventional tillage practices no later than 15 days after treatment and before regrowth occurs. PRECAUTION: Tank mixtures with residual herbicides may result in reduced performance.	Allow at least 1 day after application before tillage.

9.5 – GRAIN SORGHUM (Milo)		
LABELED CROPS: Grain Sorghum (Milo)		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
See Section 9.0 Pre-Plant, Pre-Emergence, At-Planting	See Use Directions in Section 9.0 This product may be applied alone or in tank mixture before, during or after planting grain sorghum. Applications must be made prior to emergence of the crop. TANK MIXTURES: Apply these tank mixtures in 10 to 20 gallons of water or 10 to 60 gallons of nitrogen solution per acre. atrazine — Lariat Bicep II Magnum — Lasso Bullet — Micro-Tech Dual II Magnum — Milo-Pro For difficult-to-control annual weeds such as fall panicum, barnyardgrass, crabgrass, shattercane and broadleaf signalgrass up to 2 inches tall, and Pennsylvania smartweed up to 6 inches tall, apply this product at 2 pints per acre in these tank mixtures. For other labeled annual weeds, apply 1.5 to 2 pints of this product per acre when weeds are less than 6 inches tall, and 2 to 3 pints when weeds are over 6 inches tall. When using nitrogen solutions as the carrier, the use rate may need to be increased for acceptable weed control.	See Section 9.0 For spot treatment, do not treat more than 10 percent of the total field area to be harvested. The crop receiving spray in treated area will be killed. Do not allow drift or spray outside target area for the same reason. For wiper applicators, allow at least 40 days between application and harvest. Do not use roller applicators. Do not feed or graze treated milo fodder. Do not ensile treated vegetation.
Spot Treatment, Over-the-Top Wiper Applications	This product may be applied as a spot treatment in grain sorghum. Make spot treatments before heading of milo. This product may be applied with wiper applicators to control or suppress the weeds listed under “WIPER APPLICATORS” in the “SELECTIVE EQUIPMENT” section of this label.	
Hooded Sprayers	This product may be used through hooded sprayers for weed control between the rows of milo. Only hooded sprayers that completely enclose the spray pattern may be used. See additional instruction for the use of hooded sprayers in the “APPLICATION EQUIPMENT AND TECHNIQUES” section of this label. Crop injury may occur when the foliage of treated weeds comes into direct contact with leaves of the crop. Do not apply this product when the leaves of the crop are growing in direct contact with weeds to be treated. Droplets, mist, foam or splatter of the herbicide solution may contact the crop and cause discoloration, stunting or destruction. PRECAUTIONS: Contact of this product in any manner to any vegetation to which treatment is not intended may cause damage. Such damage shall be the sole responsibility of the applicator.	Milo must be at least 12 inches tall, measured without extending leaves. Treat before milo sends tillers between the drill rows. If such tillers are contacted with the spray solution, the main plant may be killed. Do not graze or feed milo forage or fodder following applications of this product through hooded sprayers. Do not apply more than 1 quart of this product per acre per application and no more than 3 quarts per acre for hooded sprayer applications.
Pre-Harvest	Make applications at 30% grain moisture or less. As with other herbicides that cause sudden plant death, avoid pre-harvest applications of this product to milo infected with charcoal rot as lodging can occur.	Do not apply more than 2 quarts of this product per acre. Allow a minimum of 7 days between application and harvest of sorghum. Do not make applications to sorghum grown for seed as a reduction in germination or vigor may occur. The use of this product for pre-harvest grain sorghum (milo) is not registered in California.
Post-Harvest	This product may be applied after harvest of grain sorghum. Higher rates may be required for control of large weeds which were growing in the crop at the time of harvest. Tank mixtures with 2,4-D or dicamba may be used. This product may be applied to grain sorghum (milo) stubble following harvest to suppress or control regrowth. Apply 1 quart of this product per acre for control, or 1.5 pints of this product per acre for suppression.	Allow a minimum of 7 days between treatment and harvest or feeding of treated vegetation.

9.6 – HERBS AND SPICES

LABELED CROPS: Allspice, Angelica, Star anise, Annatto (seed), Balm, Basil, Borage, Burnet, Chamomile, Caper buds, Caraway, Black caraway, Cardamom, Cassia bark, Cassia buds, Catnip, Celery seed, Chervil (dried), Chive, Chinese chive, Cilantro (seed), Cinnamon, Clary, Clove buds, Coriander leaf (cilantro or Chinese parsley), Coriander seed (cilantro), Costmary, Culantro (leaf), Cumin, Curry (leaf), Dill (dillweed), Dill (seed), Epazote, Fennel seed (common and Florence), Fenugreek, White ginger flower, Grains of paradise, Horehound, Hyssop, Juniper berry, Lavender, Lemongrass, Lovage (leaf and seed), Mace, Marigold, Marjoram (including oregano), Mexican oregano, Miaga flower, Mustard (seed), Nasturtium, Nutmeg, Parsley (dried), Pennyroyal, Pepper (black and white), Pepper leaves, Peppermint, Perilla, Poppy (seed), Rosemary, Rue, Saffron, Sage, Savory (summer and winter), Spearmint, Stevia leaves, Sweet bay, Tansy, Tarragon, Thyme, Vanilla, Wintergreen, Woodruff, Wormwood

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 9.0	See Use Directions in Section 9.0 PRECAUTION: This product could cause crop injury. When applying this product prior to transplanting or direct-seeding crops into plastic mulch, care must be taken to remove product residues from the plastic prior to planting. Residual product can be removed by a single 0.5-inch application of water, either by natural rainfall or via a sprinkler system. Care must be taken to ensure that the washwater flushes off the plastic mulch and does not enter transplant holes. Applications made at emergence will result in injury or death to emerged seedlings. For some crops below, applications must be made 3 days before transplanting or planting.	See Section 9.0
Over-the-Top Wiper Application, Spot Treatment (Peppermint and Spearmint only)	This product may be applied as a spot treatment or over the top of peppermint or spearmint with wiper applications in spearmint and peppermint. Apply spot treatments on a spray-to-wet basis with hand-held equipment, such as backpack sprayers, pump-up pressure sprayers, hand-guns, hand-wands or any other hand-held or motorized spray equipment used to direct the spray solution to a limited area. In wiper applications, the applicator must be adjusted so that the wiper contact point is at least 2 inches above the crop. Weeds should be a minimum of 6 inches taller than the crop. Further applications may be made in the same area at 30-day intervals. PRECAUTION: Contact of the herbicide solution with the crop may result in discoloration, stunting, or destruction.	Allow at least 7 days between application and harvest. In spot treatment applications, no more than 10 percent of the total field area to be harvested can be treated at one time. Crop sprayed in treated area will be killed. Do not allow spray to drift outside the target area to avoid unwanted crop destruction.

9.7 – OIL SEED CROPS		
LABELED CROPS: Borage, Buffalo gourd (seed), Canola (non-Roundup Ready), Crambe, Flax, Jojoba, Lesquerella, Meadowfoam, Mustard (seed), Rape, Safflower, Sesame, Sunflower		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
See Section 9.0	See Use Directions in Section 9.0 This product may be applied before, during or after planting oil seed crops listed in this section. Broadcast applications must be made prior to crop emergence. Wiper applications or hooded sprayers may be used between the rows once the crop is established. TANK MIXTURES: For sunflowers, a tank mixture with Prowl may be applied before, during or after planting in conventional tillage systems, into a cover crop, established sod or in previous crop residue.	See Section 9.0 For use with canola, do not apply more than 2 quarts of this product per acre. For use with sunflowers, do not apply more than 1 quart of this product per acre as a single pre-plant or pre-emergence application per year. Do not feed or graze sunflower forage following application of this product.
Pre-Harvest (Sunflower and Safflower)	This product provides weed control when applied as a harvest aid to a physiologically mature crop prior to harvest of sunflower or safflower. For safflower, apply when seed has lost its opaque character, approximately 20 to 30 days after the end of flowering of the secondary branches. For sunflower, apply when the backsides of sunflower heads are yellow and bracts are turning brown and seed moisture content is less than 35%.	Allow a minimum of 7 days between treatment and harvest or livestock feeding. Apply no more than 3 quarts of this product at a pre-harvest timing to safflower. Apply no more than 1 quart of this product at a pre-harvest timing to sunflower.
Post-Harvest (Sunflower and Safflower)	This product may be applied after harvest of safflower or sunflower. Higher rates may be required for control of large weeds, which are growing in the crops at the time of harvest. Tank mixtures with 2,4-D or dicamba may be used.	Allow a minimum of 7 days between treatment and harvest or feeding of treated vegetation. Applications must be made at least 30 days prior to planting any crop not listed on the GLYSTAR® ORIGINAL label booklet.

9.8 – SOYBEANS (Non-Roundup Ready)

LABELED CROPS: Soybeans (non-Roundup Ready)

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 9.0 Pre-Plant, Pre-Emergence, At-Planting	See Use Directions in Section 9.0 This product may be applied before, during or after planting soybeans. Applications must be made prior to emergence of the crop. Refer to table below for tank mixtures that may be applied before, during or after planting in conventional tillage systems, into a cover crop, established sod or in previous crop residue. This product may be tank-mixed with 2,4-D or 2,4-DB. See the 2,4-D label for intervals between application and planting. For difficult-to-control weeds such as fall panicum, barnyardgrass, crabgrass, shattercane and broadleaf signalgrass up to 2 inches tall, and Pennsylvania smartweed up to 6 inches tall, apply this product at 2 pints per acre in these tank mixtures. For other labeled annual weeds, apply 1.5 to 2.0 pints of this product per acre when weeds are less than 6 inches tall, and 2 to 3 pints when weeds are over 6 inches tall. TANK MIXES: Aim, Assure II, Authority, Boundry, Canopy, Canopy XL, Command, Domain, Dual, Dual II Magnum, Firstrate, Flexstar, Frontline/Outlook, Fusion, Gauntlet, Intrro, Linex, Lorox/Linuron, Lorox Plus, Magnum, Micro Tech, Prowl, Pursuit, Pursuit Plus, Reflex, Scepter, Sencor/Lexone, Squadron, Steel, Valor	See Section 9.0 The tank mix recommendations in this section are not registered in California.
Spot Treatment	For spot treatments, apply this product prior to initial pod set in soybeans.	Do not treat more than 10 percent of the total field area to be harvested. The crop receiving spray in treated area will be killed. Do not allow drift or spray outside target area for the same reason.
Pre-Harvest	This product provides weed control when applied prior to harvest of soybeans. Apply at rates given in the annual, perennial and woody brush tables. This product may be applied using either aerial or ground spray equipment. Apply after pods have set and lost all green color. Care should be taken to avoid excessive seed shatter loss due to ground application equipment.	Do not apply more than 5 quarts per acre of this product for pre-harvest applications. Do not apply more than 2 quarts per acre of this product by air. Allow a minimum of 7 days between application and harvest of soybeans. Do not graze or harvest treated hay or fodder for livestock feed within 25 days of last pre-harvest application. (If the application rate is 1 quart per acre or lower, the grazing restriction is reduced to 14 days after the last pre-harvest application.) Do not apply to soybeans grown for seed as a reduction in germination or vigor may occur.
Selective Equipment	This product may be applied through shielded applicators, hooded sprayers, wiper applicators or sponge bars in soybeans. See the “SELECTIVE EQUIPMENT” part of the “APPLICATION EQUIPMENT AND TECHNIQUES” section of this label for information on proper use and calibration of this equipment.	Allow at least 7 days between application and harvest.

9.9 – SUGARCANE		
LABELED CROPS: Sugarcane		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
See Section 9.0 Pre-Plant, Pre-Emergence, At-Planting	See Use Directions in Section 9.0 This product may be applied in or around sugarcane fields or in fields prior to the emergence of plant cane.	See Section 9.0 Do not apply to vegetation in or around ditches, canals or ponds containing water to be used for irrigation.
Spot Treatment	This product may be applied as a spot treatment in sugarcane. For control of volunteer or diseased sugarcane, make a 1 percent solution of this product in water and spray to wet the foliage of vegetation to be controlled. Volunteer or diseased sugarcane should have at least 7 new leaves. PRECAUTION: Avoid spray contact with healthy cane plants since severe damage or destruction may result.	Do not feed or graze treated sugarcane foliage following application.
Fallow Treatments	This product may be used as a replacement for tillage in fields that are lying fallow between sugarcane crops. This product may also be used to remove the last stubble of ratoon cane. For removal of last stubble of ratoon cane, apply 4 to 5 quarts of this product in 10 to 40 gallons of water per acre to new growth having at least 7 new leaves. Ground or aerial application equipment may be used. Applications up to 3 quarts per acre may be made by aerial application in fallow sites where there is sufficient buffer to prevent injury due to drift onto adjacent crops. Tank mixtures with 2,4-D and dicamba may be used.	Allow 7 or more days after application before tillage.
Hooded Sprayers	This product may be used through hooded sprayers for weed control between the rows of sugarcane. See Section 8.0 for "APPLICATION EQUIPMENT AND TECHNIQUES" for additional "USE DIRECTIONS". Minimize the potential for spray particles to escape from under the hood by operating the sprayer at appropriate ground speeds, nozzle pressures and wind speeds. Operation on rough or sloping ground may result in spray particles escaping from the hood. When applying to sugarcane that is grown on raised beds, ensure that the hood is designed to completely enclose the spray. If necessary, extend the front and rear flaps of the hoods to reach the ground in furrows between the rows. PRECAUTION: Droplets, mist, foam or splatter of the herbicide solution settling on the crop may result in discoloration, stunting or destruction. Such damage shall be the sole responsibility of the applicator.	Do not allow treated weeds to come into contact with the crop.
FOR AID IN SUGARCANE RIPENING (FLORIDA, HAWAII, LOUISIANA, PUERTO RICO AND TEXAS)	This product is a foliar-applied plant growth regulator to hasten ripening and increase the level of sucrose in sugarcane. It is effective in both low and high-tonnage sugarcane. When applied as directed under the conditions described, this product will hasten ripening and extend the period of high sucrose level in sugarcane. As a result of leaf desiccation, improved trash burn can be expected. Most of the sucrose increase is concentrated in the top nodes of the treated cane stalk. In order to recover the maximum sugar where topping is practiced during harvest, top at the base of the fourth leaf. Prior to application, consult your state sugarcane authority or local Albaugh, LLC representative regarding the degree of sucrose response anticipated from the variety of sugarcane to be treated. Do not plant subsequent crops in treated fields other than the following for 30 days after application: alfalfa or other forage legumes, beans (all types), corn (all types), cotton, melons (all types), pasture grasses, peanuts, potatoes (Irish or sweet), sorghum (milo), soybeans, squash (all types) or wheat. PRECAUTION: Application of this product may initiate development of shooting eyes. This product may not increase the sucrose content of sugarcane under conditions of good nature ripening. Within 2 to 3 weeks after application, this product may produce a slight yellowing to pronounced browning and drying of leaves, and a shortening of upper internodes. Spindle death may occur. Rainfall within 6 hours after application may reduce effectiveness. APPLICATION RATES: Use the following application rates and timing instructions according to the State in which the sugarcane is grown. **NOTE:** Use the higher rate within the labeled range when treating sugarcane under adverse ripening conditions or when less responsive varieties are to be treated. FLORIDA – Apply 5 to 12 fluid ounces of this product per acre 3 to 6 weeks before harvest of LAST RATOON CANE ONLY. HAWAII – Apply 9 to 21 fluid ounces of this product per acre 4 to 10 weeks before harvest. LOUISIANA – Apply 3.5 to 12 fluid ounces of this product per acre 3 to 7 weeks before harvest of RATOON CANE ONLY. PUERTO RICO – Apply 5 fluid ounces of this product per acre 3 to 5 weeks before harvest of RATOON CANE ONLY. TEXAS – Apply 5 to 12 fluid ounces of this product per acre 3 to 5 weeks before harvest of RATOON CANE ONLY.	Do not make application to sugarcane grown for seed, as a reduction in germination or vigor may occur. Do not feed or graze treated sugarcane forage following application. Do not apply for enhanced ripening to any crops other than sugarcane. Use of this product in any manner not consistent with this label may result in injury to persons, animals or crops, or other unintended consequences.

9.10 – VEGETABLE CROPS

NOTE: THIS "VEGETABLE CROPS" SECTION GIVES DIRECTIONS THAT APPLY TO ALL LISTED VEGETABLE CROPS WITHIN SECTION 9.10 GROUPED ALPHABETICALLY BELOW. SEE THE INDIVIDUAL CROP CATEGORIES FOR SPECIFIC INSTRUCTIONS, PREHARVEST INTERVALS, PRECAUTIONS AND RESTRICTIONS.

TYPES OF APPLICATIONS: Chemical Fallow, Preplant Fallow Beds, Preplant, Preemergence, Prior to Transplanting Vegetables, At-Planting, Hooded Sprayers in Row Middles, Shielded Sprayers in Row Middles, Wiper Applications in Row Middles, and Post-Harvest, Directed Applications (Non-Bearing Ginseng), Over-the-top Wiper Applications (Rutabagas Only).

PRECAUTIONS: When applying this product prior to transplanting or direct-seeding crops into plastic mulch, care must be taken to remove residues of this product, which could cause crop injury, from the plastic prior to planting. Residues can be removed by a single 0.5-inch application of water, either by natural rainfall or via a sprinkler system. Care must be taken to ensure that the washwater flushes off the plastic mulch and does not enter transplant holes. Applications made at emergence will result in injury or death to emerged seedlings.

RESTRICTIONS: Do not allow contact of herbicide with foliage, green shoots or stems, bark, exposed roots (including those emerging from plastic mulch), or fruit of crops because severe injury or destruction may result. When making pre-emergence and at planting applications, applications must be made before crop emergence to avoid severe crop injury. Apply before seed germination in coarse sandy soils to further minimize the risk of injury. In crops with vines, hooded sprayer, shielded sprayer and wiper applications to row middles must be made prior to vine development otherwise severe injury or destruction may result. Unless otherwise specified in this product's labeling, treatments with selective equipment including wipers and hooded sprayers must be made at least 14 days prior to harvest. Post-harvest or fallow applications must be made at least 30 days prior to planting any non-labeled crop. See "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label for additional information.

9.10.1 – BRASSICA VEGETABLES

LABELED CROPS: Broccoli, Broccoli (raab), Brussels sprouts, Cabbage, Cabbage (Chinese), Cabbage (Chinese mustard), Cauliflower, Cavalo broccolo, Chinese broccoli (gai lon), Chinese cabbage (bok choy and napa), Collards, Kale, Kohlrabi, Mizuna, Mustard greens, Mustard spinach, Rape greens

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 9.10	See Use Directions under Section 9.0	See Section 9.10

9.10.2 – BULB VEGETABLES

LABELED CROPS: Garlic, Great-headed garlic, Leek, Onion (dry bulb and green), Shallot, Welsh onion, Shallot

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 9.10	See Use Directions under Section 9.0	See Section 9.10

9.10.3 – CUCURBIT VEGETABLES AND FRUITS

LABELED CROPS: Chayote (fruit), Chinese waxgourd, Citron melon, Cucumber, Gherkin, Gourds, Gourds (edible including hyotan, cucuzza, hechima, Chinese okra), Melons (All), *Momordica* spp. (includes balsam apple, balsam pear, bittermelon, Chinese cucumber), Muskmelon (cantaloupe, casaba, Crenshaw, golden Pershaw, honeydew, honey ball, mango melon and Persian, pineapple, Santa Claus, snake), Pumpkin, Summer Squash (including crookneck, scallop, straightneck, vegetable marrow, zucchini), Winter squash (including butternut, calabaza, hubbard, acorn, spaghetti), Watermelon

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 9.10	See Use Directions under Section 9.0	For Cantaloupe, Casaba melon, Crenshaw melon, Cucumber, Gherkin, Gourds, Honeydew melon, Honey ball melon, Mango melon, Melons (all), Muskmelon, Persian melon, Pumpkin, Squash (summer and winter), and Watermelon, allow at least 3 days between application and planting.

9.10.4 – LEAFY VEGETABLES

LABELED CROPS: Amaranth (Chinese spinach), Arugula (roquette), Beet greens, Cardoon, Celery, Celery (Chinese), Celtuce, Chaya, Chervil, Chrysanthemum (edible-leaved), Chrysanthemum (Garland), Corn salad, Cress (garden and upland), Dandelion, Dock (sorrel), Dokudami, Endive (escarole), Fennel (Florence), Gow kee, Lettuce (head and leaf), Orach, Parsley, Purslane (garden and winter), Radicchio (red chicory), Rhubarb, Spinach (All), Swiss Chard, Watercress (upland), Water Spinach

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 9.10	See Use Directions under Section 9.0	See Section 9.10 For Watercress, do not make application within 3 days prior to seeding and during the period between seeding and emergence to minimize the risk of injury.

9.10.5 – FRUITING VEGETABLES

LABELED CROPS: Eggplant, Ground cherry *(Physalis* spp.*),* Pepino, Pepper (includes bell, chili, cooking, pimento, sweet), Tomatillo, Tomato

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 9.10	See Use Directions under Section 9.0	See Section 9.10 For Eggplant, Ground cherry, Pepino, Pepper (all), Tomatillo and Tomato, allow at least 3 days between application and planting. Do not use hooded or shielded sprayer applications in row middles of tomatoes.

9.10.6 – LEGUME VEGETABLES (succulent or dried)

LABELED CROPS: Bean *(Lupinus:* includes grain lupin, sweet lupin, white lupin, and white sweet lupin), Bean *(Phaseolus:* includes field bean, kidney bean, lima bean, navy bean, pinto bean, runner bean, snap bean, tepary bean, wax bean), Bean *(Vigna:* includes adzuki bean, asparagus bean, blackeyed pea, catjang, Chinese long-bean, cowpea, crowder pea, moth bean, mung bean, rice bean, southern pea, urd bean, yardlong bean), Broad bean (fava), Chickpea (garbanzo), Guar, Jackbean, Lablab bean, Lentil, Pea *(Pisum:* includes dwarf pea, edible-podded pea, English pea, field pea, garden pea, green pea, snowpea, sugar snap pea), Pigeon pea, Soybean (immature seed), Sword bean

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 9.10	See Use Directions under Section 9.0	See Section 9.10
Pre-Harvest Broadcast Spray (Dry Beans)	This product may be applied as an over-the-top broadcast spray to control labeled weeds prior to the harvest of dry beans. Apply up to 32 fluid ounces in 3 to 20 gallons of water per acre at the hard dough stage of the legume seed (30 percent grain moisture or less). Either ground broadcast or aerial applications may be made.	Apply at least 7 days before harvest for Dry Beans, Dry Peas, Lentils and Chickpeas. Only one application per year may be made; do not combine a pre-harvest spray with a spot treatment on the same crop area. Do not make pre-harvest application to dry beans, dry peas, lentils and chickpeas grown for seed, as a reduction in germination or vigor may occur. Do not feed treated vines and hay from these crops to livestock. Do not apply this product through any type of irrigation system. Do not treat field (feed) peas, since these are considered to be grown as livestock feed.
Pre-Harvest Broadcast Spray (Dry Peas, Lentils and Chickpeas)	This product may be applied as an over-the-top broadcast spray to control labeled weeds prior to the harvest of dry peas, lentils, and chickpeas. Apply up to 64 fluid ounces in 3 to 20 gallons of water per acre at the hard dough stage of the legume seed (30 percent grain moisture or less). Either ground broadcast or aerial applications may be made.	
Spot Treatment (Dry Beans, Dry Peas, Lentils, Chickpeas)	This product may be applied as spot treatment to control troublesome weeds such as Canada thistle, quackgrass, mayweed (dogfennel), and milkweed in dry beans. Apply up to 26 fluid ounces in 10 to 20 gallons of water through ground spray equipment or use a 2 percent solution in a handheld sprayer. For best results, applications should be made at or beyond the bud stage of growth. The crop receiving spray in treated areas will be killed.	Apply at least 14 days before harvest Only one application per year may be made; do not combine a pre-harvest spray with a spot treatment on the same crop area. Do not feed treated vines and hay from these crops to livestock. Do not apply this product through any type of irrigation system. Do not treat field cowpeas, since these are considered to be grown as livestock feed.

9.10.7 – ROOT AND TUBER VEGETABLES

LABELED CROPS: Arracacha, Arrowroot, Artichoke (Chinese and Jerusalem), Beet (garden), Burdock, Canna, Carrot, Cassava (bitter and sweet), Celeriac, Chayote (root), Chervil, Chicory, Chufa, Dasheen, Galangal, Ginger, Ginseng, Horseradish, Leren, Kava, Parsley, Parsnips, Potato (Irish), Radish, Radish (Oriental), Rutabaga, Salsify, Salsify (Black and Spanish), Skirret, Sweet potato, Tanier, Turmeric, Turnip, Wasabi, Yacon, Yams, Yam bean, Yam (True)

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 9.10	See Use Directions under Section 9.0	See Section 9.10
Direct Application (Non-Bearing Ginseng)	This product may be used for general weed control in established non-bearing ginseng. Applications may be made with boom equipment, CDA, shielded sprayers, hand-held and high volume wands, lances, and orchard guns or with wiper application equipment. PRECAUTION: Extreme care must be exercised to avoid contact of herbicide solution, spray, drift or mist with foliage or green bark of trunk, branches, suckers, fruit or other parts of desirable plants. Contact of this product with other than matured brown bark can result in serious crop damage.	Applications must be made at least one year prior to harvest.
Over-the-Top Wiper Application (Rutabaga Only)	Wiper applicators may be used over-the-top of rutabagas.	Allow at least 14 days between application and harvest of rutabagas.

9.11 – MISCELLANEOUS CROPS

LABELED CROPS: Aloe vera, Asparagus, Bamboo shoots, Globe artichoke, Okra, Peanut (ground nut), Pineapple, Strawberry, Sugar Beet (non-Roundup Ready)

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 9.10	See Use Directions under Section 9.0 PRECAUTION: Avoid contact of herbicide with foliage, green shoots or stems, bark, exposed roots (including those emerging from plastic mulch), or fruit of crops because severe injury or destruction may result.	See Section 9.10 When making pre-emergence and at planting applications, applications must be made before crop emergence to avoid serious crop injury. Apply before seed germination in coarse sandy soils to further minimize the risk of injury. In crops with vines, hooded sprayer, shielded sprayer and wiper applications to row middles must be made prior to vine development otherwise severe injury or destruction may result. Unless otherwise specified in this product's labeling, treatments with selective equipment including wipers and hooded sprayers must be made at least 14 days prior to harvest. Post-harvest or fallow applications must be made at least 30 days prior to planting any non-labeled crop.
General Weed Control, Site Preparation	This product may be applied for general weed control or for site preparation prior to planting or transplanting crops listed in this section.	When applying this product prior to transplanting or direct seeding crops into plastic mulch, care must be taken to remove residues of this product from the plastic prior to transplanting. Residues can be removed by 0.5 inch natural rainfall or by applying water via a sprinkler system. Care must be taken to ensure that the washwater flushes off the plastic mulch and does not enter transplant holes. Injury made at emergence will result in injury or death to emerged seedlings. Do not apply within a week before the first asparagus spears emerge. Do not feed or graze treated pineapple forage following application.
Spot Treatment (Asparagus)	This product may be applied immediately after cutting, but prior to the emergence of new spears.	Do not treat more than 10 percent of the total field area to be harvested. Do not harvest within 5 days of treatment.
Post-Harvest (Asparagus)	This product may be applied after the last harvest and all spears have been removed. If spears are allowed to regrow, delay application until ferns have developed. Delayed treatments should be applied as a directed or shielded spray in order to avoid contact of the spray with ferns, stems or spears. Select and use recommended types of spray equipment for post-emergence postharvest applications. A directed spray is any application where the spray pattern is aligned in such a way as to avoid direct contact of the spray with the crop. A shielded spray is any application where a physical barrier is positioned and maintained between the spray and the crop to prevent contact of spray with the crop.	Do not allow direct contact of the spray with the asparagus which will result in serious crop injury.

10.0 – TREE, VINE AND SHRUB CROPS (Alphabetically)

NOTE: THIS SECTION GIVES DIRECTIONS THAT APPLY TO ALL LISTED TREE, VINE AND SHRUB CROPS WITHIN SECTION 10 CROP GROUPS. INDIVIDUAL CROPS MAY HAVE MORE SPECIFIC INSTRUCTIONS, PRE-HARVEST INTERVALS, PRECAUTIONS AND RESTRICTIONS.

TYPES OF APPLICATIONS: Pre-plant (Site Preparation) Broadcast Sprays, General Weed Control, Middles (between rows of trees, vines or shrubs), Strips (within rows of trees, vines or shrubs), Selective Equipment (shielded sprayers, wiper treatments), Directed Sprays, Spot Treatments, Perennial Grass Suppression, Cut Stump.

Applications may be made with boom equipment, CDA, shielded sprayers, hand-held and high-volume wands, lances, orchard guns or with wiper applicator equipment, except as directed.

USE DIRECTIONS:
This product may be applied in middles (between rows of trees or vines), strips (within rows of trees or vines), and for general weed control or perennial grass suppression in established tree fruit and tree nut groves, orchards, berries and vineyards. This product may also be used for site preparation prior to planting or transplanting these crops. **APPLY AT 1 PINT TO 5 QUARTS PER ACRE ACCORDING TO THE "ANNUAL WEEDS" AND "PERENNIAL WEEDS" RATE TABLE SECTIONS OF THIS LABEL.** Utilize rates at the higher end of the labeled rate range when weeds are stressed, growing in dense populations or are greater than 12 inches tall. Repeat applications may be made up to a maximum of 10.6 quarts per acre per year.

The maximum use rates stated throughout this product's labeling apply to this product combined with the use of all other herbicides containing glyphosate or sulfosate as the active ingredient, whether applied as mixtures or separately. Calculate the application rates and ensure that the total use of this and other glyphosate- or sulfosate-containing products does not exceed stated maximum use rate.

PRECAUTIONS:
- Extreme care must be exercised to avoid contact of herbicide solution, spray, drift or mist with foliage or green bark of trunk, branches, suckers, fruit or other part of the trees, canes and vines.
- Avoid applications when recent pruning wounds or other mechanical injury has occurred.
- Contact of this product other than mature brown bark can result in serious crop damage or destruction.
- For applications in strips (within rows of trees), only selective equipment (directed sprays, hooded sprayers, shielded applicators, or wipers) must be used to minimize the potential for leakage or drift of herbicide sprays onto crop.

See "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label for additional directions and precautions.

RESTRICTIONS:
- Only wipers or shielded applicators capable of preventing all contact with crop may be used.
- Only shielded or directed sprayers may be used in crops with potential for crop contact, and then only where there is sufficient clearance.
- For berry crops, hooded or shielded sprayers must be fully enclosed including top, sides, front and back.
- Allow a minimum of 3 days between applications and transplanting.

Middles (between rows of trees, vines or bushes)
USE DIRECTIONS: This product will control or suppress annual and perennial weeds and ground covers growing between the rows of labeled tree and vine crops. If weeds are under drought stress, irrigate prior to application. Reduced control may result if weeds have been mowed prior to application.

TANK MIXTURES: A tank mixture of this product plus Goal® 2XL (or generic equivalent) may be used for annual weeds in middles between rows of citrus crops, tree fruits, tree nuts and vine crops. This mixture is recommended when weeds are stressed or growing in dense populations. 16 to 32 oz./A of this product plus 3 to 12 oz./A of Goal® 2XL will control annual weeds with a maximum height or diameter of 6 inches, including crabgrass, common groundsel, junglerice, common lambsquarters, redroot pigweed, London rocket, common ryegrass, shepherdspurse, annual sowthistle, common cheeseweed (malva), filaree (suppression), horseweed/marestail *(Conyza canadensis),* stinging nettle and common purslane (suppression). 16 to 32 oz./A of this product plus 3 to 12 oz./A of Goal® 2XL will control common cheeseweed (malva) or hairy fleabane *(Conyza bonariensis),* with a maximum height or diameter of 3 inches.

Strips (in rows of trees, vines or bushes)
TANK MIXTURES: This product may be applied in rows of tree or vine crops and may also be tank mixed with the following products (or generic equivalent):

DEVRINOL® 50 DF	KARMEX® DF	PRINCEP® CALIBER 90	SIMAZINE 80W	SURFLAN® AS
DIREX® 4L	KROVAR® I	PROWL®	SIM-TROL™ 4L	SURFLAN® 75W
GOAL® 2XL	KROVAR® II	SIMAZINE 4L	SOLICAM® DF	

Do not apply these tank mixtures in Puerto Rico.

Refer to the individual product labels for specific crops, rates, geographic restrictions and precautionary statements.

PERENNIAL GRASS SUPPRESSION
This product will suppress perennial grasses such as bahiagrass, bermudagrass, tall fescue, orchardgrass, Kentucky bluegrass, and quackgrass that are grown as ground covers in tree and vine crops.

For suppression of tall fescue, fine fescue, orchardgrass and quackgrass, apply 8 fluid ounces of this product in 10 to 20 gallons of water per acre.

For suppression of Kentucky bluegrass covers, apply 6 fluid ounces of this product per acre. Do not add ammonium sulfate.

For best results, mow cool-season grass covers in the spring to even their height and apply this product 3 to 4 days after mowing.

For suppression of vegetative growth and seedhead inhibition of bahiagrass for approximately 45 days, apply 6 fluid ounces of this product in 10 to 25 gallons of water per acre. Apply 1 to 2 weeks after full green-up or after mowing to a uniform height of 3 to 4 inches. This application must be made prior to seedhead emergence.

For suppression up to 120 days, apply 4 fluid ounces of this product per acre, followed by an application of 2 to 4 fluid ounces per acre about 45 days later. Make no more than 2 applications per year.

For burndown of bermudagrass, apply 1 to 2 quarts of this product in 3 to 20 gallons of water per acre. Use this treatment only if reduction of the bermudagrass stand can be tolerated. When burndown is required prior to harvest, allow at least 21 days to ensure sufficient time for burndown to occur.

For suppression of bermudagrass, apply 6 to 16 fluid ounces of this product per acre east of the Rocky Mountains and 16 fluid ounces of this product per acre west of the Rocky Mountains. Apply in a total spray volume of 3 to 20 gallons per acre, no sooner than 1 to 2 weeks after full green-up. If the bermudagrass is mowed prior to application, maintain a minimum of 3 inches in height. Sequential applications may be made when regrowth occurs and bermudagrass injury and stand reduction can be tolerated. East of the Rocky Mountains, rates of 6 to 10 fluid ounces per acre should be used in shaded conditions or where a lesser degree of suppression is desired.

CUT STUMPS (Tree crops)

LABELED CROPS:
Citrus Trees: Calamondin, Chironja, Citron, Citrus hybrids, Grapefruit, Kumquat, Lemon, Lime, Mandarin (Tangerine), Orange (all), Pummelo, Tangelo, Tangor.
Fruit Trees: Apple, Apricot, Cherry (sweet, sour), Crabapple, Loquat, Mayhaw, Nectarine, Olive, Peach, Pear, Plum/Prune (all), Quince.
Nut Trees: Almond, Beechnut, Brazil nut, Butternut, Cashew, Chestnut, Chinquapin, Filbert (hazelnut), Hickory Nut, Macadamia, Pecan, Pistachio, Walnut (black, English).

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Suitable Hand-Held Equipment	Cut stump applications of this product may be made during site preparation or site renovation, prior to transplanting tree crops. This product will control regrowth of cut stumps and resprouts of many types of tree species, some of which are listed below. Apply this product using suitable equipment to ensure coverage of the entire cambium. Cut trees or resprouts close to the soil surface. Apply a 50 to 100 percent solution of this product to the freshly cut surface immediately after cutting. Delays in application may result in reduced performance. For best results, applications should be made during periods of active growth and full leaf expansion. PRECAUTION: Some sprouts, stems, or trees may share the same root system. Adjacent trees having a similar age, height and spacing may signal shared roots. Whether grafted or shared, injury is likely to occur to non-treated stems/trees when one or more trees sharing common roots are treated.	DO NOT MAKE CUT STUMP APPLICATIONS WHEN THE ROOTS OF ADJACENT DESIRABLE TREES MAY BE GRAFTED TO THE ROOTS OF THE CUT STUMP. INJURY RESULTING FROM ROOT GRAFTING MAY OCCUR IN ADJACENT TREES.

10.1 – BERRY CROPS		
LABELED CROPS: Blackberry (including bingleberry, black satin berry, boysenberry, Cherokee blackberry, chesterberry, Cheyenne blackberry, coryberry, darrowberry, dewberry, Dirksen thornless berry, Himalayaberry, hullberry, juneberry, lavacaberry, lowberry, lucretiaberry, marionberry, nectarberry, olallieberry, Oregon evergreen berry, phenomenalberry, rangeberry, ravenberry, rossberry, Shawnee blackberry, and youngberry), Blueberry, Cranberry, Currant, Elderberry, Gooseberry, Huckleberry, Loganberry, Raspberry (Black, Red), Salal		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
See Section 10.0	See Use Directions under Section 10.0	See Section 10.0 Do not permit herbicide solution to contact desirable vegetation, including green shoots, canes or foliage. Allow a minimum of 30 days between last application and harvest of cranberries. For other small fruits and berries, allow a minimum of 14 days between last application and harvest. Do not make directed sprays within the cranberry bush areas prior to berry harvest.
Spot Treatment (Cranberry Production)	May be used to control weeds growing in dry ditches (interior and perimeter) of cranberry production areas. Hand-held sprayers or other appropriate application equipment listed under "APPLICATION EQUIPMENT AND TECHNIQUES" in this label may be used. Drop water level to remove standing water in ditches prior to application. In hand-held sprayers, use 1 to 2 percent solution of this product. Spray to wet vegetation, not to runoff. For treatments after drawdown of water in dry ditches, allow 2 or more days after treatment before reintroduction of water to achieve maximum weed control. Apply this product within 1 day after drawdown to ensure application to actively growing weeds.	Allow a minimum of 30 days between last application and harvest of cranberries. Do not apply this material through irrigation system. Do not make applications by air. Do not apply directly to water. Use nozzles that emit medium- to large-sized droplets to minimize drift in order to avoid crop injury.
Post-Harvest (Cranberry Production)	Make applications only after cranberries have been harvested to control weeds growing within the field. Best results will be obtained if applications are made to vines that appear dormant (after they have turned red). Hand-held sprayers, wipers or other appropriate application equipment listed under "APPLICATION EQUIPMENT AND TECHNIQUES" in this label may be used. If using hand-held sprayers, use a 0.5 to 1 percent solution of this product. Spray to wet vegetation, not to runoff. If using hand-held boom sprayers, apply 2 to 4 quarts of this product per acre. PRECAUTION: Cranberry plants that are directly sprayed may be killed.	Do not treat more than 10 percent of the total bog. Allow a minimum of 6 months after the last application and next harvest of cranberries. Do not apply this product through the irrigation system. Do not make applications by air. Do not apply directly to water. Even though vines appear dormant, contact of the herbicide solution with desirable vegetation may result in damage or severe plant injury.

10.2 – CITRUS

LABELED CROPS: Calamondin, Chironja, Citron, Citrus Hybrids, Grapefruit, Kumquat, Lemon, Lime, Mandarin (tangerine), Orange (All), Pummelo, Satsuma Mandarin, Tangelo (ugli), Tangor

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 10.0	See Use Directions under Section 10.0 Florida and Texas only: For burndown or control of the weeds listed below, apply the labeled rates of this product in 3 to 40 gallons of water per acre. Where weed foliage is dense, use 10 to 30 gallons of water per acre. For goatweed, apply 2 to 3 quarts of this product per acre. Apply in 20 to 30 gallons of water per acre when plants are actively growing. Use 2 quarts per acre when plants are less than 8 inches tall and 3 quarts per acre when plants are greater than 8 inches tall. If goatweed is greater than 8 inches tall, the addition of Krovar® II or Karmex® may improve control. Refer to the individual product labels for specific crops, rates, geographic restrictions and precautionary statements.	See Section 10.0 Allow a minimum of 1 day between last application and harvest. For citron groves, apply as directed sprays only.

Perennial weeds: S=Suppression B=Burndown PC=Partial Control C=Control

Weed Species	GLYSTAR® ORIGINAL Rate Per Acre			
	1 QT	2 QT	3 QT	5 QT
Bermudagrass	B	–	PC	C
Guineagrass				
Texas and Florida Ridge	B	C	C	C
Florida Flatwoods	–	B	C	C
Paragrass	B	C	C	C
Torpedograss	S	–	PC	C

10.3 – MISCELLANEOUS TREE FOOD CROPS

LABELED CROPS: Cactus (fruits and pads), Palm (heart, leaves), Palm (oil)

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 10.0	See Use Directions under Section 10.0	See Section 10.0

10.4 – NON-FOOD TREE CROPS		
LABELED CROPS: Pine, Poplar, Eucalyptus, Christmas Trees, Other Non-food Tree Crops		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
See Section 10.0	See Use Directions under Section 10.0	See Section 10.0
Directed Sprays, Spot Treatments, Wiper Applications	This product may be used as a post-directed spray and spot treatment around established poplar, eucalyptus, Christmas Trees and other non-food tree crops. PRECAUTION: Care must be exercised to avoid contact of spray drift or mist with foliage or green bark of established Christmas trees and other pine trees. Desirable plants may be protected from the spray solution by using shields or coverings made of cardboard or other impermeable material.	THIS PRODUCT IS NOT LABELED FOR USE AS AN OVER-THE-TOP BROADCAST SPRAY IN CHRISTMAS TREES AND OTHER PINE TREES.
Site Preparation	This product may be used prior to planting non-food tree crops.	Precautions must be taken to protect non-target plants during site preparations applications.
Directed Spray (Eucalyptus and Poplar Production)	This product can be used around established eucalyptus and poplar trees to control undesirable vegetation. Use a 1 to 2 percent spray solution to control herbaceous weeds in eucalyptus farms. Use a 2 percent spray solution for control of undesirable woody brush and trees. For "hard-to-control" weeds, use a 5 to 10 percent spray solution. Avoid contact of spray, drift, or mist with foliage, green bark or non-woody surface roots of plants. PRECAUTION: Desirable vegetation contacted by the herbicide solution may be injured or controlled. This includes foliage, fruit, or green stems.	DO NOT ALLOW HERBICIDE SPRAY TO CONTACT DESIRABLE VEGETATION.
Wiper Application (Eucalyptus and Poplar Production)	This product may be used through wick or other suitable wiper applicators for control or partial control of grass and broadleaf weeds listed in the "WEEDS CONTROLLED" section of this label. For wick applicators, mix 1 gallon of this product with 2 gallons water to make a 33% solution. For wiper systems that can handle thicker solutions, such as force-fed systems, a 33 to 100% solution may be used. For best results, ensure that the herbicide solution is allowed to contact the maximum amount of leaf surface. As weed densities increase, decrease equipment speed to allow sufficient herbicide flow to wet all weed surfaces contacted. Weeds not contacted will be unaffected.	

10.5 – POME FRUIT		
LABELED CROPS: Apple, Crabapple, Loquat, Mayhaw, Pear (including Oriental pear), Quince		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
See Section 10.0	See Use Directions under Section 10.0	See Section 10.0 Allow a minimum of 1 day between last application and harvest in pome fruits.

10.6 – STONE FRUIT

LABELED CROPS: Apricot, Cherry (Sweet, Tart), Nectarine, Olive, Peach, Pear, Plum/Prune (All types), Plumcot

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 10.0	See Use Directions under Section 10.0	See Section 10.0 Allow a minimum of 17 days between last application and harvest in stone fruit crops. For olive groves, apply as directed sprays only.

RESTRICTIONS ON APPLICATION EQUIPMENT:
For cherries, any application equipment listed in this section may be used in all states.

Any application equipment listed in this section may be used in apricots, nectarines, peaches and plums/prunes growing in Arizona, California, Colorado, Idaho, Kansas, Kentucky, New Jersey, North Dakota, Oklahoma, Oregon, Texas, Utah and Washington, except for peaches grown in the states specified in the following paragraph. In all other states, use wiper equipment only.

For Peaches grown in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee only, apply with a shielded boom spray or shielded wiper applicator, which prevents any contact of this product with the foliage or bark of trees. Apply no later than 90 days after first bloom. Applications made after this time may result in severe damage. Remove suckers and low-hanging limbs at least 10 days prior to application. Avoid application near trees with recent pruning wounds or other mechanical injury. Apply only near trees that have been planted in the orchard for 2 or more years.

EXTREME CARE MUST BE TAKEN TO ENSURE NO PART OF THE PEACH TREE IS CONTACTED.

10.7 – TREE NUTS

LABELED CROPS: Almond, Beechnut, Betelnut, Brazil nut, Butternut, Cashew, Chestnut, Chinquapin, Coconut, Filbert (Hazelnut), Hickory nut, Macadamia, Pecan, Pine nut, Pistachio, Walnut (Black, English)

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 10.0	See Use Directions under Section 10.0	See Section 10.0 Allow a minimum of 3 days between last application and harvest of tree nuts, except coconut. Allow 14 days between application and harvest in coconuts.

10.8 – TROPICAL CROPS AND SUBTROPICAL TREES AND FRUITS

LABELED CROPS: Ambarella, Atemoya, Avocado, Banana, Barbados Cherry (acerola), Biriba, Blimbe, Breadfruit, Cacao (cocoa) bean, Canistel, Carambola (starfruit), Cherimoya, Coffee, Custard apple, Dates, Durian, Feijoa, Figs, Governor's plum, Guava, Ilama, Imbe, Imbu, Jaboticaba, Jackfruit, Longan, Lychee, Mamey apple, Mango, Mangosteen, Marmaladebox (genip), Mountain papaya, Papaya, Pawpaw, Plantain, Persimmon, Pomegranate, Pulasan, Rambutan, Rose apple, Sapodilla, Sapote (black, mamey, white), Spanish lime, Soursop, Star apple, Sugar apple, Surinam cherry, Tamarind, Tea, Ti (roots and leaves), Wax jambu

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 10.0	See Use Directions under Section 10.0 This product may be applied for general weed control or for site preparation prior to transplanting crops listed in this section. In coffee and banana, delay applications 3 months after transplanting to allow the new coffee or banana plant to become established.	See Section 10.0 Allow a minimum of 1 day between last application and harvest of banana, guava, papaya and plantain crops. Allow a minimum of 14 days between last application and harvest of any other tropical or subtropical tree fruit. Allow a minimum of 28 days between last application and harvest in coffee crops.
Bananacide (Banana only)	See Use Directions under Section 10.0 This product may be used to destroy banana plants infected with the Banana Bunchy Top Virus as well as non-infected banana plants to establish a disease free buffers around plantations. Remove all fruit from the plants within the treatment area prior to treatment. Inject 1/25 fluid ounce (1 mL) of this product's concentrate per 2 to 3 inches of pseudostem diameter. Make the injection at least one foot above ground, except for very small plants, which should be injected vertically into the top. Any subsequent regrowth must also be destroyed. All plants and mats (or units) adjacent (within a 4-foot radius) to a treated mat shall be mechanically destroyed. For control of the Banana Bunchy Top Virus, it is critical that the grower follow a strict control program involving monitoring for diseased plants, spraying to control the aphid vector, and destruction of all infected mats (or units). An infected plant may not show symptoms of the disease for up to 125 days, therefore it is critical that the entire mat (or unit) containing the diseased plant be destroyed immediately.	See Section 10.0 Do not apply more than 1/2 fluid ounce (15 mL) of this product's concentrate per mat (or units). Remove all fruit from plants and mats (or units) prior to treatment. Do not harvest any fruit or plant materials from treated mats (or units) following injection. Do not allow livestock to consume treated materials. Following transplant of new banana plants into treated areas, allow plants to become established for 3 months before applying this product for general weed control.

10.9 – VINE CROPS

LABELED CROPS: Grapes (raisin, table, wine), Hops, Kiwi, Passion fruit

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
See Section 10.0	See Use Directions under Section 10.0 Applications must not be made when green shoots, canes or foliage are in the spray zone. In the northeast and Great Lakes regions, applications must be made prior to the end of bloom stage of grapes to avoid injury, or make applications with shielded sprayers or wiper equipment.	See Section 10.0 Allow a minimum of 14 days between last application and harvest. Do not use selective equipment in kiwi.

11.0 – PASTURE GRASSES, FORAGE LEGUMES AND RANGELANDS

11.1 – ALFALFA, CLOVER AND OTHER FORAGE LEGUMES		
LABELED CROPS: Alfalfa, Clover, Kenaf, Kudzu, Lespedeza, Leucaena, Lupin, Sainfoin, Trefoil, Velvet bean, Vetch (all types)		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
Pre-Plant, Pre-Emergence, At-Planting	This product may be applied before, during or after planting crops listed. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL. Applications must be made prior to emergence of the crop.	If a single application is made at rates of 2 quarts per acre or less, no waiting period between treatment and feeding or grazing is required. If application rates greater than 2 quarts per acre are made, remove domestic livestock before application and wait 8 weeks after application before grazing or harvesting.
Spot Treatment, Over-the-Top Wiper Applications (Alfalfa and Clover only)	This product may be applied as a spot treatment in alfalfa or clover. This product may be applied with wiper applicators to control or suppress the weeds listed under "WIPER APPLICATORS" in the "SELECTIVE EQUIPMENT" section of this label. Applications may be made in the same area at 30-day intervals.	For spot treatment and wiper applications, apply in areas where the movement of domestic livestock can be controlled. No more than one-tenth of any acre can be treated at one time. Remove domestic livestock before application and wait 14 days after application before grazing livestock or harvesting.
Dormant (Alfalfa Only)	This product will control or suppress many weeds including quackgrass, downy brome and cheatgrass in dormant alfalfa. Apply 8 to 12 ounces per acre of this product. Apply in the spring to alfalfa that is dormant. Applications should be made after spring temperatures have warmed enough to encourage resumption of weed growth, but prior to initiation of trifoliate leaf expansion of the alfalfa. Applications made after expansion of the first trifoliate leaf of the alfalfa will cause growth reduction and reduced crop yield. Slight discoloration of the alfalfa may occur, but the alfalfa will regreen and regrow under moist soil conditions as effects of this product wear off. PRECAUTIONS: Application of this product can cause crop injury. Any crop injury is the sole responsibility of the applicator.	Do not use ammonium sulfate when spraying dormant alfalfa with GLYSTAR® ORIGINAL. Do not use this product where a slight yield reduction in the first cutting of alfalfa cannot be tolerated. Do not make more than one application per year. Allow 36 hours after application before grazing livestock or harvesting.
Pre-harvest (Alfalfa Only)	This product may be used in declining alfalfa stands or any stand of alfalfa where crop destruction is acceptable. This application will severely injure or destroy the stand of alfalfa. This product will control annual and perennial weeds including quackgrass, when applied prior to the harvest of alfalfa. Use up to 1 quart of this product per acre. Applications may be made at any time of the year. For control of quackgrass, apply in the spring, late summer or fall when quackgrass is actively growing. Treatments for quackgrass must be followed by deep tillage for complete control.	Make only one application to an existing stand of alfalfa per year. Do not apply more than 2 quarts of this product per acre as a pre-harvest treatment. Do not use for alfalfa grown for seed, as a reduction in germination or vigor may occur. The treated crop and weeds can be harvested and fed to livestock after 36 hours.
Renovation	This product may be applied as a broadcast spray to existing stands of alfalfa, clover, and other labeled forage legumes. Labeled crops may be planted into the treated area. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL.	Remove domestic livestock before application. If application rates of 2 quarts per acre or less are used, wait 36 hours after application before grazing or harvesting. If application rates greater than 2 quarts per acre are used, wait 8 weeks after application before grazing or harvesting.

11.2 – CONSERVATION RESERVE PROGRAM (CRP)

LABELED CROPS: Conservation Reserve Program (CRP) Acres

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Renovation (rotating out of CRP), Site Preparation	This product may be used to prepare CRP land for crop production. Refer to Federal, state or local use guides for CRP renovation recommendations. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL. PRECAUTION: Some stunting of CRP perennial grasses will occur if broadcast applications are made when plants are not dormant.	Do not apply more than 3 quarts per acre per year onto CRP grasses. For any crop not listed in the "CROPS" sections of this label, applications must be made at least 30 days prior to planting.
Post-Emergence Weed Control in Dormant Acres, Over-the-Top Wiper Application	This product may be used to suppress competitive growth and seed production of undesirable vegetation in CRP acres. Such applications may be made with wiper application equipment or as a broadcast or spot treatment to dormant CRP grasses. For selective applications with broadcast spray equipment, apply 12 to 16 fluid ounces of this product per acre in early spring before desirable CRP grasses, such as crested and tall wheatgrass, break dormancy and initiate green growth. Late fall applications can be made after desirable perennial grasses have reached dormancy.	

11.3 – GRASS or TURFGRASS SEED PRODUCTION

LABELED CROPS: Any grass *(Gramineae* family) except corn, sorghum, sugarcane and those listed under "CEREAL CROPS"

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Pre-Plant, Pre-Emergence, Renovation, Site Preparation	This product may be applied before, during, or after planting or for renovation of turf or forage grass areas grown for seed production. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL. Applications must be made prior to the emergence of the crop to avoid injury. For maximum control of existing vegetation, delay planting to determine if any regrowth from escaped underground plant parts occurs. Where repeat treatments are necessary, sufficient regrowth must be attained prior to application. For warm-season grasses, such as bermudagrass, summer or fall applications provide best control.	Do not disturb soil or underground plant parts before treatment. Tillage or renovation techniques such as vertical mowing, coring or slicing should be delayed for 7 days after application to allow proper translocation into underground plant parts. If application rates total 3 quarts per acre or less, no waiting period between treatment and feeding or livestock grazing is required. If the rate is greater than 3 quarts per acre, remove domestic livestock and wait 8 weeks following application before grazing or harvesting.
Shielded Sprayer	Apply 1 to 3 quarts of this product as a broadcast spray in 10 to 20 gallons of total spray volume per acre. Uniform planting in straight rows aid in shielded sprayer applications. Best results are obtained when the grass seed crop is small enough to easily pass by or through the protective shields. PRECAUTION: Contact of this product in any manner to any vegetation to which treatment is not intended may cause damage. Grower assumes all responsibility for crop losses from misapplication.	
Over-the-Top Wiper Applications	This product may be applied with wiper applicators to control or suppress the weeds listed under "WIPER APPLICATORS" in the "SELECTIVE EQUIPMENT" section of this label. Weeds should be a minimum of 6 inches above the desirable vegetation. Better results may be obtained when more of the weed is exposed to the herbicide solution. Weeds not contacted by the herbicide solution will not be affected. This may occur in dense clumps, severe infestations, or when weed height varies so that not all weeds are contacted. In these instances, repeat treatments may be necessary. Better results may be obtained if 2 applications are made in opposite directions. PRECAUTION: Contact of the herbicide solution with desirable vegetation may result in damage or destruction.	Applicators must be adjusted so that the wiper contact point is at least 2 inches above the desirable vegetation.

(continued)

11.3 – GRASS or TURFGRASS SEED PRODUCTION *(cont.)*

LABELED CROPS: Any grass *(Gramineae* family) except corn, sorghum, sugarcane and those listed under "CEREAL CROPS"

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Spot Treatments	Use a 1 to 1.5 percent solution. Apply this product prior to heading of grasses.	The crop receiving the spray in the treated area will be killed. Do not allow drift or spray outside of the target area for the same reason.
Creating Rows in Annual Ryegrass	Use 16 to 32 fluid ounces of this product per acre. Use the higher rate when the ryegrass is greater than 6 inches tall. Best results are obtained when applications are made before the ryegrass reaches 6 inches in height. PRECAUTION: Set nozzle height to allow the establishment of the desired row spacing while preventing spray droplets, spray fines, or drift to contact the ryegrass plants not treated. Use low-pressure nozzles, or drop nozzles designed to target the application over a narrow band. Grower assumes all responsibility for crop losses from misapplication.	

11.4 – PASTURES

LABELED CROPS: Any grass *(Gramineae* family) except corn, sorghum, sugarcane and those listed under "CEREAL CROPS" including Bahiagrass, Bermudagrass, Bluegrass, Brome, Fescue, Guineagrass, Kikuyugrass, Orchardgrass, Pangola grass, Ryegrass, Timothy, Wheatgrass

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Spot Treatment, Over-the-Top Wiper Applications	This product may be applied as a spot treatment or with wiper applicators in pastures. Applications may be made in the same area at 30-day intervals.	For spot treatments or wiper application methods using rates of 3 quarts per acre or less, the entire field or any portion of it may be treated. When spot treatment or wiper applications are made using rates above 3 quarts per acre, no more the 10 percent of the total pasture may be treated at any one time. To achieve maximum performance, remove domestic livestock before application and wait 7 days after application before grazing livestock or harvesting.
Pre-Plant, Pre-Emergence, Pasture Renovation, Stand Removal	This product may be applied prior to planting or emergence of forage grasses. In addition, this product may be used to control perennial pasture species listed on this label prior to replanting. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL.	If application rates total 3 quarts per acre or less, no waiting period between treatment and feeding or livestock grazing is required. If the rate is greater than 3 quarts per acre, remove domestic livestock and wait 8 weeks following application before grazing or harvesting.
Chemical Mowing (Bermudagrass Pastures Prior to Spring Growth or Immediately After First Cutting)	This product may be applied at 16 fluid ounces per acre to control the weeds listed below and most other winter annual grass and broadleaf weeds in established coastal bermudagrass pastures. Annual bluegrass, Cheat, Crabgrass, Henbit, Johnsongrass seedling, Little barley, Oats, Ryegrass, Sandbur field, Wheat, Wild mustard Applications prior to spring growth: Apply this product in the late winter or early spring but before new coastal bermudagrass growth begins in the spring. Applications to new growth can damage the bermudagrass. Applications following the first cutting: Apply this product after the first bermudagrass cutting when the bermudagrass has not yet begun to regrow. Applications made after regrowth has begun can damage the bermudagrass.	Labeled application rates totaling 3 quarts per acre or less do not require a waiting period between treatment and feeding or livestock grazing. **NOTE:** ONLY ONE APPLICATION PER YEAR MAY BE MADE TO ANY ONE FIELD. A SPRING APPLICATION PRIOR TO GROWTH AND AN APPLICATION FOLLOWING THE FIRST CUTTING MAY NOT BE MADE ON THE FIELD DURING THE SAME YEAR.

Colorado, Idaho, Iowa, Kansas, Montana, Nebraska, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming Only

Bromus Species: This product may be used to treat downy brome *(Bromus tectorum),* Japanese brome *(Bromus japonicus),* soft chess *(Bromus mollis)* and cheatgrass *(Bromus secalinus)* found in industrial, rangeland and pasture sites. Apply 8 to 16 fluid ounces of product per acre on a broadcast basis. For best results, treatment should coincide with early seedhead emergence of the most mature plants. Delaying the application until this growth stage will maximize the emergence of other weedy grass flushes. Applications should be made to the same site each year until seed banks are depleted and the desirable perennial grasses are able to become reestablished on the site.

Medusahead: To treat medusahead, apply 16 fluid ounces of this product per acre as soon as plants are actively growing, and prior to the 4-leaf stage. Applications may be made in the fall or spring.

Application Equipment and Techniques: Applications may be made using ground or aerial equipment. Aerial applications for these uses may be made using fixed wing or helicopter equipment. For aerial applications, apply in 2 to 10 gallons of water per acre. For applications using ground equipment, apply in 10 to 20 gallons of water per acre.

When applied as directed there are no grazing restrictions.

11.5 – RANGELANDS		
LABELED CROPS: Rangeland (Perennial cool- and warm-season grass rangelands)		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
Post-Emergence	This product will control or suppress many annual weeds growing in perennial cool- and warm-season grass rangelands. Preventing viable seed production is key to the successful control and invasion of annual grassy weeds in rangelands. Follow-up applications in sequential years should eliminate most of the viable seeds. Grazing of treated areas should be delayed to encourage growth of desirable perennials. Allowing desirable perennials to flower and reseed in the treated area will encourage successful transition. Apply 12 to 16 fluid ounces per acre to control or suppress many annual weeds growing in perennial cool- and warm-season grass rangelands including downy brome, cheatgrass, cereal rye and jointed goatgrass. Apply when most mature brome plants are in early flower and before the plants, including seedheads, turn color. Allowing for secondary weed flushes to occur in the spring following rain events further depletes the seed reserve and encourages perennial grass conversion on weedy sites. Fall applications are possible, and recommended, where spring moisture is usually limited and fall germination allows for good weed growth. For medusahead, apply 16 fluid ounces per acre at the 3-leaf stage. Delaying applications beyond this stage will result in reduced or unacceptable control. Fire may be useful in eliminating the thatch layer produced by slow decaying culms prior to application. Allow new growth to occur before spraying after a burn. PRECAUTION: Slight discoloration of the desirable grasses may occur, but they will regreen and regrow under moist soil conditions as effects of this product wear off.	Do not use ammonium sulfate when spraying rangeland grasses with this product. Do not apply more than 3 quarts per acre per year.

11.6 – TURFGRASS SOD PRODUCTION		
LABELED CROPS: Turfgrass for Sod		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
Pre-Plant, Pre-Emergence, Renovation, Site Preparation	This product controls most existing vegetation prior to renovating turf grass areas or establishing turf grass grown for sod. Broadcast or hand-held equipment may be used to control sod remnants or other unwanted vegetation after sod is harvested. For maximum control of existing vegetation, delay planting or sodding to determine if any regrowth from escaped underground plant parts occurs. Where repeat treatments are necessary, sufficient regrowth must be attained prior to application. For warm-season grasses such as bermudagrass, summer or fall applications provide the best control. Where existing vegetation is growing under mowed turfgrass management, apply this product after omitting at least one regular mowing to allow sufficient growth for good interception of the spray. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL. Desirable turfgrasses may be planted following the above procedures.	If application rates total 3 quarts per acre or less, no waiting period between treatment and feeding or livestock grazing is required. If the rate is greater than 3 quarts per acre, remove domestic livestock and wait 8 weeks following application before grazing or harvesting. Do not disturb soil or underground plant before treatment. Tillage or renovation techniques such as vertical mowing, coring, or slicing should be delayed for 7 days after application to allow translocation into underground plant parts.
Spot Treatment	Hand-held equipment may be used for spot treatment of unwanted vegetation growing in existing turfgrass.	
Turfgrass Renovation for Sod Production	This product controls most existing vegetation prior to renovating turfgrass areas or establishing turfgrass grown for seed or sod. For maximum control of existing vegetation, delay planting or sodding to determine if any regrowth from escaped underground plant parts occurs. Where repeat treatments are necessary, sufficient regrowth must be attained prior to application. For warm-season grasses such as bermudagrass, summer or fall applications provide the best control. Where existing vegetation is growing under mowed turfgrass management, apply this product after omitting at least one regular mowing to allow sufficient growth for good interception of the spray. Do not disturb soil or underground plant parts before treatment. Tillage or renovation techniques such as vertical mowing, coring or slicing should be delayed for 7 days after application to allow translocation into underground plant parts. Desirable turfgrass may be planted following the above procedures. Hand-held equipment may be used for spot treatment of unwanted vegetation growing in existing turfgrass. Broadcast or hand-held equipment may be used to control sod remnants or other unwanted vegetation after sod is harvested.	Do not feed or graze turfgrass grown for seed or sod production for 8 weeks following application.

11.7 – RELEASE OF BERMUDAGRASS OR BAHIAGRASS

Dormant applications

This product may be used to control or partially control many winter annual weeds and tall fescue for effective release of dormant bermudagrass or bahiagrass. Treat only when turf is dormant and prior to spring greenup. This product may also be tank-mixed with Oust® for residual control. Tank mixtures of this product with Oust® may delay greenup.

For best results on winter annuals, treat when plants are in an early growth stage (below 6 inches in height) after most have germinated. For best results on tall fescue, treat when fescue is at or beyond the 4- to 6-leaf stage.

Apply 8 to 64 fluid ounces of this product per acre alone or in a tank mixture with 1/4 to 1 ounce per acre of Oust®. Apply the labeled rates in 10 to 40 gallons of water per acre. Use only in areas where bermudagrass or bahiagrass are desirable ground covers and where some temporary injury or discoloration can be tolerated. To avoid delays in greenup and minimize injury, add no more than 1 ounce of Oust® per acre on bermudagrass and no more than 0.5 ounce of Oust® per acre on bahiagrass and avoid treatments when these grasses are in a semi-dormant condition.

Actively growing bermudagrass

This product may be used to control or partially control many annual and perennial weeds for effective release of actively growing bermudagrass. Apply 1 to 3 pints of this product in 10 to 40 gallons of spray solution per acre. Use the lower rate when treating annual weeds below 6 inches in height (or runner length). Use the higher rate as weeds increase in size or as they approach flower or seedhead formation. These rates will also provide partial control of the following perennial species:

Bahiagrass	Fescue, tall	Trumpetcreeper
Bluestem, silver	Johnsongrass	Vaseygrass

This product may be tank-mixed with Oust®. If tank-mixed, use no more than 1 to 2 pints of this product with 1 to 2 ounces of Oust® per acre. Use the lower rates of each product to control annual weeds less than 6 inches in height (or runner length) that are listed in this label and the Oust® label. Use the higher rates as annual weeds increase in size and approach the flower or seedhead stages. These rates will also provide partial control of the following perennial weeds:

Bahiagrass	Dock, curly	Poorjoe
Bluestem, silver	Dogfennel	Trumpetcreeper
Broomsedge	Fescue, tall	Vaseygrass
Dallisgrass	Johnsongrass	Vervain, blue

Use only on well-established bermudagrass. Bermudagrass injury may result from the treatment, but regrowth will occur under moist conditions. Do not repeat applications of the tank mix in the same season, since severe injury may occur.

Actively growing bahiagrass

For suppression of vegetative growth and seedhead inhibition of bahiagrass for approximately 45 days, apply 6 fluid ounces of this product in 10 to 40 gallons of water per acre. Apply 1 to 2 weeks after full green-up or after mowing to a uniform height of 3 to 4 inches. This application must be made prior to seedhead emergence.

For suppression up to 120 days, apply 4 fluid ounces of this product per acre, followed by an application of 2 to 4 fluid ounces per acre about 45 days later. Make no more than 2 applications per year.

A tank mixture of this product plus Oust® may be used. Apply 6 fluid ounces of this product plus 0.25 ounce of Oust® per acre 1 to 2 weeks following an initial spring mowing. Make only one application per year.

12.0 – ROUNDUP READY® CROPS

The following instructions or those separately published on Albaugh, LLC Supplemental labeling include all applications which can be made onto the specified Roundup Ready crops during the complete cropping season. DO NOT combine these instructions with those listed for crop varieties that do not contain the Roundup Ready gene, in the "ANNUAL AND PERENNIAL CROPS (Alphabetically)" section of this label.

THIS PRODUCT IS TO BE USED FOR POSTEMERGENCE APPLICATION ONLY ON CROP VARIETIES DESIGNATED AS CONTAINING A ROUNDUP READY GENE OR GLYPHOSATE-TOLERANT GENE.

Applying this product to crop varieties that are not designated as glyphosate tolerant will result in severe crop injury and yield loss. Avoid contact with foliage, green stems, or fruit of crops, or any desirable plants that do not contain a Roundup Ready or glyphosate-tolerant gene, since severe injury or destruction will result.

The Roundup Ready designation indicates that the crop variety contains a patented gene that provides tolerance to this product. Information on Roundup Ready crop varieties may be obtained from your seed supplier. Roundup Ready crop varieties must be purchased from an authorized licensed seed supplier.

NOTE: Roundup Ready seed, and the method of selectivity controlling weeds using glyphosate on a Roundup Ready crop, are protected under several U.S. Patents. A license to use Roundup Ready seed must be obtained prior to use.

For Ground Applications with broadcast equipment, apply this product in 5 to 20 gallons of spray solution per acre. Carefully select proper nozzle and spray pressure to avoid spraying a fine mist. For best results with ground application equipment use flat spray nozzles. Check for even distribution of spray droplets.

For Aerial Applications, apply this product in 3 to 15 gallons of water per acre. See the "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label for procedures to avoid spray drift that may cause injury to any vegetation not intended for treatment. Use of appropriate buffer zones will help prevent injury to adjacent vegetation.

ATTENTION: AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS WHICH DO NOT CONTAIN A GLYPHOSATE-TOLERANT GENE.

See the "MIXING and APPLICATION EQUIPMENT AND TECHNIQUES" sections of this label for additional directions and restrictions on the application of this product.

Tank mixtures with other herbicides, insecticides, fungicides, micronutrients or fertilizers may result in reduced weed control or crop injury and are NOT to be used for over-the-top applications of this product unless otherwise specified in this product label or supplemental labeling published separately by Albaugh.

Ammonium sulfate may be mixed with this product for applications to Roundup Ready crops. Refer to the "MIXING" section for "USE DIRECTIONS" for ammonium sulfate.

Sprayer Preparation: It is important that sprayer and mixing equipment be clean and free of pesticide residue before making applications of this product. Follow the cleaning procedures specified on the label of the product(s) previously used. THOROUGHLY CLEAN THE SPRAY TANK AND ALL LINES AND FILTERS TO ELIMINATE POTENTIAL CONTAMINATION FROM OTHER HERBICIDES PRIOR TO MIXING AND APPLYING THIS PRODUCT.

NOTE: The following Use Directions are based on a clean start at planting by using a burndown application or tillage to control existing weeds before crop emergence. In no-till and stale seedbed systems, use a preplant burn-down treatment of this product to control existing weeds prior to crop emergence. Some weeds, such as black nightshade, broadleaf signalgrass, sicklepod, Texas panicum, sandbur, annual morningglory, woolly cupgrass, shattercane, wild proso millet, burcucumber, and giant ragweed with multiple germination times or suppressed (stunted) weeds may require a second application of this product for complete control. The second application should be made after some regrowth has occurred and at least 10 days after a previous application of this product.

12.1 – ROUNDUP READY® ALFALFA

FOR POSTEMERGENCE APPLICATION ONLY ON ALFALFA VARIETIES DESIGNATED AS CONTAINING A ROUNDUP READY GENE.

The Roundup Ready designation indicates that the alfalfa contains a patented gene, which provides tolerance to this product. Information on Roundup Ready alfalfa varieties may be obtained from your seed supplier or Albaugh representative. Roundup Ready crop varieties must be purchased from an authorized licensed seed supplier.

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Pre-Plant, At-Planting, Pre-Emergence and Post-Emergence	This product will control many troublesome emerged weeds with over-the-top applications in Roundup Ready alfalfa. For ground applications with broadcast equipment, apply this product in 3 to 40 gallons of spray solution per acre. Carefully select proper nozzle and spray pressure to avoid spraying a fine mist. For best results with ground application equipment, use flat fan nozzles. Check for even distribution of spray droplets. For aerial application: Use the labeled rates of this product in 3 to 15 gallons of spray solution per acre. A. New Stand Establishment (seeding year) Prior to First Cutting During New Stand Establishment: From emergence up to 4 trifoliate leaves 2.0 quarts per acre From 5 trifoliate leaves up to 5 days before first cutting 2.0 quarts per acre After First Cutting in Newly Established Stands: In-crop application, per cutting, up to 5 days before cutting 2.0 quarts per acre B. Established Stands (non-seeding year) In-Crop applications, per cutting, up to 5 days before cutting 2.0 quarts per acre During stand establishment, due to the biology and breeding constraints of alfalfa, up to 10% of the seedlings may not contain the Roundup Ready gene and will not survive after the first application of this product. To eliminate the undesirable effects of stand gaps created by the loss of plants not containing a Roundup Ready gene, a single application of at least 1.0 quart per acre of this product should be applied at or before the 3 to 4 trifoliate growth stage. In both newly seeded and established stands, in order to maximize yield and quality potential of forage and hay, applications of this product should be made after weeds have emerged but before alfalfa growth or re-growth interferes with application spray coverage of the target weeds. In addition to those weeds listed in the GLYSTAR® ORIGINAL herbicide label booklet, this product will suppress or control the parasitic weed, Dodder *(Cuscuta* spp.*)* in Roundup Ready alfalfa. Repeat applications may be necessary for complete control.	DO NOT EXCEED 2.0 QUARTS OF THIS PRODUCT PER ACRE WHEN MAKING APPLICATIONS BY AIR. Any single over-the-top application of this product must not exceed 2.0 quarts (64 fluid ounces) per acre. Sequential applications of this production must be at least 7 days apart. The combined total per year for all in-crop applications in newly established and established stands must not exceed 6.0 quarts (192 fluid ounces) per acre. Remove domestic livestock before application and wait a minimum of 5 days after last application before grazing, or cutting and feeding of Roundup Ready alfalfa forage and hay.
Over-the-top applications	This product may be applied post-emergence to Roundup Ready alfalfa from emergence until 5 days prior to cutting. Any single over-the-top applications of this product must not exceed 2.0 quarts per acre. PRECAUTION: Where Roundup Ready alfalfa is grown with a companion or cover crop, or is over seeded with a second species, over-the-top applications of this product will eliminate the non-Roundup Ready species. Tank mixtures with other herbicides, insecticides, or fungicides may result in crop injury or reduced weed control and must not be used for over-the-top applications of this product.	Sequential applications of this production must be at least 7 days apart.

MAXIMUM ALLOWABLE APPLICATION RATES	
Combined total per year for all applications, including pre-plant during year of establishment	7.75 quarts per acre
Combined total per year for in-crop applications for newly established and established stands	6.0 quarts per acre
Pre-plant, At-planting and Pre-emergence single applications	2.0 quarts per acre

12.2 – ROUNDUP READY® CANOLA (Spring Varieties)

LABELED CROPS: Roundup Ready spring canola is defined as those Roundup Ready canola varieties that are seeded in the spring and harvested in the fall and do not enter a winter dormancy period.

DO NOT USE THIS PRODUCT ON SPRING CANOLA WITH A ROUNDUP READY GENE PLANTED IN THE FOLLOWING STATES: ALABAMA, DELAWARE, FLORIDA, GEORGIA, KENTUCKY, MARYLAND, NEW JERSEY, NORTH CAROLINA, SOUTH CAROLINA, TENNESSEE, VIRGINIA AND WEST VIRGINIA, EXCEPT FOR USES IN WILDLIFE FOOD PLOTS THAT WILL NOT BE FOR HUMAN OR LIVESTOCK FOOD.

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Pre-Plant, At-Planting, Pre-Emergence	This product may be applied before, during or after planting Roundup Ready spring canola.	Maximum quantity of this product that may be applied for all pre-plant, at-planting and pre-emergence applications combined is 2 quarts per season.
Post-Emergence (In-crop)	This product may be applied post-emergence to Roundup Ready spring canola from emergence through the 6-leaf stage of development. Applications made during bolting or flowering may result in crop injury and yield loss. To maximize yield potential, make applications early to eliminate competing weeds. Single Application – Apply 11 to 16 fluid ounces of this product per acre no later than the 6-leaf stage for the control of annual weeds. Avoid overlapping applications as this may result in temporary yellowing, delayed flowering, and or growth reduction. Similar crop injury may result when applications of more than 11 fluid ounces per acre are applied after the 4-leaf stage. Sequential Application – Apply 11 fluid ounces of this product per acre to 1- to 3-leaf canola followed by a sequential application at a minimum interval of 10 days, but no later than the 6-leaf stage. Sequential applications can be made for early emerged annual weeds and perennial weeds such as Canada thistle and quackgrass, or when multiple applications are needed for adequate weed control.	No more than two in-crop (over-the-top) broadcast applications may be made from crop emergence through the 6-leaf stage of development and the total of all in-crop applications must not exceed 22 fluid ounces of this product per acre. Allow a minimum of 60 days between last application and canola harvest.

MAXIMUM ALLOWABLE APPLICATION RATES	
Total of all Pre-plant, At-Planting, Pre-emergence applications	2.0 quarts per acre
Total of all In-crop applications from emergence to 6-leaf stage	1.0 quart per acre

12.3 – ROUNDUP READY® CANOLA (Fall and Winter Varieties)

LABELED CROPS: Roundup Ready winter canola is defined as those Roundup Ready canola varieties that are seeded in early fall and harvested the following spring or summer. Winter canola varieties are intended to enter a cold period dormancy in the winter.

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Pre-Plant, At-Planting, Pre-Emergence	This product may be applied before, during or after planting Roundup Ready winter canola.	Maximum quantity of this product that may be applied for all pre-plant, at-planting and pre-emergence applications combined is 2 quarts per acre per season.
Post-Emergence (In-crop)	This product may be applied to Roundup Ready winter canola varieties from emergence to canopy closure in the fall and prior to bolting in the spring. Applications made during or after bolting may result in crop injury and yield loss. To maximize yield potential, make applications early to eliminate competing weeds. Some weeds with multiple germination times, or suppressed (stunted) weeds, or weeds that have overwintered may require sequential applications of this product for control. The second application should be made after some regrowth has occurred and at least 60 days after a previous application of this product. Single Application – Apply 22 to 32 fluid ounces of this product per acre in the fall. Applications in the fall should be made when weeds are small and actively growing. Use the higher rate in the labeled range when weed densities are high, when weeds have overwintered or when weeds become large and well established. Applications of greater than 16 fluid ounces per acre prior to the 6-leaf stage may result in reduced crop growth in the fall. Avoid overlaps. Spray overlaps may result in temporary yellowing and/or growth reduction. Sequential Applications – Apply 16 to 32 fluid ounces of this product per acre to 2-leaf or larger canola in the fall, followed by a sequential application at the same rate and at a minimum interval of 60 days, but before bolting in the spring. Sequential applications can be made for early emerging annual weeds and winter emerging weeds such as downy brome, jointed goatgrass and ryegrass, and for weeds that have overwintered. This product will control or suppress most perennial weeds. For some perennial weeds, sequential applications may be required to reduce competition with the crop.	No more than two over-the-top broadcast applications may be made from crop emergence up to the onset of bolting, and the total in-crop application must not exceed 2 quarts of this product per acre. Applications of greater than 24 fluid ounces per acre prior to the 6-leaf stage may result in reduced crop growth in the fall. Allow a minimum of 60 days between last application and harvest of canola grain. No waiting period is required between application and open grazing of livestock.

MAXIMUM ALLOWABLE APPLICATION RATES	
Total of all Pre-plant, At-Planting, Pre-emergence applications	2.0 quarts per acre
Total of all In-crop applications from emergence to canopy closure or prior to bolting in the spring	2.0 quarts per acre

12.4 – ROUNDUP READY® CORN

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Pre-Plant, Pre-Emergence, At-Planting	This product may be applied alone or in a tank-mixture before, during or after planting corn. TANK MIXTURES: This product may be tank mixed with Bullet, Degree, Degree Xtra, Harness, Harness Xtra, Harness Xtra 5.6L, Lariat, Lasso or Micro-Tech at 50 to 100 percent of labeled rate. Refer to the specific product label and observe all precautions and limitations on the label for any pre-emergence herbicide application, including application timing restrictions, soil restrictions, minimum re-cropping interval and rotational guidelines – the more restrictive requirements apply. **NOTE:** For maximum weed control, a post-emergence (in-crop) application of this product should be applied following the use of less than labeled rates of the pre-emergence residual products listed above. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL.	Applying this product to crop varieties that are not designated as glyphosate tolerant will result in severe crop injury and yield loss. Do not allow contact with foliage, green stems, or fruit of crops, or any desirable plants that do not contain a Roundup Ready or glyphosate-tolerant gene, since severe injury or destruction will result. AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS WHICH DO NOT CONTAIN A GLYPHOSATE-TOLERANT GENE. See the "MIXING and APPLICATION EQUIPMENT AND TECHNIQUES" sections of this label for additional directions and restrictions on the application of this product.

(continued)

12.4 – ROUNDUP READY® CORN *(cont.)*

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Post-Emergence (in-crop)	When applied as directed, this product controls labeled annual grass and broadleaf weeds in Roundup Ready corn. Many perennial grasses and broadleaf weeds will be controlled or suppressed with one or more application of this product. The post-emergent application of 0.75 to 1.5 quarts per acre of this product should be made before the weeds reach a height and/or density that the weeds become competitive with the crop, generally 4 inch tall weeds or less. This product may be applied over-the-top to Roundup Ready corn from emergence through the V8 stage (8 leaves with collars) or until corn height reaches 48 inches, whichever comes first. Use drop nozzles when corn height is 24 to 30 inches (free standing), for optimum spray coverage and weed control. For corn heights 30 to 48 inches (free standing), apply this product ONLY using ground application equipment with drop nozzles adjusted to avoid spraying into the whorls of the corn plants. If product is applied to whorls of corn, plant injury and yield reduction can occur. Maximum single in-crop application rate of this product up to 48-inch corn is 48 fluid ounces per acre. See the "ROUNDUP READY CROPS" section of this label for additional instructions for use in Roundup Ready crops. TANK MIXTURES: This product may be applied in tank mixture with Bullet, Degree, Degree Xtra, Harness, Harness Xtra, Harness Xtra 5.6L, and Micro-Tech at 50 to 100 percent of labeled rate. This product may be applied in tank mixture with Permit and Atrazine at labeled rates. Refer to the specific product label and observe all precautions and limitations on the label for all products used in tank mixtures, including application timing restrictions, soil restrictions, minimum re-cropping interval and rotational guidelines – the more restrictive requirements apply. **Tank-mix Partner** — **Maximum Height of Corn For Application** Degree, Degree Xtra, Harness, Harness Xtra, Harness Xtra 5.6L — 11 inches Bullet*, Micro-Tech* — 5 inches Atrazine — 12 inches *Bullet and Micro-Tech are not registered for use as a post-emergence application in Texas.	Single in-crop applications of this product are not to exceed 1.5 quarts per acre. The maximum combined total of multiple in-crop applications from emergence through the 48-inch stage is 3 quarts per acre. Allow a minimum of 10 days between in-crop applications of this product. Allow a minimum of 50 days between application of this product and harvest of corn forage.
Pre-Harvest	In Roundup Ready corn, up to 1 quart per acre of this product can be applied pre-harvest. Make applications at 35 percent grain moisture or less. Ensure that maximum kernel fill is complete and the corn is physiologically mature (black layer formed).	Allow a minimum of 7 days between application and harvest.
Post-Harvest	This product may be applied after harvest of corn. Higher rates may be required for control of large weeds that were growing in the crop at the time of harvest. Tank mixtures with 2,4-D or dicamba may be used.	Allow a minimum of 7 days between treatment and harvest or feeding of treated vegetation.

MAXIMUM ALLOWABLE APPLICATION RATES	
Combined total per year for all applications	8.0 quarts per acre
Total of all Pre-plant, Pre-emergence, At-Planting applications	5.0 quarts per acre
Maximum single in-crop application rate up to 48-inch corn	1.5 quarts per acre
Total in-crop applications from emergence through 48-inch corn	3.0 quarts per acre
Maximum pre-harvest application rate after maximum kernel fill is complete and the crop is physiologically mature (black layer formation) until 7 days before harvest	1.0 quart per acre

12.5 – ROUNDUP READY® COTTON

ATTENTION: USE OF THIS PRODUCT IN ACCORDANCE WITH LABEL DIRECTIONS IS EXPECTED TO RESULT IN NORMAL GROWTH OF ROUNDUP READY COTTON; HOWEVER, VARIOUS ENVIRONMENTAL CONDITIONS, AGRONOMIC PRACTICES AND OTHER FACTORS MAKE IT IMPOSSIBLE TO ELIMINATE ALL RISKS ASSOCIATED WITH THIS PRODUCT, EVEN WHEN APPLICATIONS ARE MADE IN CONFORMANCE WITH THE LABEL SPECIFICATIONS. IN SOME CASES, THESE FACTORS CAN RESULT IN BOLL LOSS, DELAYED MATURITY AND/OR YIELD LOSS.

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Pre-Plant, Pre-Emergence, At-Planting	This product may be applied before, during or after planting cotton. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL.	See the "ROUNDUP READY CROPS" section of this label for additional instructions for use in Roundup Ready crops.
Post-Emergence (Over-the-Top)	This product may be applied by aerial or ground application equipment at rates up to 1 quart per acre per application post-emergence to Roundup Ready cotton from the ground cracking stage until the 4-leaf (node) stage of development (until the fifth true leaf reaches the size of a quarter). Over-the-top applications made after the 4-leaf (node) stage of development may result in boll loss, delayed maturity and/or yield loss. Salvage Treatment. This treatment may be used after the 4-leaf stage of development and must only be used where weeds threaten to cause the loss of the crop. One quart per acre may be applied either as an over-the-top application or as a post-directed treatment sprayed higher on the cotton plants and over the weeds. **NOTE: SALVAGE TREATMENTS WILL RESULT IN SIGNIFICANT BOLL LOSS, DELAYED MATURITY AND/OR YIELD LOSS. NO MORE THAN ONE SALVAGE TREATMENT MAY BE USED PER GROWING SEASON.**	See the "ROUNDUP READY CROPS" section of this label for additional instructions for use in Roundup Ready crops. The combined total application of this product from cotton emergence until harvest must not exceed 6 quarts per acre. NO MORE THAN TWO OVER-THE-TOP BROADCAST APPLICATIONS MAY BE MADE FROM CROP EMERGENCE THROUGH THE 4-LEAF (NODE) STAGE OF DEVELOPMENT. NO MORE THAN TWO APPLICATIONS MAY BE MADE FROM THE 5-LEAF STAGE THROUGH LAYBY. SEQUENTIAL IN-CROP OVER-THE-TOP OR POST-DIRECTED APPLICATIONS OF THIS PRODUCT MUST BE AT LEAST 10 DAYS APART AND COTTON MUST HAVE AT LEAST TWO NODES OF INCREMENTAL GROWTH BETWEEN APPLICATIONS. ALLOW A MINIMUM OF 7 DAYS BETWEEN APPLICATION AND HARVEST.
Selective Equipment	This product may be applied using precision post-directed or hooded sprayers at rates up to 1 quart per acre per application to Roundup Ready cotton through layby. At this stage, post-directed equipment must be used which directs the spray to the base of the cotton plants. Contact of the spray with cotton leaves should be avoided to the maximum extent possible. To minimize spray onto the leaves of the cotton plants, place nozzles in a low position directing a horizontal spray pattern under the cotton leaves to contact weeds in the row, and maintain low spray pressure (less than 30 psi). For best results, make applications while weeds are small (less than 3 inches).	See the "SELECTIVE EQUIPMENT" part of the "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label for information on proper use and calibration of this equipment.
Pre-Harvest	This product may be applied for pre-harvest annual and perennial weed control as a broadcast treatment to Roundup Ready cotton after 20 percent boll crack. Up to 2 quarts of this product may be applied using either aerial or ground spray equipment. TANK MIXTURES: This product may be tank mixed with DEF™ 6, Folex™, Ginstar, or Prep™ (or generic equivalents). **NOTE:** This product will not enhance the performance of these harvest aids when applied to Roundup Ready cotton.	Allow a minimum of 7 days between application and harvest of cotton. Do not apply this product to cotton grown for seed, as a reduction in germination or vigor may occur. REFER TO MANUFACTURERS' LABELS FOR USE OF ADDITIVES (such as surfactants, stickers and spreaders) FOR PRE-HARVEST APPLICATION TO COTTON.

MAXIMUM ALLOWABLE APPLICATION RATES	
Combined total per year for all applications	8.0 quarts per acre
Total of Pre-plant, Pre-emergence, At-Planting applications	5.0 quarts per acre
Total in-crop applications from ground cracking to layby	4.0 quarts per acre
Maximum pre-harvest application rate	2.0 quarts per acre

12.6 – ROUNDUP READY® FLEX COTTON

ATTENTION: USE OF THIS PRODUCT IN ACCORDANCE WITH LABEL DIRECTIONS IS EXPECTED TO RESULT IN NORMAL GROWTH OF ROUNDUP READY COTTON, HOWEVER, VARIOUS ENVIRONMENTAL CONDITIONS, AGRONOMIC PRACTICES AND OTHER FACTORS MAKE IT IMPOSSIBLE TO ELIMINATE ALL RISKS ASSOCIATED WITH THIS PRODUCT, EVEN WHEN APPLICATIONS ARE MADE IN CONFORMANCE WITH THE LABEL SPECIFICATIONS. IN SOME CASES, THESE FACTORS CAN RESULT IN BOLL LOSS, DELAYED MATURITY AND/OR YIELD LOSS.

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Pre-Plant, Pre-Emergence, At-Planting	This product may be applied before, during or after planting Roundup Ready Flex cotton. Always plant into a weed free seedbed. In no-till and stale seedbed systems, always burn down existing weeds before cotton emerges. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL.	See the "ROUNDUP READY CROPS" section of this label for additional instructions for use in Roundup Ready crops.
Post-Emergence (Over-the-Top)	When applied in accordance with this label, GLYSTAR® ORIGINAL herbicide will control labeled annual grasses and broadleaf weeds in Roundup Ready Flex cotton. To maximize yield potential, spray cotton early to eliminate competing weeds. Many perennial weeds will be controlled or suppressed with one or more applications of this product. Make an initial application of 1.0 quart per acre on 1 to 3 inch tall annual grass and broadleaf weeds. This product may be applied by ground application equipment at rates up to 1.5 quarts per acre per application post-emergence to Roundup Ready Flex cotton. In addition to broadcast applications, post-directed equipment may be used to achieve weed coverage. **NOTE:** For specific rates of application and instructions, refer to the "ANNUAL WEEDS" and "PERENNIAL WEEDS" rate sections in the label booklet for GLYSTAR® ORIGINAL herbicide. PRECAUTIONS: In-crop application rates above 1.0 quart per acre made alone or with the addition of other crop chemical products containing surfactant may cause a crop response including leaf speckling or leaf necrosis. Application after 10th leaf or 10th node may result in plant injury and yield loss.	The maximum rate for any single in-crop application of this product is 1.5 quarts per acre made using ground application equipment. Except for pre-harvest use, do not exceed a maximum rate of 1.0 quart per acre of this product when making applications by air. Between layby and 60 percent open bolls, the maximum combined total rate of this product that may be applied is 2.0 quarts per acre. The maximum combined total of all applications made from crop emergence through 60 percent open bolls must not exceed 6.0 quarts per acre.
Pre-Harvest	This product may be applied for pre-harvest annual and perennial weed control as a broadcast treatment to Roundup Ready Flex cotton after 60 percent boll crack. Up to 2.0 quarts of this product may be applied using either aerial or ground spray equipment. **NOTE:** This product will not enhance the performance of harvest aids when applied to Roundup Ready Flex cotton.	Allow a minimum of 7 days between application and harvest of cotton. Do not apply this product to cotton grown for seed, as a reduction in germination or vigor may occur. THE USE OF ADDITIVES, OTHER THAN THOSE LISTED ON THIS LABEL, FOR PRE-HARVEST APPLICATION TO COTTON IS PROHIBITED.

MAXIMUM ALLOWABLE APPLICATION RATES	
Combined total per year for all applications (Calculate the combined rate to be used for all pre-plant, in-crop and pre-harvest applications)	8.0 quarts per acre
Total of Pre-plant, Pre-emergence, At-Planting applications	5.0 quarts per acre
Total in-crop applications from ground cracking to 60 percent open bolls	6.0 quarts per acre
Maximum allowed from 60 percent bolls open to 7 days prior to harvest	2.0 quarts per acre

12.7 – ROUNDUP READY® SOYBEANS

THE USE OF THIS PRODUCT FOR IN-CROP APPLICATIONS OVER ROUNDUP READY SOYBEANS MAY NOT BE PRACTICED IN CALIFORNIA UNLESS THE APPLICATOR HAS AT THE TIME OF APPLICATION A CALIFORNIA APPROVED SUPPLEMENTAL LABEL SPECIFYING THE ACCEPTED DIRECTION FOR USE.

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Pre-Plant, Pre-Emergence, At-Planting	This product may be applied before, during or after planting soybeans. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL.	See the "ROUNDUP READY CROPS" section of this label for additional instructions for use in Roundup Ready crops.
Post-Emergence (In-Crop)	When applied as directed, this product will control labeled annual grasses and broadleaf weeds in Roundup Ready soybeans. Applications of this product can be made in Roundup Ready soybeans from emergence (cracking) throughout flowering. Refer to the "ANNUAL WEEDS RATE TABLE" in this label for specific rates on various annual weeds, Make an initial application of 1 quart per acre on 2- to 8-inch tall weeds. Weeds will generally be 2 to 8 inches tall, 2 to 5 weeks after planting. If the initial application is delayed and weeds are larger, apply a higher rate of this product. This product may be used up to 2 quarts per acre in any single in-crop application for control of annual weeds and where heavy weed densities exist. A 1- to 2-quarts per acre rate (single or multiple applications) of this product will control or suppress perennial weeds such as: bermudagrass, Canada thistle, common milkweed, field bindweed, hemp dogbane, horsenettle, marestail (horseweed), nutsedge, quackgrass, rhizome johnsongrass, redvine, trumpetcreeper, swamp smartweed and wirestem muhly. For best results, allow perennial weed species to achieve at least 6 inches of growth before spraying with this product. Under adverse growing conditions such as drought, hail, wind damage or a poor soybean stand that slows or delays canopy closure, a sequential application of this may be necessary to control late flushes of weeds. IN THE SOUTHERN STATES, A SEQUENTIAL APPLICATION OF THIS PRODUCT WILL BE REQUIRED TO CONTROL NEW FLUSHES OF WEEDS IN THE ROUNDUP READY SOYBEAN CROP. To control giant ragweed, apply up to 1 quart per acre of this product when the weed is 8 to 12 inches tall to increase control and possibly avoid the need for a sequential application.	The combined total application from crop emergence through harvest must not exceed 3 quarts per acre. The maximum rate for any single in-crop application is 2 quarts per acre. The maximum combined total of this product that can be applied during flowering is 2 quarts per acre.
Pre-Harvest	This product provides weed control when applied prior to harvest of soybeans. Up to 1 quart per acre of this product can be applied by aerial or ground application. PRECAUTION: Care should be taken to avoid excessive seed shatter loss due to ground application equipment.	Allow a minimum of 14 days between final application and harvest of soybean grain or feeding of soybean grain, forage or hay.
Post-Harvest	This product may be applied after harvest of Roundup Ready soybeans. Higher rates may be required for control of large weeds that were growing in the crop at the time of harvest. Tank mixtures with 2,4-D or dicamba may be used.	

MAXIMUM ALLOWABLE APPLICATION RATES	
Combined total per year for all applications	8.0 quarts per acre
Total of Pre-plant, Pre-emergence, At-Planting applications	5.0 quarts per acre
Total in-crop applications from cracking throughout flowering	3.0 quarts per acre
Maximum pre-harvest application rate	1.0 quart per acre

12.8 – ROUNDUP READY® SUGAR BEETS

The Roundup Ready designation indicates that the sugar beet contains a patented gene, which provides tolerance to this product. Information on Roundup Ready sugarbeet may be obtained from your seed supplier or Albaugh representative. Roundup Ready crop varieties must be purchased from an authorized licensed seed supplier.

DO NOT combine these instructions with those listed for crop varieties that do not contain a Roundup Ready gene listed in the "ANNUAL AND PERENNIAL CROPS (Alphabetically)" sections of the GLYSTAR® ORIGINAL herbicide label booklet.

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Pre-Plant, Pre-Emergence, At-Planting	This product may be applied before, during or after planting of Roundup Ready sugar beets. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL.	Maximum quantity of this product that may be applied for all pre-plant, at-planting and pre-emergence applications combined is 5.0 quarts per acre per season.
Post-Emergence (In-Crop)	This product may be applied over the top of Roundup Ready sugar beets for control of annual grasses and broadleaf weeds from emergence to 30 days prior to harvest. To maximize yield potential, spray sugar beets early to eliminate competing weeds. Up to 4 sequential applications of this product may be made with at least 10 days between applications. This product will control or suppress most perennial weeds. For some perennial weeds, repeat applications may be required to eliminate crop competition throughout the growing season.	The combined total application from crop emergence through harvest must not exceed 4.5 quarts per acre. The maximum rate for any single application between emergence to the 8-leaf stage is 1.5 quarts per acre. The maximum rate for any single application between the 8-leaf stage and canopy closure is 1.0 quart per acre. Allow a minimum of 30 days between last application and sugar beet harvest. For any crop NOT listed in the "CROPS" section of this label booklet, applications must be at least 30 days prior to planting.

MAXIMUM ALLOWABLE APPLICATION RATES	
Combined total per year for all applications	8.0 quarts per acre
Total of Pre-plant, Pre-emergence, At-Planting applications	5.0 quarts per acre
Emergence to 8-leaf stage	2.5 quarts per acre
Between 8-leaf stage and canopy closure	2.0 quarts per acre

13.0 – NON-CROP USES AROUND THE FARMSTEAD

13.1 – WEED CONTROL AND TRIM-AND-EDGE

LABELED SITES: Non-crop Areas including building foundations, along and in fences, in dry ditches and canals, along ditchbanks, farm roads, shelterbelts, prior to landscape plantings and equipment storage areas.

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Any suitable application equipment described in Section 8.0 of this label	This product may be used to control annual weeds, perennials weeds and woody brush which are found in any part of the farmstead. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL. TANK MIXTURES: This product may be tank mixed with the following products (or generic equivalents). Refer to these product labels for approved farmstead sites and application rates. For annual weeds, use 1 quart per acre of this product when weeds are less than 6 inches tall and 1.5 quarts per acre when weeds are greater than 6 inches tall. For perennial weeds, apply 2 to 5 quarts per acre in these tank mixes. For tank mixtures with these products through backpack sprayers, handguns or other high-volume spray-to-wet applications, see the "HAND-HELD AND HIGH VOLUME EQUIPMENT" section of this label for allowable application rates.	This product plus dicamba tank mixtures may not be applied by air in California.
	Arsenal Barricade 65WG Diuron Endurance Escort Karmex DF Krovar DF Oust Pendulum 3.3 EC Pendulum WDG Plateau Princep DF Princep Liquid Ronstar 50 WP Sahara Simazine Surflan Telar Vanquish 2,4-D	
	For control or partial control of the following perennial weeds, apply 1 to 2 quarts of this product plus 2 to 4 ounces of Oust® per acre: Bahiagrass Bermudagrass Broomsedge Dallisgrass Dock, curly Dogfennel Fescue, tall Johnsongrass Poorjoe Quackgrass Vaseygrass Vervain, blue	

13.2 – GREENHOUSE/SHADEHOUSE

LABELED USES:

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Spot Spray, Directed Spray	This product may be used to control weeds in and around greenhouses and shadehouses. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL.	Air circulation fans must be turned off during application. Desirable vegetation should not be present during application.

13.3 – CHEMICAL MOWING

LABELED USES: Farm Ditches and Other Parts of Farmsteads

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Any suitable application equipment described in Section 8.0 of this label	This product will suppress perennial grasses listed in this section to serve as a substitute for mowing. Use 8 fluid ounces of this product per acre when treating tall fescue, fine fescue, orchardgrass or quackgrass covers. Use 6 fluid ounces of this product per acre when treating Kentucky bluegrass. Use 16 fluid ounces of this product when treating bermudagrass. Use 64 fluid ounces of this product when treating torpedograss or paragrass. Apply treatments in 10 to 20 gallons of spray solution per acre.	Use only in areas where some temporary injury or discoloration of perennial grasses can be tolerated.

13.4 – CUT STUMPS

LABELED USES: Cut Stumps (on any non-crop site listed on this label)

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Suitable Hand-Held Equipment	This product will control regrowth of cut stumps and resprouts of many types of woody brush and tree species, some of which are listed below. Apply this product using suitable equipment to ensure coverage of the entire cambium. Cut trees or resprouts close to the soil surface. Apply a 50 to 100 percent solution of this product to the freshly-cut surface immediately after cutting. Delays in application may result in reduced performance. For best results, applications should be made during periods of active growth and full leaf expansion. Alder, Eucalyptus, Madrone, Oak, Pepper, Brazilian, Pine, Austrian, Reed, giant, Salt cedar, Sweetgum, Tan oak, Willow	Some sprouts, stems, or trees may share the same root system. Adjacent trees having a similar age, height and spacing may signal shared roots. Whether grafted or shared, injury is likely to occur to non-treated stems/trees when one or more trees sharing common roots are treated.

13.5 – HABITAT MANAGEMENT

LABELED USES: Habitat Restoration and Maintenance, Wildlife Food Plots

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Any suitable application equipment described in Section 8.0 of this label	This product may be used to control exotic and other undesirable vegetation in habitat management and natural areas including rangeland and wildlife refuges. Applications can be made to allow recovery of native plant species, prior to planting desirable native species, and for similar broad spectrum vegetation control requirements in habitat management areas. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL. Spot treatments can be made to selectively remove unwanted plants for habitat maintenance and enhancement. This product may be used as a site preparation treatment to control annual and perennial weeds prior to planting wildlife food plots. Any wildlife food species may be planted after applying this product, or native species may be allowed to repopulate the area.	If tillage is needed to prepare a seedbed, wait 7 days after application before tillage to allow translocation into underground plant parts.

14.0 – FORESTRY, INDUSTRIAL, TURF AND ORNAMENTAL

14.1 – FORESTRY SITE PREPARATION

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Boom Sprayers, Shielded Boom Sprayers, High-Volume Off-Center Nozzles, Hand-Held Equipment, and Similar Equipment	This product is to be used for the control or partial control of woody brush, trees and herbaceous weeds in forestry, as well as for use in preparing or establishing wildlife openings with these sites and maintaining logging roads. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL. This product can be used for site preparation prior to planting any tree species, including Christmas trees, eucalyptus, hybrid tree cultivars and silvicultural nursery sites. Use higher rates of this product within the labeled range for control or partial control of woody brush, trees and hard-to-control perennial herbaceous weeds. For best results, apply to actively growing woody brush and trees after full leaf expansion and before fall color and leaf drop. Increase rates within the labeled range for control of perennial herbaceous weeds any time after emergence and before seedheads, flowers or berries appear. Use the lower rates of this product within the labeled range for control of annual herbaceous weeds and actively growing perennial herbaceous weeds after seedheads, flowers or berries appear. Apply to the foliage of actively growing annual herbaceous weeds any time after emergence. TANK MIXTURES: Tank mixtures of this product may be used to increase the spectrum of vegetation controlled. When tank mixing, read and carefully observe the label claims, cautionary statements and all information on the labels of all products used. Use according to the restrictive precautionary statements for each product in the mixture. **NOTE:** For forestry site preparation, make sure the tank-mix product is approved for use prior to planting the desired species. Observe planting interval restrictions. Any labeled rate of this product may be used in a tank mix with the following products (or generic equivalents) for forestry site preparation. Arsenal Applicators Concentrate Chopper Escort or Escort XP Garlon 3A Garlon 4A Landmark XP Oust or Oust XP Westar For control of herbaceous weeds, use the lower labeled tank mixture rates. For control of dense stands or tough-to-control woody brush and trees, use the higher labeled rates.	Do not apply this product as an over-the-top broadcast spray for forestry conifer or hardwood release unless otherwise specified on this label, or in separate supplemental labeling published by Albaugh, LLC for this product.

14.2 – NONCROP AREAS AND INDUSTRIAL SITES

LABELED USES: Non-crop areas including airports, apartment complexes, Christmas tree farms, commercial sites, Conservation Reserve Program (CRP) areas, ditch banks, dry ditches, dry canals, fencerows, golf courses, greenhouses, industrial sites, landscape areas, lumber yards, manufacturing sites, municipal sites, natural areas, office complexes, ornamentals, parks, parking areas, pastures, petroleum tank farms and pumping installations, plant nurseries, public areas, railroads, rangeland, recreational areas, residential areas, rights-of-way, roadsides, schools, sod or turf seed farms, sports complexes, storage areas, substations, turfgrass areas, utility sites, warehouse areas, and wildlife management areas.

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
This product may be applied with any suitable application equipment described in Section 8.0 of this label.	This product may be used to trim-and-edge around objects in non-crop sites, for spot treatment of unwanted vegetation and to eliminate unwanted weeds growing in established shrub beds or ornamental plantings. This product may be used prior to planting an area to ornamentals, flowers, turfgrass (sod or seed), or prior to laying asphalt or beginning construction projects. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN “ANNUAL WEEDS”, “PERENNIAL WEEDS”, AND “WOODY BRUSH AND TREES” RATE TABLES IN THIS LABEL. Repeated applications of this product may be used, as weeds emerge, to maintain bare ground. TANK MIXTURES: This product may be tank mixed with the following products (or generic equivalents) provided that the specific product is registered for use on the target site. Refer to these product labels for approved sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture. User is responsible for ensuring that the mixture product’s label allows the specific applications. Arsenal™ atrazine Barricade™ 65WG Certainty Crossbow L dicamba* diuron Endurance™ Escort™ Escort XP Gallery 75DF Garlon™ 3A Garlon 4 Goal 2XL Krovar™ I DF Landmark II Landmark II MP Oust Oust XP Outrider pendimethalin Plateau™ Poast Ronstar™ 50 WP simazine Surflan™ AS Surflan WDG Telar™ DF Transline Velpar DF Velpar L 2,4-D When applied as a tank mixture for bare ground, this product provides control of the emerged annual weeds and control or partial control of emerged perennial weeds, woody brush and trees. For control or partial control of the following perennial weeds, apply 1 to 2 quarts of this product plus 2 to 4 ounces of Oust or Oust XP per acre. Bahiagrass Bermudagrass Broomsedge Dallisgrass Dock, curly Dogfennel Fescue, tall Johnsongrass Poorjoe Quackgrass Vaseygrass Vervain, blue	*This product plus dicamba tank mixtures may not be applied by air in California.

14.3 – INJECTION AND FRILL (Woody Brush and Trees)		
LABELED SITES: Woody Brush and Trees in non-crop areas		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
Injection or Frill Applications	Apply this product using suitable equipment which must penetrate into the living tissue. Apply the equivalent of 1 mL of this product per each 2 to 3 inches of trunk diameter at breast height (DBH). This is best achieved by applying a 50 to 100 percent concentration of this product either to a continuous frill around the tree or as cuts evenly spaced around the tree below all branches. As tree diameter increases in size, better results are achieved by applying diluted material to a continuous frill or more closely spaced cuttings. For best results, application should be made during periods of active growth and after full leaf expansion. This product will control many species, some of which are listed below: Control: Oak, Poplar, Sweetgum, Sycamore Partial Control: Black gum, Dogwood, Hickory, Maple, red	Do not allow runoff to occur from frilled or cut areas in species that exude sap freely. In species such as this, make the frill or cuts at an oblique angle to produce a cupping effect and use a 100 percent concentration of this product.

14.4 – HOLLOW STEM INJECTION		
LABELED SITES: Hollow-stem plants growing in any non-crop site specified on this label		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
Hand-Held Injection Devices That Deliver Labeled Amounts of This Product	For control of the following hollow-stem plants, use the application rates below: Japanese Knotweed *(Polygonum cuspidatum)* Inject 5mL per stem of this product between second and third internode. Bohemian Knotweed *(Polygonum bohemicum)* Inject 5mL per stem of this product between the second and third internode. Giant Hogweed *(Hercleum mantegazzianum)* Inject one leaf cane per plant 12 inches above the root crown with 5 mL of a 5% v/v solution of this product. Poison Hemlock *(Conium maculatum)* Inject one leaf cane per plant 10 to 12 inches above the root crown with 5 mL of a 5% v/v solution of this product. Field horsetail *(Equisetum arvense)* Inject one segment above the root crown with 0.5 mL per stem of this product. Use a small syringe that calibrates to this rate. Canada Thistle *(Cirsium arvense)* Cut 8 to 9 of the tallest plants at bud stage in a clump with clippers. Use a cavity needle that is pushed into the stem center and then slowly removed as 0.5 mL per stem of this product is injected into the stem.	The combined total for all treatments must not exceed 7 quarts of this product per acre. At 5 mL per stem, 7 quarts should treat approximately 1300 stems per acre.

14.5 – ORNAMENTALS, PLANT NURSERIES AND CHRISTMAS TREES		
LABELED SITES: Plant Nurseries, Christmas Tree farms and other non-food tree production sites		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
Post-Directed, Trim-and-Edge	This product may be used as a post-directed spray around established woody ornamental species (including arborvitae, azalea, boxwood, crab-apple, eucalyptus, euonymus, fir, Douglas fir, jojoba, hollies, lilac, magnolia, maple, oak, poplar, privet, pine, spruce and yew, growing in plant nurseries, on Christmas tree farms, or on other non-food tree production sites), or to trim and edge around trees, buildings, sidewalks, roads, potted plants and other objects in a production setting. Apply at a concentration labeled by Section 15.0 or Section 16.0 or Section 16.1 or Section 17.0 appropriate to the species of weed to be controlled. Desirable plants may be protected from the spray solution by using shields or coverings made of cardboard or other impermeable material.	UNLESS OTHERWISE DIRECTED, THIS PRODUCT IS NOT ALLOWED FOR USE AS AN OVER-THE-TOP BROADCAST SPRAY IN ORNAMENTALS AND CHRISTMAS TREES. Do not allow contact of spray, drift or mist with foliage or green bark of desirable ornamental species.
Site Preparation	This product may be used prior to planting any tree, shrub or vine, including Christmas tree species, in a nursery or production setting.	
Wiper Application	This product may be used through wick or other suitable wiper applicators to control or partially control undesirable vegetation around established trees, shrubs or vines. See the “SELECTIVE EQUIPMENT” section of this label for further information about the proper use of wiper applicators.	

14.6 – PARKS, RECREATIONAL AND RESIDENTIAL AREAS		
LABELED SITES: Around Trees, Fences, Paths, Driveways, Around Buildings, Patios, Sidewalks, Flower Beds, Around Shrubs and other Ornamental Plants		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
Trim-and-Edge, Spot Treatment	This product may be used to eliminate unwanted weeds growing in areas listed above. Use suitable hand-held equipment for directed spraying according to instructions in Section 7.3 “MIXING FOR HAND-HELD SPRAYERS”. If necessary, use cardboard or plastic to shield desirable plants. Do not use for spot weed control in lawns since desirable lawn grass will also be killed.	Spray only when air is calm. Do not allow contact of spray, drift or mist with foliage or green bark of desirable ornamental species.
Site Preparation, Lawn Renovation	This product may be used prior to planting an area to ornamentals, flowers, turfgrass (sod or seed), lawn renovation or prior to laying asphalt or beginning construction projects. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN “ANNUAL WEEDS”, “PERENNIAL WEEDS”, AND “WOODY BRUSH AND TREES” RATE TABLES IN THIS LABEL. Apply using suitable broadcast or directed spray equipment. For lawn renovation, thorough coverage is necessary to kill all weeds and old lawn. For best results, apply when daytime temperatures are at least 60°F. Do not mow for 7 days before or after treatment. 7 days after application, soil may be tilled, fertilized and seeded.	

14.7 – RAILROADS		
LABELED SITES: Railroad Rights-of-Way, Railroad Ballast Areas		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
Boom Sprayers, Shielded Boom Sprayers, High-Volume Off-Center Nozzles, Hand-Held Equipment	All of the instructions in the "NONCROP AREAS AND INDUSTRIAL SITES" section apply to railroads. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL. This product may be used to maintain bare ground on railroad ballast and shoulders. Repeat applications of this product may be used, as weeds emerge, to maintain bare ground. This product may be used to control tall-growing weeds to improve line-of-sight at railroad crossings and reduce the need for mowing along rights-of-way. For crossing applications, up to 80 gallons of spray solution per acre may be used. TANK MIXTURES: This product may be tank mixed with the following products (or generic equivalent) for ballast, shoulder, spot, bare ground and crossing treatments provided that the specific product is registered for use on such sites. Refer to these product labels for approved non-crop sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture. ARSENAL® GARLON® 4 SPIKE® Dicamba HYVAR® X TELAR® DIURON KROVAR® I DF VELPAR® ESCORT® OUST® 2,4-D GARLON® 3A SAHARA® **Brush control** This product may be used to control woody brush and trees on railroad rights-of-way. Apply 4 to 10 quarts of this product per acre as a broadcast spray, using boom-type or boomless nozzles. Up to 80 gallons of spray solution per acre may be used. Apply a 3/4 to 2 percent solution of this product when using high-volume spray-to-wet applications. Apply a 5 to 10 percent solution of this product when using low-volume directed sprays for spot treatment. This product may be mixed with the following products (or generic equivalent) for enhanced control of woody brush and trees: ARSENAL® KRENITE TRANSLINE ESCORT® TELAR DF VANQUISH GARLON® 3A TORDON 22K VELPAR GARLON 4 TORDON® K	Observe application precautions in Section 8.0. Do not allow herbicide contact with non-target plants due to drift, overspray or runoff.

14.8 – ROADSIDES		
LABELED SITES: Roadside Rights-of-Way areas (including Shoulders, Guardrails and Signposts)		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
Boom Sprayers, Shielded Boom Sprayers, High-Volume Off-Center Nozzles, Hand-Held Equipment, and Similar Equipment	All the instructions in the "NONCROP AREAS AND INDUSTRIAL SITES" section apply to roadsides. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL. This product may be used on road shoulders, under guardrails and around sign-posts and other objects along roadsides that may be obstacles to mowing. TANK MIXTURES: This product may be tank-mixed with the following products (or generic equivalent) for shoulder, guardrail, spot and bare ground treatments: BANVEL® / PENDULUM® 3.3 EC / SIMAZINE DIURON / PENDULUM® WDG / SURFLAN® ENDURANCE® / PRINCEP® DF / TELAR® ESCORT® / PRINCEP® LIQUID / VANQUISH® KROVAR® I DF / RONSTAR® 50 WP / 2,4-D OUST® / SAHARA® See the "NONCROP AREAS AND INDUSTRIAL SITES" section of this label for instructions for tank mixing.	Observe application precautions in Section 8.0. Do not allow herbicide contact with non-target plants due to drift, overspray or runoff.
Spot Treatment	This product may be used as a spot treatment to control unwanted vegetation growing along roadsides.	

14.9 – UTILITY SITES

LABELED SITES: Electrical Power, Pipeline And Telephone Rights-Of-Way, And In Other Sites Associated With These Rights-Of-Way, Including Substations, Roadsides, Railroads Or Similar Rights-Of-Way That Run In Conjunction With Utilities.

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Boom Sprayers, Shielded Boom Sprayers, High-Volume Off-Center Nozzles, Hand-Held Equipment, and Similar Equipment	This product may be used in utility sites and substations to control unwanted vegetation and to eliminate unwanted weeds growing in established shrub beds or ornamental plantings. This product may be used prior to planting a utility site to ornamentals, flowers, turfgrass (sod or seed), or beginning construction projects. MAKE APPLICATIONS ACCORDING TO THE RATES LISTED IN "ANNUAL WEEDS", "PERENNIAL WEEDS", AND "WOODY BRUSH AND TREES" RATE TABLES IN THIS LABEL. Repeated applications of this product may be used, as weeds emerge, to maintain bare ground. This product can also be used when preparing or establishing wildlife openings within these sites, maintaining access roads and for side trimming along utility rights-of-way. For control of herbaceous weeds, use the lower labeled tank mixture rates. For control of dense stands of tough-to-control woody brush and trees, use the higher labeled rates. TANK MIXTURES: Tank mixtures of this product may be used to increase the spectrum of control for herbaceous weeds, woody brush and trees. This product may be tank mixed with the following products or generic equivalent). Refer to these products' labels for approved non-crop sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture. User is responsible for ensuring that the mixture product's label allows the specific application when tank mixing with a single generic active ingredient listed below. ARSENAL atrazine[1] BARRICADE 65WG dicamba[1] diuron[1] ENDURANCE ESCORT ESCORT XP GARLON 3A[2] GARLON 4[3] KRENITE KROVAR 1 DF OUST OUST XP OUTRIDER pendimethalin[1] PLATEAU PRINCEP RONSTAR 50WP SAHARA simazine[1] SURFLAN AS SURFLAN WDG TELAR DF TRANSLINE VANQUISH VELPAR DF VELPAR L 2,4-D[2] [1]Tank mixtures with product containing this generic active ingredient may be made provided the specific product is registered for the use. [2]Ensure that Garlon 3A is thoroughly mixed with water according to label directions before adding this product. Have spray mixture agitating at the time this product is added to avoid spray incompatibility problems. [3]For side trimming treatments, use this product alone or in a tank mixture with Garlon 4.	Observe application precautions in Section 8.0. Do not allow herbicide contact with non-target plants due to drift, overspray or runoff.

14.10 – CONIFER RELEASE
(Not For Use in California)

LABELED SITES: Forestry

TYPES OF APPLICATIONS	USE DIRECTIONS	RESTRICTIONS
Boom Sprayers, Shielded Boom Sprayers, High-Volume Off-Center Nozzles, Hand-Held Equipment, Aerial, and Similar Equipment. See the "APPLICATION EQUIPMENT and TECHNIQUES" part of the "MIXING, ADDITIVES and APPLICATION INSTRUCTIONS" section of this label for information on how to properly spray this product by air.	For release, apply only where conifers have been established for more than one year. Vegetation should not be disturbed prior to treatment or until visual symptoms appear after treatment. Symptoms of treatment are slow to appear, especially in woody species treated in late fall. Injury may occur to conifers treated for release, especially where spray patterns overlap or the higher rates are applied or when applications are made during periods of active conifer growth. Applications must be made after formation of final conifer resting buds in the fall or prior to initial budswelling in spring. Some autumn colors on undesirable deciduous species are acceptable provided no major leaf drop has occurred. For release of the following conifer species: Douglas Fir — *Pseudotsuga menziesii* Pines* — *Pinus* spp. Fir — *Abies* spp. Spruce — *Picea* spp. Hemlock — *Tsuga* spp. *includes all species except eastern white pine, loblolly pine or slash pine. Apply 1.5 to 2 quarts of this product per acre except in Washington and Oregon, west of the crest of the Cascade Mountains. For spring treatments west of the crest of the Cascade Mountains, apply 1 quart of this product per acre before conifer bud swell for control of annual weeds. For fall treatments in Washington and Oregon, west of the crest of the Cascade Mountains, apply 1 to 1.5 quarts of this product per acre before any major leaf drop of deciduous species. For release of western hemlock apply 1 quart of this product per acre. For release of the following conifer species: Loblolly pine — *Pinus taeda* Slash pine — *Pinus elliottii* Eastern white pine Late Season Application – Apply 1.5 to 2 quarts of this product in a minimum of 5 gallons of spray solution per acre during early autumn. Applications made prior to September 1 or when conditions are conducive to rapid growth of conifers will result in potential for increased injury in the form of tip and/or needle burn, injury may decrease with later application. Some autumn colors are acceptable at time of application. Apply prior to frost or leaf drop of undesirable plants. Applications made according to label direction will release loblolly pine, eastern white pine and slash pine by reducing competition from the following species: Ash — *Fraxinus* spp. Cherry, black — *Prunus serotina* Cherry, pin — *Prunus pensylvanica* Elm — *Ulmus* spp. Hawthorn — *Crataegus* spp. Locust, black — *Robina pseudoacacia* Maple, red — *Acer rubra* Oak, white — *Quercus alba* Oak, black — *Quercus velutina* Oak, post — *Quercus stellata* Oak, southern red — *Quercus falcata* Persimmon — *Diospyros* spp. Poplar, yellow — *Liriodendron tulipfera* Sassafras — *Sassaras albidum* Sourwood — *Oxydendrum arboretum* Sumac, poison — *Rhus vermix* Sumac, smooth — *Rhus glabra* Sumac, winged — *Rhus copallina* Sweetgum — *Liquidambar styraciflua* *(continued)*	Observe application precautions in Section 8.0. Do not allow herbicide contact with non-target plants due to drift, overspray or runoff. DO NOT APPLY THIS PRODUCT BY AIR TO RIGHTS-OF-WAY SITES IN THE STATE OF CALIFORNIA. Do not use additional surfactant with conifer release applications. This product plus Oust tank mixtures may not be applied by air in California.

(continued)

14.10 – CONIFER RELEASE *(cont.)* (Not For Use in California)		
LABELED SITES: Forestry		
TYPES OF APPLICATIONS	**USE DIRECTIONS**	**RESTRICTIONS**
Boom Sprayers, Shielded Boom Sprayers, High-Volume Off-Center Nozzles, Hand-Held Equipment, Aerial, and Similar Equipment. See the "APPLICATION EQUIPMENT and TECHNIQUES" part of the "MIXING, ADDITIVES and APPLICATION INSTRUCTIONS" section of this label for information on how to properly spray this product by air.	Apply only to those sites where woody brush and trees listed in this label constitute the majority of the undesirable species. TANK MIXTURES: Mix with Oust for conifer release from herbaceous weeds. To release loblolly pines from herbaceous weeds, tank mixtures of this product with Oust will provide control of annual weeds listed in the "ANNUAL WEEDS RATE TABLE" section of this label and the Oust label, and partial control of the perennial weeds listed below. Apply 16 to 24 fluid ounces of this product with 2 to 4 ounces of Oust in 10 to 30 gallons of spray solution per acre. Make application to actively growing weeds as a broadcast spray over the top of the young loblolly pines. This tank mixture may be applied using aerial equipment. When applying by air, use the specified rate in 5 to 15 gallons of spray solution per acre. For control of annual weeds below 12 inches in height (or runner length on annual vines), use the low rates of both products: Use the higher rates of both products when annual weeds are in more advanced stages of growth and approaching flower or seed formation. Use the higher rates of both products for partial control of the following perennial weeds. Use the lower rates tor suppression of growth. Bahiagrass *Paspalum notatum* Broomsedge *Andropogon virginicus* Dock, curly *Rumex crispus* Dogfennel *Eupatorium capillitorium* Fescue, Tall *Festuca arundinacea* Johnson grass** *Sorghum halepense* Poorjoe** *Diodia teres* Trumpetcreeper* *Campus radicans* Vaseygrass *Paspalum urvillei* Vervain, blue *Verbena hastata* *Suppression at the higher rates only. **Control at the higher rates. Pine damage may occur or can be accentuated if treatment takes place when young trees are under stress from drought, flood water, insects or disease. Read and observe the cautionary statements and all other information appearing on the labels of all herbicides used.	Observe application precautions in Section 8.0. Do not allow herbicide contact with non-target plants due to drift, overspray or runoff. DO NOT APPLY THIS PRODUCT BY AIR TO RIGHTS-OF-WAY SITES IN THE STATE OF CALIFORNIA. Do not use additional surfactant with conifer release applications. This product plus Oust tank mixtures may not be applied by air in California.

15.0 – ANNUAL WEEDS RATE TABLES (Alphabetically by Species)

WATER CARRIER VOLUMES OF 3 TO 10 GALLONS PER ACRE FOR GROUND APPLICATIONS AND 3 TO 5 GALLONS PER ACRE FOR AERIAL APPLICATIONS ARE REQUIRED.

- Apply to actively growing annual weeds. Annual weeds are generally easiest to control when they are small.
- Older, mature (hardened) annual weed species may require higher rates even if they meet the size requirements.
- Do not tank mix with soil residual herbicides when using these rates unless otherwise specified.
- For weeds that have been mowed, grazed or cut, allow regrowth to occur prior to treatment.
- This product may be used up to 48 fluid ounces per acre where heavy weed densities exist.

(continued)

ANNUAL WEEDS RATE TABLE

WEED SPECIES	APPLICATION RATE (fluid ounces/acre)				
	16	24	32	40	48
	Maximum height/length (in inches)				
Ammannia, purple	3"	6"	12"	–	18"
Annoda, spurred	–	2"	3"	5"	8"
Barley	18"	18"+	–	–	–
Barnyardgrass	–	3"	6"	7"	9"
Bassia, fivehook	–	–	6"	–	–
Beggarweed, Florida	–	5"	8"	–	–
Bittercress	12"	20"	–	–	–
Bluegrass, annual	10"	–	–	–	–
Bluegrass, bulbous	6"	–	–	–	–
Brome, downy[1,2]	6"	12"	–	–	–
Brome, Japanese	6"	12"	24"	–	–
Browntop panicum	6"	8"	12"	–	24"
Buckwheat, wild[3]	–	1"	2"	–	–
Burcucumber	–	6"	12"	–	18"
Buttercup	12"	20"	–	–	–
Carolina geranium	–	–	4"	–	9"
Carpetweed	–	6"	12"	–	–
Cheat[2]	6"	20"	–	–	–
Chervil	20"	–	–	–	–
Chickweed	–	12"	18"	–	–
Cocklebur	12"	18"	24"	–	36"
Copperleaf, hophornbeam	–	2"	4"	–	6"
Copperleaf, Virginia	–	2"	4"	–	6"
Coreopsis, plains	–	6"	12"	–	18"
Corn, Volunteer	6"	12"	20"	–	–
Corn, speedwell	12"	–	–	–	–
Crabgrass	3"	6"	12"	–	–
Crowfootgrass	–	–	6"	–	12"
Cutleaf evening primrose	–	–	3"	–	6"
Devilsclaw (unicorn plant)	–	3"	6"	–	–
Dwarfdandelion	12"	–	–	–	–
Eastern mannagrass	8"	12"	–	–	–
Eclipta	–	4"	8"	12"	–
Fall panicum	4"	–	6"	–	12"
Falsedandelion	–	20"	–	–	–
Falseflax, smallseed	12"	–	–	–	–
Fiddleneck	–	6"	12"	–	–
Field pennycress	6"	12"	–	–	–
Filaree	–	–	6"	–	12"
Fleabane, annual	6"	20"	–	–	–

(continued)

ANNUAL WEEDS RATE TABLE *(cont.)*

WEED SPECIES	APPLICATION RATE (fluid ounces/acre)				
	16	24	32	40	48
	Maximum height/length (in inches)				
Fleabane, hairy *(Conyza bonariensis)*	–	–	6"	–	10"
Fleabane, rough	3"	6"	12"	–	–
Florida pusley	–	–	4"	–	6"
Foxtail, giant, bristly, yellow	6"	12"	20"	–	–
Foxtail, Carolina	10"	–	–	–	–
Foxtail, green	12"	–	–	–	–
Goatgrass, jointed	6"	12"	–	–	–
Goosegrass	–	3"	6"	–	12"
Grain sorghum (milo)	6"	12"	20"	–	–
Groundcherry	–	3"	6"	–	9"
Groundsel, common	–	6"	10"	–	–
Hemp sesbania	–	2"	4"	6"	8"
Henbit	–	–	6"	–	12"
Horseweed/Marestail *(Conyza canadensis)*	–	6"	12"	–	18"
Itchgrass	6"	8"	12"	–	18"
Jimsonweed	–	–	12"	–	18"
Johnsongrass, seedling	6"	12"	18"	–	24"
Junglerice	–	3"	6"	7"	9"
Knotweed	–	–	6"	–	12"
Kochia[4]	–	3" to 6"	12"	–	–
Lambsquarters	–	6"	12"	–	20"
Little barley	6"	12"	–	–	–
London rocket	6"	–	24"	–	–
Mayweed	–	2"	6"	12"	18"
Morningglory *(Ipomoea* spp.)	–	–	3"	–	6"
Mustard, blue	6"	12"	18"	–	–
Mustard, tansy	6"	12"	18"	–	–
Mustard, tumble	6"	12"	18"	–	–
Mustard, wild	6"	12"	18"	–	–
Nightshade, black	–	4"	6"	–	12"
Nightshade, hairy	–	4"	6"	–	12"
Oats	3"	6"	18"	–	–
Pigweed	–	12"	18"	24"	–
Prickly lettuce	–	6"	12"	–	–
Purslane	–	–	3"	–	6"
Ragweed, common	–	6"	12"	–	18"
Ragweed, giant	–	6"	12"	–	18"
Red rice	–	–	4"	–	–
Rye, volunteer/cereal[2]	6"	18"	18" +	–	–
Ryegrass	–	–	6"	–	12"

(continued)

ANNUAL WEEDS RATE TABLE *(cont.)*

WEED SPECIES	APPLICATION RATE (fluid ounces/acre)				
	16	24	32	40	48
	Maximum height/length (in inches)				
Sandbur, field	6"	12"	–	–	–
Sandbur, longspine	6"	12"	–	–	–
Shattercane	6"	12"	20"	–	–
Shepherdspurse	6"	12"	–	–	–
Sicklepod	–	2"	4"	–	8"
Signalgrass, broadleaf	–	3"	6"	7"	9"
Smartweed, ladysthumb	–	–	6"	–	9"
Smartweed, Pennsylvania	–	–	6"	–	9"
Sowthistle, annual	–	–	6"	–	12"
Spanishneedles	–	–	6"	–	12"
Speedwell, purslane	12"	–	–	–	–
Sprangletop	6"	12"	20"	–	–
Spurge, prostrate	–	6"	12"	–	–
Spurge, spotted	–	6"	12"	–	–
Spurry, umbrella	6"	–	–	–	–
Stinkgrass	–	12"	–	–	–
Sunflower	12"	18"	–	–	–
Swinecress	–	5"	12"	–	–
Teaweed/Prickly sida	–	2"	4"	–	6"
Texas panicum	6"	8"	12"	–	24"
Thistle, Russian[5]	–	6"	12"	–	–
Velvetleaf	–	–	6"	–	12"
Virginia pepperweed	–	18"	–	–	–
Waterhemp	–	–	6"	–	12"
Wheat[2]	6"	12"	18"	–	–
Wheat (overwintered)	–	6"	12"	–	18"
Wild oats	3"	6"	18"	–	–
Wild proso millet	–	6"	12"	–	18"
Witchgrass	–	12"	–	–	–
Woolly cupgrass	–	6"	12"	–	–
Yellow rocket	–	12"	20"	–	–

[1] For control of downy brome in no-till systems, use 24 fluid ounces per acre.
[2] Performance is better if application is made before this weed reaches the boot stage of growth.
[3] Use 24 fluid ounces per acre of this product to control wild buckwheat in the cotyledon to 2-leaf stage.
Use 32 fluid ounces per acre to control 2- to 4-leaf wild buckwheat. For improved control of wild buckwheat over 2 inches in size, use sequential treatments of 32 fluid ounces followed by 32 fluid ounces of this product per acre.
[4] Do not treat kochia in the button stage.
[5] Control of Russian thistle may vary based on environmental conditions and spray coverage.

Whenever possible, a tank mixture with 2,4-D as described below may improve control.

15.1 – ANNUAL WEEDS – Water Carrier Volumes of 10 to 40 Gallons per Acre

Apply 1 to 2 quarts of this product per acre. Use 1 quart per acre if weeds are less than 6 inches tall and 1.5 quarts per acre if weeds are 6 to 12 inches tall and 2 quarts per acre if weeds are greater than 12 inches tall.

These rates will provide control of weeds listed in the annual weed control tables when water carrier volumes are 10 to 40 gallons per acre for ground applications. Older, mature (hardened) annual weed species may require higher rates even of they meet the size requirements.

15.2 – ANNUAL WEEDS – Tank Mixtures with 2,4-D or Dicamba or Picloram 22K

12 to 16 fluid ounces of this product plus 0.25 pounds a.i. of Dicamba or 0.5 pounds a.i. of 2,4-D per acre or 1 to 2 fluid ounces of Picloram 22K per acre will control the following weeds with the maximum height or length indicated:

6" – prickly lettuce, marestail/horseweed *(Conyza canadensis),* morningglory *(Ipomoea* spp.), kochia (dicamba only); Wild buckwheat (Picloram 22K only)

12" – cocklebur, lambsquarters, pigweed, Russian thistle (2,4-D only).

16 fluid ounces of this product plus 0.5 pounds a.i. of 2,4-D per acre will control the following weeds when they are a maximum height or length of 6 inches: common ragweed, giant ragweed, Pennsylvania smartweed, and velvetleaf.

Refer to the specific product labels for crop rotation restrictions and cautionary statements of all products used in tank mixtures. Some crop injury may occur if dicamba or Picloram 22K is applied within 45 days of planting.

DO NOT APPLY DICAMBA TANK MIXTURES BY AIR IN CALIFORNIA.

15.3 – ANNUAL WEEDS – Hand-Held or High-Volume Equipment

For control of weeds listed in the "ANNUAL WEEDS RATE TABLE", apply a 0.5 percent solution of this product to weeds less than 6 inches in height or runner length. Apply prior to seedhead formation in grass or bud formation in broadleaf weeds. For annual weeds over 6 inches tall, or unless otherwise specified, use a 1 percent solution.

For best results, use a 2 percent solution on harder-to-control perennials, such as bermudagrass, dock, field bindweed, hemp dogbane, milkweed and Canada thistle.

When using application methods that result in less than complete coverage, use a 5 percent solution for annual and perennial weeds and a 5 to 10 percent solution for woody brush and trees.

15.4 – ANNUAL WEEDS – Tank Mixtures with Atrazine for Fallow and Reduced Tillage Systems

For use only in Colorado, Kansas, Nebraska, Oklahoma, Oregon, South Dakota, and Washington. In Oregon and Washington, do not exceed 1 pound of atrazine per acre.

24 to 28 fluid ounces of this product plus 1 to 2 pounds of atrazine per acre will control the following weeds: Barnyardgrass (requires 28 ounces for control), Downy brome, Green foxtail, Lambsquarters, Prickly lettuce, Tansy mustard, Pigweed, Field sandbur, Stinkgrass, Russian thistle, Volunteer wheat, Witchgrass and Kochia (add 1/8 pound of dicamba for control).

16.0 – PERENNIAL WEEDS RATE TABLE (Alphabetically by Species)

Apply to actively growing perennial weeds.

NOTE: If weeds have been mowed or tilled, do not treat until plants have resumed active growth and have reached the recommended stages.

Repeat treatments may be necessary to control weeds regenerating from underground parts or seed. Repeat treatments must be made prior to crop emergence.

Unless otherwise stated, allow 7 or more days after application before tillage.

Do not treat when weeds are under drought stress as good soil moisture is necessary for active growth.

For hand-held sprayers, prepare the desired volume of spray solution by mixing the amount of this product in water as shown in the following table.

Spray Solution

Desired Volume	Amount of GlyStar® Original					
	1/2%	1%	1-1/2%	2%	5%	10%
1 Gal.	2/3 fl. oz.	1-1/3 fl. oz.	2 fl.oz.	2-2/3 fl. oz.	6-1/2 fl. oz.	13 fl. oz.
25 Gals.	1 pt.	1 qt.	1-1/2 qts.	2 qts.	5 qts.	10 qts.
100 Gals.	2 qts.	1 gal.	1-1/2 gals.	2 gals.	5 gals.	10 gals.

2 tablespoons = 1 fluid ounce

WEED SPECIES	RATE (QT/A)	WATER VOL. (GPA)	HAND-HELD % SOLUTION	COMMENTS
Alfalfa	1-2	3-10	2%	Make applications after the last hay cutting in the fall. Allow alfalfa to regrow to a height of 6 to 8 inches or more prior to treatment. Applications should be followed with deep tillage at least 7 days after treatment, but before soil freeze-up.
Alligatorweed	4	3-20	1.5%	Partial control. Apply when most of the plants are in bloom. Repeat applications will be required to maintain control.
Anise (fennel)	–	–	1-2%	Apply as a spray-to-wet treatment. Optimum results are obtained when plants are treated at the bud to full-bloom stage of growth.
Bahiagrass	3-5	3-20	2%	Apply when most plants have reached the early head stage.
Bentgrass	1.5	10-20	2%	For suppression in grass seed production areas. For ground applications only. Ensure entire crown area has resumed growth prior to a fall application. Bentgrass should have at least 3 inches of growth. Tillage prior to treatment should be avoided. Till 7 to 10 days after application for best results.
Bermudagrass	3-5	3-20	2%	For control, apply 5 quarts of this product per acre. For partial control, apply 3 quarts per acre. Treat when bermudagrass is actively growing and seedheads are present. Retreatment may be necessary to maintain control.
Bermudagrass, water (knotgrass)	1-1.5	5-10	2%	Apply 1.5 quarts of this product in 5 to 10 gallons of water per acre. Apply when water bermudagrass is 12 to 18 inches in length. Allow 7 or more days before tilling, flushing or flooding the field. Fall applications only: Apply 1 quart of this product in 5 to 10 gallons of water per acre. Fallow fields should be tilled prior to application. Apply prior to frost on water bermudagrass that is 12 to 18 inches in length. This product is not registered in California for use on water bermudagrass.
Bindweed, field	0.5-5	3-20	2%	Do not treat when weeds are under drought stress as good soil moisture is necessary for active growth. For control, apply 4 to 5 quarts of this product per acre west of the Mississippi River and 3 to 4 quarts east of the Mississippi River. Apply when the weeds are at or beyond full bloom. For best results, apply in late summer or fall. Fall treatments must be applied before a killing frost. Also for control, apply 2 quarts of this product plus 0.5 pounds a.i. of Banvel® in 10 to 20 gallons of water per acre. Do not apply by air. For suppression on irrigated agricultural land, apply 1 to 2 quarts of this product plus 1 pound a.i. of 2,4-D in 10 to 20 gallons of water per acre with ground equipment only. Applications should be made following harvest or in fall fallow ground when the bindweed is actively growing and the majority of runners are 12 inches or more in length. The use of at least one irrigation will promote active bindweed growth. For suppression, apply 16 fluid ounces of this product plus 0.5 pound a.i. 2,4-D in 3 to 10 gallons of water per acre for ground applications and 3 to 5 gallons of water per acre for aerial applications. Apply by air in fallow and reduced tillage systems only. Applications should be delayed until maximum emergence has occurred and when vines are between 6 to 18 inches in length. In California only, apply 1 to 5 quarts of this product per acre. Actual rate needed for suppression or control will vary within this range depending on local conditions. For suppression on irrigated land where annual tillage is performed, apply 1 quart of this product in 3 to 10 gallons of water per acre. Apply to bindweed that has reached a length of 12 inches or greater. Allow maximum weed emergence and runner growth. Allow 3 or more days after application before tillage.
Bluegrass, Kentucky	1-2	3-40	2%	Apply 2 quarts of this product in 10 to 40 gallons of water per acre when most plants have reached boot-to-early seedhead stage of development. For partial control in pasture or hay crop renovation, apply 1 to 1.5 quarts of this product in 3 to 10 gallons of water per acre. Apply to actively growing plants when most have reached 4 to 12 inches in height.

(continued)

WEED SPECIES	RATE (QT/A)	WATER VOL. (GPA)	HAND-HELD % SOLUTION	COMMENTS
Blueweed, Texas	3-5	3-40	2%	Apply 4 to 5 quarts of this product per acre west of the Mississippi River and 3 to 4 quarts per acre east of the Mississippi River. Apply when plants are at or beyond full bloom. New leaf development indicates active growth. For best results, apply in late summer or fall. Fall treatments must be applied before a killing frost.
Brackenfern	3-4	3-40	1-1.5%	Apply to fully expanded fronds which are at least 18 inches long.
Bromegrass, smooth	1-2	3-40	2%	Apply 2 quarts of this product in 10 to 40 gallons of water per acre when most plants have reached boot-to-early seedhead stage of development. For partial control in pasture or hay crop renovation, apply 1 to 1.5 quarts of this product in 3 to 10 gallons of water per acre. Apply to actively growing plants when most have reached 4 to 12 inches in height.
Bursage, woolly-leaf	–	3-20	2%	For control, apply 2 quarts of this product plus 1 pint of Banvel® per acre. For partial control, apply 1 quart of this product plus 1 pint of Banvel® per acre. Apply when plants are producing new active growth which has been initiated by moisture for at least 2 weeks and when plants are at or beyond flowering.
Canarygrass, reed	2-3	3-40	2%	For best results, apply when most plants have reached the boot-to-head stage of growth.
Cattail	3-5	3-40	2%	Apply when most plants have reached the early head stage.
Clover; red, white	3-5	3-20	2%	Apply when most plants have reached the early bud stage. Also for control, apply 16 to 32 fluid ounces of this product plus 1/2 to 1 pound of 2,4-D in 3 to 10 gallons of water per acre.
Cogongrass	3-5	10-40	2%	Apply when cogongrass is at least 18 inches tall in late summer or fall. Due to uneven stages of growth and the dense nature of vegetation preventing good spray coverage, repeat treatments may be necessary to maintain control.
Dallisgrass	3-5	3-20	2%	Apply when most plants have reached the early head stage.
Dandelion	3-5	3-40	2%	Apply when most plants have reached the early bud stage of growth. Also for control, apply 16 fluid ounces of this product plus 0.5 pound a.i. 2,4-D in 3 to 10 gallons of water per acre.
Dock, curly	3-5	3-40	2%	Apply when most plants have reached the early bud stage of growth. Also for control, apply 16 fluid ounces of this product plus 0.5 pound a.i. 2,4-D in 3 to 10 gallons of water per acre.
Dogbane, hemp	4	3-40	2%	Apply when most plants have reached the late bud to flower stage of growth. Following crop harvest or mowing, allow weeds to regrow to a mature stage prior to treatment. For best results, apply in late summer or fall. For suppression, apply 16 fluid ounces of this product plus 0.5 pound a.i. of 2,4-D in 3 to 10 gallons of water per acre for ground applications and 3 to 5 gallons of water per acre for aerial applications. Delay applications until maximum emergence of dogbane has occurred.
Fescue (except tall)	3-5	3-20	2%	Apply when most plants have reached the early head stage.
Fescue, tall	1-3	3-40	2%	Apply 3 quarts of this product per acre when most plants have reached boot-to-early seedhead stage of development. Fall applications only: Apply 1 quart of this product in 3 to 10 gallons of water per acre. Apply to fescue in the fall when plants have 6 to 12 inches of new growth. A sequential application of 1 pint per acre of this product will improve long-term control and control seedlings germinating after fall treatments or the following spring.
Guineagrass	2-3	3-40	1%	Apply when most plants have reached at least the 7-leaf stage of growth. Ensure thorough coverage when using hand-held equipment.
Horsenettle	3-5	3-20	2%	Apply when most plants have reached the early bud stage.
Horseradish	4	3-40	2%	Apply when most plants have reached the late bud to flower stage of growth. For best results, apply in late summer or fall.
Iceplant	–	–	1.5-2%	Iceplant should be at or beyond the early bud stage of growth. Thorough coverage is necessary for best control.

(continued)

WEED SPECIES	RATE (QT/A)	WATER VOL. (GPA)	HAND-HELD % SOLUTION	COMMENTS
Jerusalem artichoke	3-5	3-20	2%	Apply when most plants are in the early bud stage.
Johnsongrass	0.5-3	3-40	1%	In annual cropping systems apply 1 to 2 quarts of this product per acre. Apply 1 quart of this product in 3 to 10 gallons of water per acre. Use 2 quarts of this product when applying 10 to 40 gallons of water per acre. In noncrop, or areas where annual tillage (no-till) is not practiced, apply 2 to 3 quarts of this product in 10 to 40 gallons of water per acre. For best results, apply when most plants have reached the boot-to-head stage of growth or in the fall prior to frost. Allow 7 or more days after application before tillage. Do not tank mix with residual herbicides when using the 1 quart per acre rate. For burndown of Johnsongrass, apply 1 pint of this product in 3 to 10 gallons of water per acre before the plants reach a height of 12 inches. For this use, allow at least 3 days after treatment before tillage. Spot treatment (partial control or suppression) – Apply a 1 percent solution of this product when Johnsongrass is 12 to 18 inches in height. Coverage must be uniform and complete.
Kikuyugrass	2-3	3-40	2%	Spray when most kikuyugrass is at least 8 inches in height (3- or 4-leaf stage of growth). Allow 3 or more days after application before tillage.
Knapweed	4	3-40	2%	Apply when most plants have reached the late bud to flower stage of growth. For best results, apply in late summer or fall.
Lantana	–	–	1-1.25%	Apply at or beyond the bloom stage of growth. Use the higher application rate for plants that have reached the woody stage of growth.
Lespedeza	3-5	3-20	2%	Apply when most plants have reached the early bud stage.
Milkweed, common	3	3-40	2%	Apply when most plants have reached the late bud to flower stage of growth.
Muhly, wirestem	1-2	3-40	2%	Use 1 quart of this product in 3 to 10 gallons of water per acre. Use 2 quarts of this product when applying 10 to 40 gallons of water per acre or in pasture, sod, or noncrop areas. Spray when the wirestem muhly is 8 inches or more in height. Do not till between harvest and fall applications or in the fall or spring prior to spring applications. Allow 3 or more days after application before tillage.
Mullein, common	3-5	3-20	2%	Apply when most plants are in the early bud stage.
Napiergrass	3-5	3-20	2%	Apply when most plants are in the early head stage.
Nightshade, silverleaf	2	3-10	2%	Applications should be made when at least 60 percent of the plants have berries. Fall treatments must be applied before a killing frost.
Nutsedge; purple, yellow	0.5-3	3-40	1-2%	Apply 3 quarts of this product per acre or apply a 1 to 2 percent solution for control of nutsedge plants and immature nutlets attached to treated plants. Treat when plants are in flower or when new nutlets can be found at rhizome tips. Nutlets which have not germinated will not be controlled and may germinate following treatment. Repeat treatments will be required for long-term control of ungerminated tubers. Sequential applications: 1 to 2 quarts of this product in 3 to 10 gallons of water per acre will also provide control. Make applications when a majority of the plants are in the 3- to 5-leaf stage (less than 6 inches tall). Repeat this application, as necessary, when newly emerging plants reach the 3- to 5-leaf stage. Subsequent applications will be necessary for long-term control. For partial control of existing plants, apply 1 pint to 2 quarts of this product in 3 to 40 gallons of water per acre. Treat when plants have 3 to 5 leaves and most are less than 6 inches tall. Repeat treatments will be required to control subsequent emerging plants or regrowth of existing plants.
Orchardgrass	1-2	3-40	2%	Apply 2 quarts of this product in 10 to 40 gallons of water per acre when most plants have reached boot-to-early seedhead stage of development. For partial control in pasture or hay crop renovation, apply 1 to 1.5 quarts of this product in 3 to 10 gallons of water per acre. Apply to actively growing plants when most have reached 4 to 12 inches in height. Orchardgrass sods going to no-till corn: Apply 1 to 1.5 quarts of this product in 3 to 10 gallons of water per acre. Apply to orchardgrass that is a minimum of 12 inches tall for spring applications and 6 inches tall for fall applications. Allow at least 3 days following application before planting. A sequential application of atrazine will be necessary for optimum results.

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WEED SPECIES	RATE (QT/A)	WATER VOL. (GPA)	HAND-HELD % SOLUTION	COMMENTS
Pampasgrass	–	–	1.5- 2%	Pampasgrass should be at or beyond the boot stage of growth. Thorough coverage is necessary for best control.
Paragrass	3-5	3-20	2%	Apply when most plants are in the early head stage.
Phragmites	3-5	10-40	1-2%	For partial control. For best results, treat during late summer or fall months or when plants are actively growing and in full bloom. Treatment before or after this stage may lead to reduced control. Due to the dense nature of the vegetation, which may prevent good spray coverage or uneven stages of growth, repeat treatments may be necessary to maintain control. Visual control symptoms will be slow to develop.
Poison hemlock	–	–	1-2%	Apply as a spray-to-wet treatment. Optimum results are obtained when plants are treated at the bud to full-bloom stage of growth.
Pokeweed, common	1	3-40	2%	Apply to actively growing plants up to 24 inches tall.
Quackgrass	1-3	3-40	2%	In annual cropping systems, or in pastures and sods followed by deep tillage: Apply 1 quart of this product in 3 to 10 gallons of water per acre. For 10 to 40 gallons of water per acre, apply 2 quarts of this product. Do not tank mix with residual herbicides when using the 1 quart rate. Spray when quackgrass is 6 to 8 inches in height. Do not till between harvest and fall applications or in fall or spring prior to spring application. Allow 3 or more days after application before tillage. In pastures or sods, use a moldboard plow for best results. In pastures, sods or noncrop areas where deep tillage does not follow application: Apply 2 to 3 quarts of this product in 10 to 40 gallons of water per acre when the quackgrass is greater than 8 inches tall.
Redvine	0.75-2	5-10	2%	For suppression, apply 24 fluid ounces of this product per acre at each of two applications 7 to 14 days apart or a single application of 2 quarts per acre. Apply labeled rates in 5 to 10 gallons of water per acre. Apply in late September or early October to plants which are at least 18 inches tall and have been growing 45 to 60 days since the last tillage operation. Make applications at least 1 week before a killing frost.
Reed, giant	–	–	2%	Best results are obtained when applications are made in late summer to fall.
Ryegrass, perennial	1-3	3-40	1%	In annual cropping systems apply 1 to 2 quarts of this product per acre. Apply 1 quart of this product in 3 to 10 gallons of water per acre. Use 2 quarts of this product when applying 10 to 40 gallons of water per acre. In noncrop, or areas where annual tillage (no-till) is not practiced, apply 2 to 3 quarts of this product in 10 to 40 gallons water per acre. For best results, apply when most plants have reached the boot-to-head stage of growth or in the fall prior to frost. Do not tank-mix with residual herbicides when using the 1 quart per acre rate.
Smartweed, swamp	3-5	3-40	2%	Apply when most plants have reached the early bud stage of growth. Also for control, apply 16 fluid ounces of this product plus 0.5 pound a.i. 2,4-D in 3 to 10 gallons of water per acre in the late summer or fall.
Sowthistle, perennial	2-3	3-40	2%	Apply when most plants are at or beyond the bud stage of growth. After harvest, mowing or tillage in the late summer or fall, allow at least 4 weeks for initiation of active growth and rosette development prior to the application of this product. Fall treatments must be applied before a killing frost. Allow 3 or more days after application before tillage.
Spurge, leafy	–	3-10	2%	For suppression, apply 16 fluid ounces of this product plus 0.5 pound a.i. 2,4-D in 3 to 10 gallons of water per acre in the late summer or fall. If mowing has occurred prior to treatment, apply when most of the plants are 12 inches tall.
Starthistle, yellow	2	10-40	2%	Best results are obtained when applications are made during the rosette, bolting and early flower stages.
Sweet potato, wild	–	–	2%	Partial control. Apply to plants that are at or beyond the bloom stage of growth. Repeat applications may be required.
Thistle, artichoke	–	–	2%	Partial control. Apply to plants that are at or beyond the bloom stage of growth. Repeat applications may be required.

(continued)

WEED SPECIES	RATE (QT/A)	WATER VOL. (GPA)	HAND-HELD % SOLUTION	COMMENTS
Thistle, Canada	2-3	3-40	2%	Apply when most plants are at or beyond the bud stage of growth. After harvest, mowing or tillage in the late summer or fall, allow at least 4 weeks for initiation of active growth and rosette development prior to the application of this product. Fall treatments must be applied before a killing frost. Allow 3 or more days after application before tillage. For suppression, apply 1 quart of this product, or 1 pint of this product plus 0.5 pound a.i. 2,4-D, in 3 to 10 gallons of water per acre in the late summer or fall after harvest, mowing or tillage. Allow rosette regrowth to a minimum of 6 inches in diameter before treating. Applications can be made as long as leaves are still green and plants are actively growing at the time of application. Allow 3 or more days after application before tillage.
Timothy	2-3	3-40	2%	For best results, apply when most plants have reached the boot-to-head stage of growth.
Torpedograss	4-5	3-40	2%	For partial control. Apply when most plants are at or beyond the seedhead stage of growth. Repeat applications will be required to maintain control. Fall treatments must be applied before frost.
Trumpetcreeper	2	5-10	2%	Partial control. Apply in late September or October to plants which are at least 18 inches tall and have been growing 45–60 days since the last tillage operation. Make applications at least 1 week before a killing frost.
Vaseygrass	3-5	3-20	2%	Apply when most plants are in the early head stage.
Velvetgrass	3-5	3-20	2%	Apply when most plants are in the early head stage.
Wheatgrass, western	2-3	3-40	2%	For best results, apply when most plants have reached the boot-to-head stage of growth.

16.1 – PERENNIAL WEEDS – Bromus Species and Medusahead

For Use in the States of Colorado, Idaho, Iowa, Kansas, Montana, Nebraska, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming Only

Bromus Species: This product may be used to treat downy brome *(Bromus tectorum),* Japanese brome *(Bromus japonicus),* soft chess *(Bromus mollis)* and cheatgrass *(Bromus secalinus)* found in industrial, rangeland and pasture sites. Apply 8 to 16 fluid ounces of product per acre on a broadcast basis. For best results, treatment should coincide with early seedhead emergence of the most mature plants. Delaying the application until this growth stage will maximize the emergence of other weedy grass flushes. Applications should be made to the same site each year until seed banks are depleted and the desirable perennial grasses are able to become re-established on the site.

Medusahead: To treat medusahead, apply 16 fluid ounces of this product per acre as soon as plants are actively growing, and prior to the 4-leaf stage. Applications may be made in the fall or spring.

Application Equipment and Techniques: Applications may be made using ground or aerial equipment. Aerial applications for these uses may be made using fixed wing or helicopter equipment. For aerial applications, apply in 2 to 10 gallons of water per acre. For applications using ground equipment, apply in 10 to 20 gallons of water per acre.

When applied as directed there are no grazing restrictions.

17.0 – WOODY BRUSH AND TREES RATE TABLE (Alphabetically by Species)

Apply this product after full leaf expansion, unless otherwise directed. Use the higher rate for larger plants and/or dense areas of growth. On vines, use the higher rate for plants that have reached the woody stage of growth. Best results are obtained when application is made in late summer or fall after fruit formation.

In arid areas, best results are obtained when applications are made in the spring to early summer when brush species are at high moisture content and are flowering.

Unless otherwise directed, apply broadcast treatments in 3 to 40 gallons of water per acre. Ensure thorough coverage when using hand-held equipment. Symptoms may not appear prior to frost or senescence with fall treatments.

Allow 7 or more days after application before tillage, mowing or removal. Repeat treatments may be necessary to control plants regenerating from underground parts or seed. Some autumn colors on undesirable deciduous species are acceptable provided no major leaf drop has occurred. Reduced performance may result if fall treatments are made following a frost.

WEED SPECIES	RATE (QT/A)	HAND-HELD % SOLUTION	COMMENTS
Alder	3-4	1-1.5%	For control
Ash	2-5	1-2%	Partial control
Aspen, quaking	2-3	1-1.5%	For control
Bearmat (Bearclover)	2-5	1-2%	Partial control
Beech	2-5	1-2%	Partial control
Birch	2	1%	For control
Blackberry	3-4	1-1.5%	For control. Make applications after plants have reached full leaf maturity. Best results are obtained when applications are made in late summer or fall. Applications may also be made after leaf drop and until a killing frost or as long as stems are green. After berries have set or dropped in late fall, blackberry can be controlled by applying a 3/4 percent solution of this product. For control of blackberries after leaf drop and until a killing frost or as long as stems are green, apply 3 to 4 quarts of this product in 10 to 40 gallons of water per acre.
Blackgum	2-5	1-2%	For control
Bracken	2-5	1-2%	For control
Broom; French, Scotch	–	1.5-2%	For control
Buckwheat, California	–	1-2%	For partial control. Thorough coverage of foliage is necessary for best results.
Cascara	2-5	1-2%	Partial control
Catsclaw	–	1-1.5%	Partial control
Ceanothus	2-5	1-2%	Partial control
Chamise	–	1%	For control. Thorough coverage of foliage is necessary for best results.
Cherry; bitter, black, pin	2-3	1-1.5%	For control
Coyote brush	–	1.5-2%	For control. Apply when at least 50 percent of the new leaves are fully developed.
Dogwood	2-5	1-2%	Partial control
Elderberry	2	1%	For control
Elm	2-5	1-2%	Partial control
Eucalyptus	–	2%	For control of eucalyptus resprouts, apply when resprouts are 6 to 12 feet tall. Ensure complete coverage. Avoid application to drought-stressed plants.
Florida holly (Brazilian Peppertree)	2-5	1-2%	Partial control
Gorse	2-5	1-2%	Partial control
Hasardia	–	1-2%	Partial control. Thorough coverage of foliage is necessary for best results.
Hawthorn	2-3	1-1.5%	For control
Hazel	2	1%	For control
Hickory	2-5	1-2%	Partial control
Honeysuckle	3-4	1-1.5%	For control
Hornbeam, American	2-5	1-2%	Partial control

(continued)

WEED SPECIES	RATE (QT/A)	HAND-HELD % SOLUTION	COMMENTS
Kudzu	4	2%	For control. Repeat applications may be required to maintain control.
Locust, black	2-4	1-2%	Partial control
Madrone resprouts	–	2%	Partial control. Apply to resprouts that are 3 to 6 feet tall. Best results are obtained with spring/early summer treatments.
Manzanita	2-5	1-2%	Partial control
Maple, red	2-4	1-1.5%	For control, apply a 1 to 1.5 percent solution when at least 50 percent of the new leaves are fully developed. For partial control, apply 2 to 4 quarts of this product per acre.
Maple, sugar	–	1-1.5%	For control. Apply when at least 50 percent of the new leaves are fully developed.
Monkey flower	–	1-2%	Partial control. Thorough coverage of foliage is necessary for best results.
Oak; black, white	2-4	1-2%	Partial control
Oak, post	3-4	1-1.5%	For control
Oak; northern, pin	–	1-1.5%	For control. Apply when at least 50 percent of the new leaves are fully developed.
Oak, southern, red	2-3	1-1.5%	For control
Persimmon	2-5	1-2%	Partial control
Pine	2-5	1-2%	For control
Poison ivy/Poison oak	4-5	2%	For control. Repeat applications may be required to maintain control. Fall treatments must be applied before leaves lose green color.
Poplar, yellow	2-5	1-2%	Partial control
Redbud, eastern	2-5	1-2%	For control
Rose, multiflora	2	1%	For control. Treatments should be made prior to leaf deterioration by leaf-eating insects.
Russian olive	2-5	1-2%	Partial control
Sage, black	–	1%	For control. Thorough coverage of foliage is necessary for best results.
Sage, white	2-5	1-2%	Partial control
Sage brush, California	–	1%	For control. Thorough coverage of foliage is necessary for best results.
Salmonberry	2	1%	For control
Salt-cedar	2-5	1-2%	For control
Sassafras	2-5	1-2%	Partial control
Sourwood	2-5	1-2%	Partial control
Sumac; poison, smooth, winged	2-4	1-2%	Partial control
Sweetgum	2-3	1-1.5%	For control
Swordfern	2-5	1-2%	Partial control
Tallowtree, Chinese	–	1%	For control. Thorough coverage of foliage is necessary for best results.
Tan oak resprouts	–	2%	For partial control. Apply to resprouts that are less than 3 to 6 feet tall. Best results are obtained with fall applications.
Thimbleberry	2	1%	For control
Tobacco, tree	–	1-2%	Partial control
Trumpetcreeper	2-3	1-1.5%	For control
Vine maple	2-5	1-2%	Partial control
Virginia creeper	2-5	1-2%	For control
Waxmyrtle, southern	2-5	1-2%	Partial control
Willow	3	1%	For control

18.0 CONDITIONS OF SALE AND WARRANTY

The DIRECTIONS FOR USE of this product reflect the opinion of experts based on field use and tests. The directions are believed to be reliable and must be followed carefully. However, it is impossible to eliminate all risks inherently associated with use of this product. Crop injury, ineffectiveness, or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of use or application, all of which are beyond the control of ALBAUGH, LLC, its Supplemental Distributors, or the Seller. All such risks shall be assumed by the Buyer.

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DuPont™ Oust® XP

herbicide

Dispersible Granules

Active Ingredient	*By Weight*
Sulfometuron methyl {Methyl 2-[[[[(4,6-dimethyl-2-pyrimidinyl)amino]-carbonyl]amino] sulfonyl]benzoate}	75%
Other Ingredients	*25%*
TOTAL	100%

EPA Reg. No. 352-601 EPA Est. No. _____

Nonrefillable Container

Net: _____

OR

Refillable Container

Net: _____

E. I. duPont de Nemours and Company
1007 Market Street
Wilmington, DE 19898

KEEP OUT OF REACH OF CHILDREN

CAUTION

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand this label, find someone to explain it to you in detail.)

FIRST AID

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first five minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

Have the product container label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-441-3637 for emergency medical treatment information.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION! Causes (moderate) eye injury (irritation). Avoid contact with eyes or clothing.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and other handlers must wear:
Long-sleeved shirt and long pants.
Shoes plus socks.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

Engineering Control Statement: When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240 (d) (4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

USER SAFETY RECOMMENDATIONS

USERS SHOULD: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
Remove clothing/PPE immediately if pesticide gets inside then wash thoroughly and put on clean clothing.
Remove PPE immediately after handling this product and as soon as possible wash thoroughly and put on clean clothing.

ENVIRONMENTAL HAZARDS

Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water by cleaning of equipment or disposal of equipment washwaters.

GENERAL INFORMATION

DuPont™ OUST® XP herbicide is a dispersible granule that is mixed in water and applied as a spray or impregnated on dry, bulk fertilizer. OUST® XP controls many annual and perennial grasses and broadleaf weeds in forestry and noncrop sites.

OUST® XP may be used for general weed control on terrestrial noncrop sites and for selective weed control in certain types of unimproved turf grasses on these same sites. OUST® XP may also be used for selective weed control in forest site preparation and in the release of certain conifers and hardwoods. OUST® XP can be tank mixed with other herbicides registered for use in forestry and noncrop sites; when tank mixing, use the most restrictive limitations from the labeling of both products.

When applied as spray, OUST® XP controls weeds by both preemergence and postemergence activity. When applied on dry fertilizer, OUST® XP controls weeds by preemergence activity. When applied as a spray, the best results are obtained when the application is made before the early stages of weed growth before weeds develop an established root system. When applied on dry fertilizer, the best results are obtained when the application is made before weed emergence. The best results are obtained when the application is made before or during the early stages of weed growth before weeds develop an established root system. Moisture is required to move OUST® XP into the root zone of weeds for preemergence control.

This product may be applied on forestry and noncrop sites that contain areas of temporary surface water caused by collection of water between planting beds, in equipment ruts, or in other depressions created by management activities. It is permissible to treat intermittently flooded low lying sites, seasonal dry flood plains and transitional areas between upland and lowland sites when no water is present. It is also permissible to treat marshes, swamps and bogs after water has receded, as well as seasonally dry flood deltas. DO NOT make applications to natural or man-made bodies of water such as lakes, reservoirs, ponds, streams and canals.

A drift control agent may be used at the manufacturer's recommended rate in the application of DuPont™ OUST® XP.

OUST® XP is noncorrosive, nonflammable, nonvolatile and does not freeze.

For best postemergence results, apply OUST® XP to young, actively growing weeds. The use rate depends upon the weed species, weed size at application, and soil texture. The degree and duration of control may depend on the following:

- weed spectrum and infestation intensity
- weed size at application
- environmental conditions at and following treatment
- soil pH, soil moisture, and soil organic matter

Use a high rate on established plants and on fine-textured soils and a lower rate on smaller weeds and coarse-textured soils.

ENVIRONMENTAL CONDITIONS AND BIOLOGICAL ACTIVITY

When applied as a spray, OUST® XP is absorbed by both the roots and foliage of plants, rapidly inhibiting the growth of susceptible weeds. When applied on dry fertilizer, OUST® XP is absorbed primarily by the roots. Two to 3 weeks after application to weeds, leaf growth slows, and the growing points turn reddish-purple. Within 4 to 6 weeks of application, leaf veins and leaves become discolored, and the growing points subsequently die.

Warm, moist conditions following application accelerate the herbicidal activity of OUST® XP; cold, dry conditions delay the herbicidal activity. In addition, weeds hardened-off by drought stress are less susceptible to OUST® XP. Moisture is needed to move OUST® XP into the soil for preemergence weed control.

INVASIVE SPECIES MANAGEMENT

This product may be used on public, private, and tribal lands to treat certain weed species infestations that have been determined to be invasive, consistent with the Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW) National Early Detection and Rapid Response (EDRR) System for invasive plants. Effective EDRR systems address invasions by eradicating the invader where possible, and controlling them when the invasive species is too established to be feasibly eradicated. Once an EDRR assessment has been completed and action is recommended, a Rapid Response needs to be taken to quickly contain, deny reproduction, and if possible eliminate the invader. Consult your appropriate state extension service, forest service, or regional multidisciplinary invasive species management coordination team to determine the appropriate Rapid Response provisions and allowed treatments in your area.

RESISTANCE

When herbicides that affect the same biological site of action are used repeatedly over several years to control the same weed species in the same field, naturally-occurring resistant biotypes may survive a correctly applied herbicide treatment, propagate, and become dominant in that field. Adequate control of these resistant weed biotypes cannot be expected. If weed control is unsatisfactory, it may be necessary to retreat the problem area using a product affecting a different site of action.

To better manage herbicide resistance through delaying the proliferation and possible dominance of herbicide resistant weed biotypes, it may be necessary to change cultural practices such as using a retreatment, tank-mix partners and/or sequential herbicide applications that have a different site of action. Weed escapes that are allowed to go to seed will promote the spread of resistant biotypes.

It is advisable to keep accurate records of pesticides applied to individual sites to help obtain information on the spread and dispersal of resistant biotypes. Consult your agricultural dealer, consultant, applicator, and/or appropriate state agricultural extension service representative for specific alternative cultural practices or herbicide recommendations available in your area.

INTEGRATED PEST MANAGEMENT

This product may be used as part of an Integrated Pest Management (IPM) program that can include biological, cultural, and genetic practices aimed at preventing economic pest damage. IPM principles and practices include field scouting or other detection methods, correct target pest identification, population monitoring, and treating when target pest populations reach locally determined action thresholds. Consult your state cooperative extension service, professional consultants or other qualified authorities to determine appropriate action treatment threshold levels for treating specific pest/crop systems in your area.

DIRECTIONS FOR USE

It is a violation of federal law to use this product in a manner inconsistent with its labeling.

DuPont™ OUST® XP must be used only in accordance with instructions on this label or in separately published DuPont labeling.

DuPont will not be responsible for losses or damages resulting from the use of this product in any manner not specifically instructed by the label. User assumes all risks associated with such non-labeled use.

Do not apply more than 8 ounces per acre per year.

Do not use on food or feed crops.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency in your State responsible for pesticide regulation.

AGRICULTURAL USES

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

Coveralls.
Chemical resistant gloves made of any waterproof material.
Shoes plus socks.

FORESTRY

Application Information

OUST® XP is recommended to control many broadleaf weeds and grasses in forestry sites. Apply sprays by ground equipment or by helicopter or as otherwise directed by Supplemental or Special Local Need labeling. Apply impregnated fertilizer by ground equipment or by air (helicopter or fixed-wing aircraft).

OUST® XP may be tank mixed with other herbicides registered for use in forestry; when tank mixing use the most restrictive limitations from the labels of both products.

Application Timing

Apply OUST® XP sprays before herbaceous weeds emerge or shortly thereafter. Apply impregnated fertilizer before weeds emerge.

Weeds Controlled

OUST® XP effectively controls the following weeds when applied at the use rates indicated for the respective crop species:

Chickweed	Nutsedge (yellow)
Crabgrass	Panicums (broadleaf, fall, narrow)
Dogfennel	Pokeweed
Fescue	Ragweed
Fireweed (willowweed)	Shepherd's purse
Goldenrod	White snakeroot
Horseweed	Yellow sweetclover
Kentucky bluegrass	

See also weeds controlled under **Application Information—Noncrop (Industrial) Sites**

Application Rates

Apply DuPont™ OUST® XP at the rates indicated by region. Use a low rate on coarse-textured soils (i.e., loamy sands, sandy loams) and a higher rate on fine-textured soils (i.e. sandy clay loams and silty clay loams).

CONIFERS

Conifer Site Preparation Application Before Transplanting

Make all applications before transplanting to control herbaceous weeds.

Southeast—Apply 2 to 8 ounces per acre for loblolly, longleaf, slash, and Virginia pine. Pines may be transplanted in treated areas in the planting season following application.

Northeast and Lake States—Apply 2 to 4 ounces per acre for black spruce. Transplant not less than 13 months after treatment.

Apply 1 to 2 ounces per acre for red pine. Transplant the following spring or summer but not less than 3 months after application. Areas receiving 1/2 to 1 ounce per acre may be transplanted a minimum of 30 days following application.

Apply 2-1/2 to 4 ounces OUST® XP plus glyphosate (as registered) for larch and tamarack. Transplant the following spring or summer but not less than 8 months after treatment.

West—Apply 2 to 4 ounces per acre for coastal redwood, Douglas fir, grand fir, hemlock, lodgepole pine, ponderosa pine, western larch, western white pine and white fir. Where western red cedar is a primary species apply 2 to 3 ounces per acre, as higher rates may cause unacceptable injury. Other species of conifers may be planted providing the user has experience indicating acceptable tolerance to OUST® XP. Without prior experience, it is recommended that small area plantings be tested for tolerance to OUST® XP before large scale plantings are made. The user accepts all responsibility for injury on any conifer species not listed above. For ponderosa pine in California and other arid areas, apply in the fall and transplant the following spring.

Conifer Release Application After Transplanting

Apply OUST® XP after transplanting to control herbaceous weeds.

Southeast—Apply 2 to 8 ounces per acre for loblolly, longleaf, slash or Virginia pine. Apply 1 to 1 1/2 ounces per acre for eastern white pine. Apply 1 to 2 ounces per acre for shortleaf pine.

To control a broader spectrum of weeds in stands of loblolly, longleaf, or slash pine, apply 2 to 4 ounces of OUST® XP plus 2 to 3 pints of DuPont™ VELPAR® L herbicide or 2/3 to 1 pound of VELPAR® DF herbicide. Tank mix may injure or kill trees when applied during high humidity and temperature.

To enhance control of bermudagrass and Johnsongrass in stands of loblolly pine, apply 2 ounces of OUST® XP plus 4 to 6 fluid ounces of imazapyr (4 pounds active per gallon). For the best results, make the application during late winter through spring when weeds first emerge. Imazapyr may temporarily inhibit pine growth if it is applied when pine is actively growing.

For control of many annual weeds particularly on crop land conversion areas, apply 2 to 4 ounces of OUST® XP plus 4 to 8 pints of atrazine (4 pound active per gallon) per acre. Use the higher rates on medium to fine texture soils where organic matter exceeds 2%. Use only on tree species specifically listed on both the OUST® XP and atrazine (4 pound active per gallon) labels.

Northeast and Lake States—Apply 2 to 8 ounces per acre for jack or Virginia pine.

Apply 1 to 1-1/2 ounces per acre for eastern white pine.

Apply 1-1/2 to 3 ounces per acre for white spruce.

Apply 1/2 to 2 ounces per acre for red pine not less than 1 year following transplanting.

Make applications when trees are dormant. Applications at budbreak and later stages of active growth may severely injure or kill trees.

West—Apply 2 to 4 ounces per acre for coastal redwood, Douglas fir, grand fir, hemlock, lodgepole pine, ponderosa pine, western larch, western white pine and white fir. Where western red cedar is a primary species apply 2 to 3 ounces per acre, as higher rates may cause unacceptable injury. Other species of conifers may be treated providing the user has experience indicating acceptable tolerance to OUST® XP. Without prior experience, it is recommended that small areas be treated with OUST® XP to determine selectivity on specific conifer species before large scale treatments are made. The user accepts all responsibility for injury on any conifer species not listed above. Dormant trees are less susceptible to injury. Applications where the spray comes into direct contact with conifers after dormancy break in the spring or before the final resting bud has hardened in the fall may severely injure or kill the trees. For ponderosa pine in California and other arid areas, OUST® XP should be applied over dormant seedlings in the spring following fall planting or in the fall over dormant trees following spring planting.

FERTILIZER IMPREGNATION

OUST® XP herbicide is recommended to impregnate or coat dry bulk fertilizer to be applied on forested areas. Dry bulk fertilizer may be impregnated with OUST® XP for application in the establishment of loblolly and slash pine.

IMPREGNATION

To impregnate the fertilizer, use a system consisting of a conveyor or closed drum used to blend dry bulk fertilizer. Some fertilizers such as potassium nitrate, sodium nitrate and triple super phosphate are not compatible with OUST® XP. Diammonium phosphate, potassium chloride, 16-16-16 and 24-4-4 have been successfully used. Do not use OUST® XP on limestone.

If fertilizer materials are excessively dusty, use a suitable additive to reduce dust prior to impregnation. Dusty fertilizer may result in poor distribution and excessive risk of drift during application. The dry fertilizer must be properly

impregnated and uniformly applied to avoid potential tree injury/mortality and poor weed control.

Consult the Application Rates section of this label for the appropriate rate of DuPont™ OUST® XP to be used per acre. Apply this amount of OUST® XP to the volume of fertilizer to be applied per acre. To impregnate dry bulk fertilizer, mix the amount of OUST® XP as prescribed above in a sufficient quantity of water to uniformly coat the desired amount of fertilizer. Suspensions of OUST® XP will require thorough agitation. Direct the spray nozzles to deliver a fine spray of the mixture toward the fertilizer for uniform coverage. The use of a colorant or dye may be beneficial to visually determine the uniformity of impregnation.

Impregnation of OUST® XP to dry bulk fertilizer may vary. If absorption of the impregnating spray by the fertilizer is not adequate, the use of an absorptive powder or additive, such as Microcel E (Johns Manville Product Company) or HiSil - 233 (Pittsburg Plate Glass) may be required to produce a dry, free-flowing mixture.

Apply impregnated fertilizer as soon as possible after impregnation for optimum performance. Impregnated fertilizer may become lumpy and difficult to apply following storage. Uniform and precise application of the fertilizer impregnated with OUST® XP is essential for satisfactory weed control and to minimize tree injury.

Follow the instructions for spray tank cleanout on this label for cleaning the equipment used to impregnate, transport, and apply the fertilizer.

Low rates of OUST® XP can kill or severely injure most crops. Following an OUST® XP application, the use of spray equipment to apply other pesticides to crops on which OUST® XP is not registered may result in their damage. The most effective way to reduce this crop damage potential is to use dedicated mixing and application equipment.

BROADCAST APPLICATION

Applications may be made by ground or air (helicopter or fixed wing aircraft).

Accurate calibration of the application equipment is essential for uniform distribution on the soil surface. Overlaps or skips between adjoining swaths or non-uniform distribution of impregnated fertilizer within the swath will deliver poor results and may result in tree injury or mortality.

HARDWOODS

Hardwood Site Preparation Application Before Transplanting

Apply 3 to 5 ounces per acre on sites where northern red oak, white oak, chestnut oak, American sycamore, ash (white or green), red maple, sweetgum, or yellow poplar are to be planted. Make all applications before transplanting.

West—For hybrid poplar west of the Cascade mountains, apply 1/2 to 1 1/4 ounces per acre. Use 1 to 1 1/4 ounces per acre for heavy weed infestations and where maximum residual control is desired. Use 1/2 to 3/4 ounce per acre for light weed infestations or where small diameter cuttings are to be planted. Allow a minimum of 3 days between application and planting. Limit the first use to a small area to determine the selectivity of OUST® XP on specific clones. OUST® XP must be activated by rainfall or overhead irrigation before weeds become well established. Use of OUST® XP may cause temporary chlorosis (yellowing) or a small reduction in tree height during the year of use.

Hardwood Release Application After Transplanting

Apply 1 to 4 ounces per acre in stands of American sycamore, ash (white or green), bald cypress, oaks (such as chestnut, northern red, southern red, overcup, pin, swamp chestnut, cherrybark, water, white, pin, etc.), red maple, sweetgum, or yellow poplar.

OUST® XP should be applied before the hardwood tree seedlings or transplants break dormancy (bud swell stage). Applications made over the top after the trees have broken dormancy may injure or kill the trees.

West—For hybrid poplar west of the Cascade mountains, apply 1/2 to 1 1/4 ounces per acre. Use 1 to 1 1/4 ounces per acre for heavy weed infestations and where maximum residual control is desired. Use 0.5 to 0.75 ounce per acre for light weed infestations or when small diameter cuttings have been planted. Apply only to trees which have been established for a minimum of 1 year. Apply when the trees are dormant and avoid contact of the spray with green buds or tissue as injury to the trees may result. Avoid applications during the period when the hybrid poplar are actively growing; from bud-swell in the spring to leaf drop in the fall. Limit the first use to a small area to determine the selectivity of OUST® XP on specific clones. OUST® XP must be activated by rainfall or overhead irrigation before weeds become well established. Use of OUST® XP may cause temporary chlorosis (yellowing) or a small reduction in tree height during the year of use.

Lake States—For hybrid poplar in the Lake States, apply at the rate of 1 to 2 ounces per acre in the fall or early winter. When late winter or early spring applications are made use 1 ounce per acre. Apply when the trees are dormant and avoid contact of the spray with green buds or tissue as injury to the trees may result. Avoid applications during the period when the hybrid poplar are actively growing; from bud-swell in the spring to leaf drop in the fall. Apply only to trees which have been established for a minimum of 1 year. Limit the first use to a small area to determine the selectivity of OUST® XP on specific clones. Use of OUST® XP may cause temporary chlorosis (yellowing) or a small reduction in tree height during the year of use.

Natural Hardwood Regeneration

OUST® XP is recommended for herbaceous weed control in commercial reforestation areas where hardwood seedling regeneration is desired following shelterwood seed cuts. Apply 2 to 5 ounces per acre using appropriate ground equipment. For control of striped maple and beech, tank mix with 1 to 2 quarts per acre of glyphosate. For best results, apply from late summer to mid-fall. Note that hardwood seedlings present at the time of application may be severely injured or killed.

USE PRECAUTIONS—FORESTRY ONLY

- DuPont™ OUST® XP applications made with boomless nozzle spray equipment may cause severe injury to conifers and/or poor weed control performance due to the inherent variability (rate and coverage) in the uniformity of the application.
- Treated soil should be left undisturbed to reduce the potential for OUST® XP movement by soil erosion due to wind or water.
- Applications of OUST® XP made to trees, conifers, or hardwoods that are suffering from loss of vigor caused by insects, diseases, drought, winter damage, animal damage, excessive soil moisture, planting shock, previous agricultural practices, or other stresses, may injure or kill the trees.
- Applications of OUST® XP made for release (trees present) should only be made after adequate rainfall has closed the planting slit and settled the soil around the roots following transplanting.
- Do not apply OUST® XP to conifers or hardwoods grown for Christmas trees or ornamentals.
- If a surfactant is used with OUST® XP, allowing the spray to contact tree foliage may injure or kill trees. The user assumes all responsibility for tree injury if a surfactant is used with OUST® XP treatments applied after planting.
- OUST® XP applications may result in damage and mortality to other species of trees when they are present on sites with those listed in the preceding recommendations for forestry uses.
- Use on hardwood trees growing in soils having a pH of 7 or greater may injure or kill the trees.
- Careful consideration must be given by an experienced and knowledgeable forester to match the requirements of the hardwood tree species to the conditions of the site. Treatment of species mismatched to the site may injure or kill the trees.

NON-AGRICULTURAL USES

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR Part170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Use on noncrop sites and turf (unimproved) are not within the scope of the Worker Protection Standard.

Do not enter treated areas until sprays have dried.

NON-CROP SITES

Application Information

OUST® XP is recommended for general weed control on private, public and military lands as follows: Uncultivated nonagricultural areas (such as airports, highway, railroad and utility rights-of-way, sewage disposal areas, etc.); uncultivated agricultural areas--noncrop producing (such as farmyards, fuel storage areas, fence rows, barrier strips, etc.); industrial sites--outdoor (such as lumberyards, pipeline and tank farms, etc.)

OUST® XP is not recommended for use on recreation areas or for direct application to paved areas (surfaces).

Apply by ground or helicopter or as otherwise directed by Supplemental or Special Local Need Labeling.

Combination with other herbicides broadens the spectrum of weeds controlled. In addition, total vegetation control can be achieved with higher rates of OUST® XP plus residual-type companion herbicides. To improve the control of weeds, add surfactant at 0.25% by volume.

AREAS OF 20" OR LESS ANNUAL RAINFALL (ARID AREAS)

Application Timing

Apply OUST® XP as a preemergence or early postemergence spray before or during the rainy season when weeds are actively germinating or growing.

Weeds Controlled

OUST® XP effectively controls the following broadleaf weeds and grasses when applied at the rates shown.

Application Rates

Apply OUST® XP at the rates indicated by weed type. When applied at lower rates, OUST® XP provides short-term control of weeds listed; when applied at higher rates, weed control is extended.

Broadleaf Weeds	**1-1/3 to 2 ounces per acre**
Annual sowthistle	Common yarrow
Black mustard	Curly dock
Buckhorn plantain	Prickly coontail
Burclover	Seaside heliotrope
Carolina geranium	Spreading orach
Chickweed	Sunflower
Common mallow	Western ragweed
Common speedwell	Whitestem filaree

Grasses (up to 6 to 12" tall)	**3/4 to 1 1/2 ounces per acre**
Cheat	Medusahead
Downy brome	

Grasses (up to 6 to 12" tall)	1-1/3 to 2 ounces per acre
Annual bluegrass	Red brome
Barnyardgrass	Reed Canarygrass
Foxtail barley	Ripgut brome
Foxtail fescue	Seashore saltgrass
Italian ryegrass	Signalgrass
Jointed goatgrass	Yellow foxtail

Grasses	2 to 3 ounces per acre
Smooth brome	

The weeds listed in **Areas Of 20" Or More Annual Rainfall** can also be controlled in arid areas; however, DuPont™ OUST® XP must be applied at 3 to 8 ounces per acre to control those weeds. These higher rates also provide control of severe infestations and longer term control of weeds listed for arid areas.

AREAS OF 20" OR MORE ANNUAL RAINFALL

Application Timing

Apply OUST® XP as a preemergence or early postemergence spray before or during the rainy season when weeds are actively germinating or growing.

Weeds Controlled

OUST® XP effectively controls the following broadleaf weeds and grasses when applied at the rates shown.

Application Rates

Apply OUST® XP at the rates indicated by weed type. When applied at lower rates, OUST® XP provides short term control of weeds listed; when applied at higher rates, weed control is extended.

Broadleaf Weeds	3 to 5 ounces per acre
Annual sowthistle	Pepperweed
Bouncingbet	Pigweed
Burclover	Purple starthistle
Carolina geranium	Ragweed
Common chickweed	Sunflower
Common dandelion	Sweet clover
Common speedwell	Tansymustard
Common yarrow	Tansy ragwort
Crimson clover	Tumble mustard
Dogfennel	Vetch
Hoary cress (whitetop)	Wild carrot
Little mallow	Wild oats
Mustard	Yellow rocket
Ox-eye daisy	

Broadleaf Weeds	6 to 8 ounces per acre
Bedstraw	Horsetail (Equisetum)
Canada thistle	Kudzu
Curly dock	Musk thistle
Redstem filaree	Turkey mullein
Goldenrod	Wild blackberry

Grasses	3 to 5 ounces per acre
Alta fescue	Kentucky bluegrass
Annual bluegrass	Little barley
Annual ryegrass	Red brome
Bahiagrass	Red fescue
Barnyardgrass	Reed canarygrass
Downy brome	Ripgut brome
Fescue	Ryegrass
Foxtails (except green)	Smooth brome
Foxtail barley	Sprangletop (annual)
Indiangrass	Wheat (volunteer)
Italian ryegrass	

Grasses	6 to 8 ounces per acre
Johnsongrass	

For short-term (up to 3 months) control of johnsongrass, apply early postemergence. Repeat treatment if additional control is desired or if regrowth occurs.

Note: Use the higher level of listed dosage ranges under the following conditions:

- heavy weed growth
- soils containing more than 2-1/2% organic matter
- high soil moisture areas, such as along road edges or railroad shoulders

For planting areas treated with OUST® XP refer to the GRASS REPLANT INTERVALS section of this label.

SPECIFIC WEED PROBLEMS NON-CROP SITES

Kochia, Russian Thistle, and Prickly Lettuce

Since biotypes of kochia, Russian thistle, and prickly lettuce are known to be resistant to OUST® XP, tank mixture combinations with herbicides having different modes of action, such as DuPont™ KARMEX® DF, DuPont™ HYVAR® X or DuPont™ KROVAR® I DF, must be used. In areas where resistance is known to exist, these weeds should be treated postemergence with other herbicides registered for their control, such as 2,4-D or dicamba. Do not allow kochia, Russian thistle, or prickly lettuce to form mature seed.

TANK MIX COMBINATIONS

To improve preemergence to early postemergence control of weeds and grasses, add 2 to 8 ounces of OUST® XP per acre to the listed rates of the following herbicides: HYVAR® X herbicide, KARMEX® DF herbicide, KROVAR® I DF herbicide, DuPont™ VELPAR® L herbicide, VELPAR® herbicide, DuPont™ ESCORT® herbicide (do not use in California), DuPont™ TELAR® herbicide, glyphosate, dicamba, or 2,4-D.

Apply OUST® XP plus a companion herbicide at the rates and timing as shown on package labels for target weeds. For application method and other use specifications, use the most restrictive directions for the intended combination.

Do not tank mix OUST® XP with HYVAR® X-L herbicide.

UNDER ASPHALT AND CONCRETE PAVEMENT

Application Information

DuPont™ OUST® XP can be used to control weeds under asphalt and concrete pavement, such as that used in parking lots, highway shoulders, median strips, roadways, and other industrial sites.

OUST® XP will not control tubers, rhizomes, woody vegetation such as small trees, brush or woody vines.

OUST® XP should only be used in an area that has been prepared according to good construction practices. Use sufficient water to ensure uniform coverage, generally 100 gallons per acre. Agitate the tank continuously to keep OUST® XP in suspension.

Application Timing

OUST® XP should be applied immediately before paving to avoid lateral movement of the herbicide as a result of soil movement due to rainfall or mechanical means.

Application Rate

Apply OUST® XP at 4 to 8 ounces per acre. Use a higher rate on hard-to-control weeds and for long-term control.

Tank Mix Combinations Under Asphalt and Concrete Pavement

For broader spectrum control or for an extended period of control under asphalt or concrete pavement, OUST® XP may be applied as a tank mix with DuPont™ HYVAR® X at 6 to 15 pounds per acre or DuPont™ KROVAR® I DF at 7 to 15 pounds per acre.

USE PRECAUTIONS—UNDER ASPHALT ONLY

- Do not use OUST® XP under pavement in residential properties such as driveways, or in recreational areas, including jogging or bike paths, tennis courts, or golf cart paths.
- Desirable plants may be injured if their roots extend into treated areas or if planted in treated areas.

INDUSTRIAL TURFGRASS

Application Information

OUST® XP is recommended to control weeds on industrial turfgrass, on roadsides, or on other noncrop sites where the turfgrass is well established as a ground cover. Applications may temporarily suppress grass growth and inhibit seedhead formation (chemical mowing).

Bermudagrass Release

Application Timing

Apply OUST® XP after bermudagrass has broken dormancy and is well established, usually 30 days after initial spring flush. If additional applications are necessary, apply OUST® XP again during late spring to early summer. On established weeds, apply OUST® XP 1 to 2 weeks after mowing for the best results.

OUST® XP may also be applied in late fall or early winter. Use the lower rates on small seedling weeds and a higher rate on larger weeds. Also, refer to the listing of Weeds Controlled under Noncrop Weed Control.

Weeds Controlled

OUST® XP may be used to control the following weeds when applied at the use rates shown.

Late Spring to Early Summer	1 to 2 ounces/acre
Carolina Geranium	Goldenrod
Fescue	Spotted Spurge
Foxtail	Wild carrot

Spring to Fall	2 to 3 ounces/acre
Johnsongrass	

Late Fall to Early Winter	1 to 4 ounces/acre
Carolina geranium	Little barley
Common chickweed	Wild blackberry
Fescue	

Tank Mix Combinations—Bermudagrass (South Only)

Apply 1 to 2 ounces OUST® XP per acre as a tank mix with 3 to 4 pounds active ingredient of MSMA per acre on well-established bermudagrass during the summer. Refer to the MSMA package label for a list of additional weeds that may be controlled. Two or more sequential applications of MSMA alone may be necessary to maintain weed control.

Centipedegrass Release

Application timing

Apply 1 to 2 ounces per acre of OUST® XP in the fall or early winter, or in the early summer following greenup of the centipede. Refer to the listing of Weeds Controlled under Bermudagrass Release.

Bahiagrass Release and Seedhead Suppression

Application Timing

Apply 1/2 to 1 ounce OUST® XP per acre to turfgrass after green-up and before seedheads emerge (boot stage). Ensure that desirable grasses are well-established at application, as premature treatment may result in top kill and stand reduction of desirable turfgrass. Make only one application per year.

Smooth Brome and Crested Wheatgrass Release and Suppression

Application Timing

Apply 1 ounce OUST® XP per acre to turfgrass after green-up and before seedheads emerge (boot stage). Ensure that desirable grasses are well-established at application, as premature treatment may result in top kill and stand reduction of desirable turfgrass. Make only one application per year.

Weeds Controlled

DuPont™ OUST® XP may be used to control the following weeds when applied at the use rates shown.

Late Spring to Early Summer	1 ounce/acre
Downy Brome	Goldenrod
Foxtail	

USE PRECAUTIONS INDUSTRIAL TURFGRASS

- Excessive injury to turf may result if a surfactant is used with OUST® XP applications made to actively growing turf. The user assumes all responsibility for turf injury if a surfactant is used with OUST® XP treatments applied to actively growing turf.
- OUST® XP may temporarily discolor or cause top kill of turf grasses. Applications made while turf is dormant may delay green-up in the spring.
- Annual retreatments may reduce vigor, particularly at the higher labeled use rates, where bahiagrass, crested wheatgrass and smooth brome are grown.
- OUST® XP application on turf that is under stress from drought, insects, disease, cold temperatures or late spring frost, may result in injury.

GRASS REPLANT INTERVALS

Following a treatment with OUST® XP at use rates up to 2 ounces per acre the following grasses may be replanted at least 3 months after a spring application:

Green needlegrass, meadow brome, Russian wild rye and switchgrass.

The following grasses may be replanted at least 6 months after a spring application: Alta fescue, meadow foxtail, orchard grass, smooth brome, sheep fescue and western wheatgrass.

The intervals recommended are for soils with a pH of less 7.5. Soils having a pH greater than 7.5 will require longer intervals. The recommended intervals are for applications made in the spring. Because OUST® XP degradation is slowed by cold or frozen soils, applications made in the fall should consider the intervals as beginning in the spring following treatment.

Testing has indicated that there is considerable variation in response among species and types of grasses when seeded into areas treated with OUST® XP. If species other those listed above are to be planted into areas treated with OUST® XP a field bioassay should be performed, or previous experience may be used to determine the feasibility of replanting treated areas.

ADDITIONAL PRECAUTIONS AND INSTRUCTIONS FOR AGRICULTURAL AND NON-AGRICULTURAL USES

- Injury to or loss may occur if equipment is drained or flushed on or near desirable trees or other plants, or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots.
- Treated soil should be left undisturbed to reduce the potential for OUST® XP movement by soil erosion due to wind or water.
- Treatment of powdery, dry soil or light, sandy soil when there is little likelihood of rainfall soon after treatment may result in off target movement and possible damage to susceptible crops when soil particles are moved by wind or water. Injury to crops may result if treated soil is washed, blown, or moved onto land used to produce crops. Exposure to OUST® XP may injure or kill most crops. Injury may be more severe when the crops are irrigated. Do not apply OUST® XP when these conditions are identified and powdery, dry soil or light or sandy soil are known to be prevalent in the area to be treated.
- Applications made where runoff water flows onto agricultural land may injure crops. Applications made during periods of intense rainfall, to soils saturated with water, surfaces paved with materials such as asphalt or concrete, or soils through which rainfall will not readily penetrate may result in runoff and movement of OUST® XP.
- Do not treat frozen soil.
- Do not use on lawns, walks, driveways, tennis courts, or similar areas.
- Keep from contact with fertilizers, insecticides, fungicides, and seeds.
- Do not apply in or on irrigation ditches or canals including their outer banks.
- Do not apply through any type of irrigation system.
- Low rates of OUST® XP can kill or severely injure most crops. Following an OUST® XP application, the use of spray equipment to apply other pesticides to crops on which OUST® XP is not registered may result in their damage. The most effective way to reduce this crop damage potential is to use dedicated mixing and application equipment.
- Do not use this product in the following counties of Colorado: Saguache, Rio Grande, Alamosa, Costilla and Conejos.
- If noncrop or forested sites treated with OUST® XP are to be converted to a food, feed, or fiber agricultural crop, or to a horticultural crop, do not plant the treated sites for at least one year after the OUST® XP application. A field bioassay must then be completed before planting to crops.

FIELD BIOASSAY

To conduct a field bioassay, grow to maturity test strips of the crop(s) you plan to grow the following year. The test strips should cross the entire field including knolls and low areas. Crop response to the bioassay will indicate whether or not to plant the crops(s) grown in the test strips. In the case of suspected offsite movement of OUST® XP to cropland, soil samples should be quantitatively analyzed for OUST® XP or any other herbicide which could be having an adverse effect on the crop, in addition to conducting the above-described bioassay.

SPRAY EQUIPMENT

Low rates of OUST® XP can kill or severely injure most crops. Following an OUST® XP application, the use of spray equipment to apply other pesticides to crops on which OUST® XP is not registered may result in their damage. The most effective way to reduce this crop damage potential is to use dedicated mixing and application equipment.

APPLICATION

Ground

Use a sufficient volume of water to ensure thorough coverage when applying OUST® XP as a broadcast or directed spray. Select a spray volume and delivery system that will ensure thorough coverage and a uniform spray pattern. Be sure the sprayer is calibrated before use. Avoid overlapping and shut off spray booms while starting, turning, slowing, or stoping to avoid injury to desired species.

Air

Select a spray volume and delivery system that will ensure thorough coverage and a uniform spray pattern. Be sure the sprayer is calibrated. Avoid overlapping and shut off spray booms while starting, turning or slowing to avoid injury to desired species.

MIXING INSTRUCTIONS

1. Fill spray tank 1/2 full of water.
2. With the agitator running, add the proper amount of OUST® XP.
3. If using a companion product, add the directed amount.
4. For postemergent applications, add the proper amount of spray adjuvants.
5. Add the remaining water.
6. Agitate the spray tank thoroughly.

OUST® XP spray preparations are stable if they are pH neutral or alkaline and stored at or below 100° F.

SPRAYER CLEANUP

Thoroughly clean all mixing and spray equipment following applications of OUST® XP as follows:

1. Drain tank; thoroughly rinse spray tanks, boom, and hoses with clean water.
2. Fill the tank with clean water and 1 gallon of household ammonia (contains 3% active) for every 100 gallons of water. Flush the hoses, boom, and nozzles with the cleaning solution. Then add more water to completely fill the tank. Circulate the cleaning solution through the tank and hoses for at least 15 min. Flush the hoses, boom, and nozzles again with the cleaning solution, and then drain the tank.

   Equivalent amounts of an alternate-strength ammonia solution or a commercial cleaner can be used in the cleanout procedure. If a commercial cleaner is used, carefully read and follow the individual cleaner instructions.
3. Remove the nozzles and screens and clean separately in a bucket containing cleaning agent and water.
4. Repeat step 2.
5. Rinse the tank, boom, and hoses with clean water.
6. Dispose of the rinsate on a labeled site or at an approved waste disposal facility. If a commercial cleaner is used follow the directions for rinsate disposal on the label.

Notes:

1. **Caution:** Do not use chlorine bleach with ammonia as dangerous gases will form. Do not clean equipment in an enclosed area.
2. Steam-cleaning aerial spray tanks is recommended before performing the above cleanout procedure to facilitate the removal of any caked deposits.
3. When DuPont™ OUST® XP is tank mixed with other pesticides, all required cleanout procedures should be examined and the most rigorous procedure should be followed.

SPRAY DRIFT MANAGEMENT

The interaction of many equipment and weather-related factors determines the potential for spray drift. The applicator is responsible for considering all these factors when making application decisions.

AVOIDING SPRAY DRIFT IS THE RESPONSIBILITY OF THE APPLICATOR.

IMPORTANCE OF DROPLET SIZE

The most effective way to reduce drift potential is to apply large droplets (>150 - 200 microns). The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. The presence of sensitive species nearby, the environmental conditions, and pest pressure may affect how an applicator balances drift control and coverage. APPLYING LARGER DROPLETS REDUCES DRIFT POTENTIAL, BUT WILL NOT PREVENT DRIFT IF APPLICATIONS ARE MADE IMPROPERLY OR UNDER UNFAVORABLE ENVIRONMENTAL CONDITIONS! See **Wind**, **Temperature and Humidity**, and **Surface Temperature Inversions** sections of this label.

Controlling Droplet Size - General Techniques

- **Volume** - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.

- **Pressure** - Use the lower spray pressures recommended for the nozzle. Higher pressure reduces droplet size and does not improve canopy penetration. WHEN HIGHER FLOW RATES ARE NEEDED, USE A HIGHER-CAPACITY NOZZLE INSTEAD OF INCREASING PRESSURE.
- **Nozzle Type** - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles.

Controlling Droplet Size - Aircraft

- **Number of Nozzles** - Use the minimum number of nozzles with the highest flow rate that provide uniform coverage.
- **Nozzle Orientation** - Orienting nozzles so that the spray is emitted backwards, parallel to the airstream will produce larger droplets than other orientations.
- **Nozzle Type** - Solid stream nozzles (such as disc and core with swirl plate removed) oriented straight back produce larger droplets than other nozzle types.

BOOM LENGTH AND HEIGHT

- **Boom Length (aircraft)** - The boom length should not exceed 3/4 of the wing length, using shorter booms decreases drift potential. For helicopters use a boom length and position that prevents droplets from entering the rotor vortices.
- **Boom Height (aircraft)** - Application more than 10 ft above the canopy increases the potential for spray drift.
- **Boom Height (ground)** Setting the boom at the lowest height which provides uniform coverage reduces the exposure of droplets to evaporation and wind. The boom should remain level with the crop and have minimal bounce.

WIND

Drift potential increases at wind speeds of less than 3 mph (due to variable direction and inversion potential) or more than 10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given wind speed. AVOID APPLICATIONS DURING GUSTY OR WINDLESS CONDITIONS.

Note: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they effect spray drift.

TEMPERATURE AND HUMIDITY

When making applications in hot and dry conditions, set up equipment to produce larger droplets to reduce effects of evaporation.

SURFACE TEMPERATURE INVERSIONS

Drift potential is high during a surface temperature inversion. Surface inversions restrict vertical air mixing, which causes small suspended droplets to remain close to the ground and move laterally in a concentrated cloud. Surface inversions are characterized by increasing temperature with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates a surface inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

SHIELDED SPRAYERS

Shielding the boom or individual nozzles can reduce the effects of wind. However, it is the responsibility of the applicator to verify that the shields are preventing drift and not interfering with uniform deposition of the product.

SENSITIVE AREAS

The pesticide must only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g, when wind is blowing away from the sensitive areas).

DRIFT CONTROL ADDITIVES

Drift control additives may be used with all spray equipment with the exception of controlled droplet applicators. When a drift control additive is used, read and carefully observe cautionary statements and all other information on the label. It is recommended that drift control additives be certified by the Chemical Producers and Distributors Association (CPDA).

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by stoage and disposal.

Pesticide Storage: Store product in original container only. Store in a cool, dry place.

Pesticide Disposal: Waste resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.

CONTAINER HANDLING: Refer to the Net Contents section of this product's labeling for the applicable "Nonrefillable Container" or "Refillable Container" designation.

Nonrefillable Plastic and Metal Containers (Capacity Equal to or Less Than 50 Pounds): Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Then, for Plastic Containers, offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. For Metal Containers, offer for recycling if available or reconditioning if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Nonrefillable Plastic and Metal Containers (Capacity Greater Than 50 Pounds): Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. Then, for Plastic Containers, offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. For Metal Containers, offer for recycling if available or reconditioning if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Nonrefillable Plastic and Metal Containers, e.g., Intermediate Bulk Containers [IBC] (Size or Shape Too Large to be Tipped, Rolled or Turned Upside Down): Nonrefillable container. Do not reuse or refill this container. Clean container promptly after emptying the contents from this container into application equipment or mix tank and before final disposal using the following pressure rinsing procedure. Insert a lance fitted with a suitable tank cleaning nozzle into the container and ensure that the water spray thoroughly covers the top, bottom and all sides inside the container. The nozzle manufacturer generally provides instructions for the appropriate spray pressure, spray duration and/or spray volume. If the manufacturer's instructions are not available, pressure rinse the container for at least 60 seconds using a minimum pressure of 30 PSI with a minimum rinse volume of 10% of the container volume. Drain, pour or pump rinsate into application equipment or rinsate collection system. Repeat this pressure rinsing procedure two more times. Then, for Plastic Containers, offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. For Metal Containers, offer for recycling if available or reconditioning if appropriate or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Nonrefillable Paper or Plastic Bags, Fiber Sacks including Flexible Intermediate Bulk Containers (FIBC) or Fiber Drums With Liners: Nonrefillable container. Do not reuse or refill this container. Completely empty paper or plastic bag, fiber sack or drum liner by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application or manufacturing equipment. Then offer for recycling if available or dispose of empty paper or plastic bag, fiber sack or fiber drum and liner in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances.

Refillable Fiber Drums With Liners: Refillable container (fiber drum only). Refilling Fiber Drum: Refill this fiber drum with DuPont™ OUST® XP containing sulfometuron methyl only. Do not reuse this fiber drum for any other purpose. Cleaning before refilling is the responsibility of the refiller. Completely empty liner by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application or manufacturing equipment. Disposing of Fiber Drum and/or Liner: Do not reuse this fiber drum for any other purpose other than refilling (see preceding). Cleaning the container (liner and/or fiber drum) before final disposal is the responsibility of the person disposing of the container. Offer the liner for recycling if available or dispose of liner in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. If drum is contaminated and cannot be reused, dispose of it in the manner required for its liner. To clean the fiber drum before final disposal, completely empty the fiber drum by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application or manufacturing equipment. Then offer the fiber drum for recycling if available or dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances.

All Other Refillable Containers: Refillable container. Refilling Container: Refill this container with DuPont™ OUST® XP containing sulfometuron methyl only. Do not reuse this container for any other purpose. Cleaning before refilling is the responsibility of the refiller. Prior to refilling, inspect carefully for damage such as cracks, punctures, abrasions, worn out threads and closure devices. If damage is found, do not use the container, contact DuPont at the number below for instructions. Check for leaks after refilling and before transporting. If leaks are found, do not reuse or transport container, contact DuPont at the number below for instructions. Disposing of Container: Do not reuse this container for any other purpose other than refilling (see preceding). Cleaning the container before final disposal is the responsibility of the person disposing of the container. To clean the container before final disposal, use the following pressure rinsing procedure. Insert a lance fitted with a suitable tank cleaning nozzle into the container and ensure that the water spray thoroughly covers the top, bottom and all sides inside the container. The nozzle manufacturer generally provides instructions for the appropriate spray pressure, spray duration and/or spray volume. If the manufacturer's instructions are not available, pressure rinse the container for at least 60 seconds using a minimum pressure of 30 PSI with a minimum rinse volume of 10% of the container volume. Drain, pour or pump rinsate into application equipment or rinsate collection system. Repeat this pressure rinsing procedure two more times. Then, for Plastic Containers, offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. For Metal Containers, offer for recycling if available or reconditioning if appropriate or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Outer Foil Pouches of Water Soluble Packets (WSP): Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available or, dispose of the empty outer foil pouch in the trash as long as WSP is unbroken. If the outer pouch contacts the formulated product in any way, the pouch must be triple rinsed with clean water. Add the rinsate to the spray tank and dispose of the outer pouch as described previously.

Do not transport if this container is damaged or leaking. If the container is damaged, leaking or obsolete, or in the event of a major spill, fire or other emergency, contact DuPont at 1-800-441-3637, day or night.

NOTICE TO BUYER: Purchase of this material does not confer any rights under patents of countries outside of the United States.

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LIMITATION OF WARRANTY AND LIABILITY

NOTICE: Read This Limitation of Warranty and Liability Before Buying or Using This Product. If the Terms Are Not Acceptable, Return the Product at Once, Unopened, and the Purchase Price Will Be Refunded.

It is impossible to eliminate all risks associated with the use of this product. Such risks arise from weather conditions, soil factors, off target movement, unconventional farming techniques, presence of other materials, the manner of use or application, or other unknown factors, all of which are beyond the control of DuPont. These risks can cause: ineffectiveness of the product; crop injury, or; injury to non-target crops or plants.

DuPont does not agree to be an insurer of these risks. TO THE FULLEST EXTENT PERMITTED BY LAW, WHEN YOU BUY OR USE THIS PRODUCT, YOU AGREE TO ACCEPT THESE RISKS.

DuPont warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for the purpose stated in the Directions for Use, subject to the inherent risks described above, when used in accordance with the Directions for Use under normal conditions.

DUPONT MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS OR OF MERCHANTABILITY OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

TO THE FULLEST EXTENT PERMITTED BY LAW, IN NO EVENT SHALL DUPONT OR SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT. BUYER'S OR USER'S BARGAINED-FOR EXPECTATION IS CROP PROTECTION. THE EXCLUSIVE REMEDY OF THE USER OR BUYER AND THE EXCLUSIVE LIABILITY OF DUPONT OR SELLER, FOR ANY AND ALL CLAIMS, LOSSES, INJURIES OR DAMAGES (INCLUDING CLAIMS BASED ON BREACH OF WARRANTY OR CONTRACT, NEGLIGENCE, TORT OR STRICT LIABILITY), WHETHER FROM FAILURE TO PERFORM OR INJURY TO CROPS OR OTHER PLANTS, AND RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, SHALL BE THE RETURN OF THE PURCHASE PRICE OF THE PRODUCT, OR AT THE ELECTION OF DUPONT OR SELLER, THE REPLACEMENT OF THE PRODUCT.

DuPont or its Ag Retailer must have prompt notice of any claim so that an immediate inspection of buyer's or user's growing crops can be made. Buyer and all users shall promptly notify DuPont or a DuPont Ag Retailer of any claims, whether based on contract, negligence, strict liability, other tort or otherwise or be barred from any remedy.

This Limitation of Warranty and Liability may not be amended by any oral or written agreement.

For product information call: 1-888-6-DUPONT

Internet address: http://cropprotection.dupont.com/

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ATTENTION:

This specimen label is provided for general information only.

- This pesticide product may not yet be available or approved for sale or use in your area.
- It is your responsibility to follow all Federal, state and local laws and regulations regarding the use of pesticides.
- Before using any pesticide, be sure the intended use is approved in your state or locality.
- Your state or locality may require additional precautions and instructions for use of this product that are not included here.
- Monsanto does not guarantee the completeness or accuracy of this specimen label. The information found in this label may differ from the information found on the product label. You must have the EPA approved labeling with you at the time of use and must read and follow all label directions.
- You should not base any use of a similar product on the precautions, instructions for use or other information you find here.
- Always follow the precautions and instructions for use on the label of the pesticide you are using.

21203I3-23

The complete broad-spectrum postemergence professional herbicide for industrial, turf and ornamental weed control.

Complete Directions for Use

AVOID CONTACT OF HERBICIDE WITH FOLIAGE, STEMS, EXPOSED NON-WOODY ROOTS OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, BECAUSE SEVERE INJURY OR DESTRUCTION IS LIKELY TO RESULT.

GROUP	9	HERBICIDE

EPA Reg. No. 524-529 2010-1

Read the entire label before using this product.

Use only according to label instructions.

Not all products listed on this label are registered for use in California. Check the registration status of each product in California before using.

Read the "LIMIT OF WARRANTY AND LIABILITY" statement at the end of the label before buying or using. If terms are not acceptable, return at once unopened.

THIS IS AN END-USE PRODUCT. MONSANTO DOES NOT INTEND AND HAS NOT REGISTERED IT FOR REFORMULATION. SEE INDIVIDUAL CONTAINER LABEL FOR REPACKAGING LIMITATIONS.

1.0 INGREDIENT

ACTIVE INGREDIENT:
*Glyphosate, N-(phosphonomethyl)glycine,
in the form of its isopropylamine salt..... 50.2%
OTHER INGREDIENTS (including 13% surfactant):..... 49.8%
100.0%

*Contains 600 grams per liter or 5 pounds per U.S. gallon of the active ingredient glyphosate, in the form of its isopropylamine salt. Equivalent to 445 grams per liter or 3.7 pounds per U.S. gallon of the acid glyphosate.

This product is protected by U.S. Patent No. 4,405,531. Other patents pending. No license granted under any non-U.S. patent(s).

2.0 IMPORTANT PHONE NUMBERS

1. FOR PRODUCT INFORMATION OR ASSISTANCE IN USING THIS PRODUCT, CALL TOLL-FREE,
   1-800-332-3111
2. IN CASE OF AN EMERGENCY INVOLVING THIS PRODUCT, OR FOR MEDICAL ASSISTANCE, CALL COLLECT, DAY OR NIGHT,
   (314)-694-4000

3.0 PRECAUTIONARY STATEMENTS

3.1 Hazards to Humans and Domestic Animals

Keep out of reach of children.

CAUTION!

CAUSES MODERATE EYE IRRITATION

Avoid contact with eyes or clothing.

FIRST AID: Call a poison control center or doctor for treatment advice.	
IF IN EYES	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.

- Have the product container or label with you when calling a poison control center or doctor, or going for treatment.
- You may also contact **(314) 694-4000**, collect day or night, for emergency medical treatment information.
- This product is identified as **Roundup PRO® Concentrate Herbicide**, **EPA Registration No. 524-529**.

DOMESTIC ANIMALS: This product is considered to be relatively nontoxic to dogs and other domestic animals; however, ingestion of this product or large amounts of freshly sprayed vegetation may result in temporary gastrointestinal irritation (vomiting, diarrhea, colic, etc.). If such symptoms are observed, provide the animal with plenty of fluids to prevent dehydration. Call a veterinarian if symptoms persist for more than 24 hours.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear: long-sleeved shirt and long pants, shoes plus socks. Follow manufacturer's instructions for cleaning/maintaining Personal Protective Equipment (PPE). If there are no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

When handlers use closed systems, enclosed cabs or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240 (d) (4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

IMPORTANT: When reduced PPE is worn because a closed system is being used, handlers must be provided all PPE specified above for "applicators and other handlers" and have such PPE immediately available for use in an emergency, such as a spill or equipment breakdown.

User Safety Recommendations

Users should:
- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

3.2 Environmental Hazards

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

3.3 Physical or Chemical Hazards

Spray solutions of this product can be mixed, stored and applied using only stainless steel, fiberglass, plastic or plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in any manner inconsistent with its labeling. This product can only be used in accordance with the Directions for Use on this label or in separately published Monsanto Supplemental Labeling. Supplemental Labeling may be found on the internet at www.agrian.com, www.cdms.net or www.greenbook.net or obtained by contacting your Authorized Monsanto Retailer or Monsanto Company representative.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulations.

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about Personal Protective Equipment (PPE) and restricted entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil or water, is: coveralls, shoes plus socks and chemical-resistant gloves made of any waterproof material.

Non-Agricultural Use Requirements

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard (40 CFR Part 170) for agricultural pesticides. The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries or greenhouses.

Keep people and pets off treated areas until spray solution has dried.

4.0 STORAGE AND DISPOSAL

Proper pesticide storage and disposal are essential to protect against exposure to people and the environment due to leaks and spills, excess product or waste, and vandalism. Do not allow this product to contaminate water, foodstuffs, feed or seed by storage or disposal.

PESTICIDE STORAGE: Store pesticides away from food, pet food, feed, seed, fertilizers, and veterinary supplies. Keep container closed to prevent spills and contamination.

PESTICIDE DISPOSAL: To avoid wastes, use all material in this container, including rinsate, by application in accordance with label directions. If wastes cannot be avoided, offer remaining product to a waste disposal facility or pesticide disposal program. Such programs are often run by state or local governments or by industry. All disposal must be in accordance with applicable Federal, State and local procedures.

CONTAINER DISPOSAL:

[FOR RIGID PLASTIC 2.5 GAL CONTAINERS OR OTHERS </= 5 GAL]

Nonrefillable container. Do not reuse this container to hold materials other than pesticides or dilute pesticides (rinsate). After emptying and cleaning, it may be allowable to temporarily hold rinsate or other pesticide-related materials in this container. Contact your state regulatory agency to determine allowable practices in your state.

CONTAINER HANDLING: Triple rinse or pressure rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times.

Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

Once cleaned, some plastic pesticide containers can be taken to a container collection site or picked up for recycling. To find the nearest site, contact your chemical dealer or Monsanto at 1-800-768-6387. If recycling is not available, puncture and dispose of in a sanitary landfill.

[FOR RIGID PLASTIC 30 GAL CONTAINERS OR OTHERS > 5 GAL]

CONTAINER DISPOSAL: Nonrefillable container. Do not reuse this container to hold materials other than pesticides or dilute pesticides (rinsate). After emptying and cleaning, it may be allowable to temporarily hold rinsate or other pesticide-related materials in this container. Contact your state regulatory agency to determine allowable practices in your state.

CONTAINER HANDLING: Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times.

Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

Once cleaned, some plastic pesticide containers can be taken to a container collection site or picked up for recycling. To find the nearest site, contact your chemical dealer or Monsanto at 1-800-768-6387. If recycling is not available, puncture and dispose of in a sanitary landfill.

[CONTAINER LABEL LANGUAGE FOR TRANSPORT VEHICLES AS DEFINED IN 40 CFR §156.3]

CONTAINER DISPOSAL: Emptied container retains vapor and product residue. Observe all precautions stated on this label until the container is cleaned, reconditioned or destroyed.

CONTAINER HANDLING: Prior to refilling, inspect carefully for damage such as cracks, punctures, abrasions, and worn-out threads and closures. Clean thoroughly before reuse for transportation of a material of different composition or before retiring this transport vehicle from service.

5.0 GENERAL INFORMATION

Product Description: This product is a postemergence, systemic herbicide with no soil residual activity. It gives broad-spectrum control of many annual weeds, perennial weeds, woody brush and trees. It is formulated as a water-soluble liquid containing surfactant.

Time to Symptoms: This product moves through the plant from the point of foliage contact to and into the root system. Visible effects on most annual weeds occur within 2 to 4 days, but on most perennial weeds may not occur for 7 days or more. Extremely cool or cloudy weather following treatment may slow activity of this product and delay development of visual symptoms. Visible effects are a gradual wilting and yellowing of the plant which advances to complete browning of above-ground growth and deterioration of underground plant parts.

Mode of Action in Plants: The active ingredient in this product inhibits an enzyme found only in plants that is essential to formation of specific amino acids.

Cultural Considerations: Reduced control may result when applications are made to annual or perennial weeds that have been mowed, grazed or cut, and have not been allowed to regrow to the specified stage for treatment.

Rainfastness: Heavy rainfall soon after application may wash this product off of the foliage and a repeat application may be required for adequate control.

No Soil Activity: Weeds must be emerged at the time of application to be controlled by this product. Weeds germinating from seed after application will not be controlled. Unemerged plants arising from unattached underground rhizomes or root stocks of perennials will not be affected by the herbicide.

Tank Mixing: This product does not provide residual weed control. For subsequent residual weed control, follow a label-approved herbicide program. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

When this label lists a tank mixture with a generic active ingredient such as diuron, 2,4-D or dicamba, the user is responsible for ensuring that the mixture product's label allows the specific application.

Buyer and all users are responsible for all loss or damage in connection with the use or handling of mixtures of this product with herbicides or other materials that are not expressly listed in this label. Mixing this product with herbicides or other materials not listed on this label may result in reduced performance.

Maximum Application Rates: The maximum application or use rates stated throughout this label are given in units of volume (fluid ounces or quarts) of this product per acre. However, the maximum allowed application rates apply to this product combined with the use of any and all other herbicides containing the active ingredient glyphosate, whether applied separately or as tank mixtures, on a basis of total pounds of glyphosate (acid equivalents) per acre. If more than one glyphosate-containing product is applied to the same site within the same year, you must ensure that the total use of glyphosate (pounds acid equivalents) does not exceed the maximum allowed. See the **INGREDIENTS** section of this label for necessary product information.

Except as otherwise specified, the combined total of all treatments must not exceed 8.5 quarts of this product (8 pounds of glyphosate acid) per acre per year.

ATTENTION

AVOID CONTACT OF HERBICIDE WITH FOLIAGE, STEMS, EXPOSED NON-WOODY ROOTS OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, BECAUSE SEVERE INJURY OR DESTRUCTION MAY RESULT.

AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS.

Do not allow the herbicide solution to mist, drip, drift or splash onto desirable vegetation since minute quantities of this product can cause severe damage or destruction to the crop, plants or other areas on which treatment was not intended. The likelihood of injury occurring from the use of this product increases when winds are gusty, as wind velocity increases, when wind direction is constantly changing or when there are other meteorological conditions that favor spray drift. When spraying, avoid combinations of pressure and nozzle type that

will result in splatter or fine particles (mist) which are likely to drift. AVOID APPLYING AT EXCESSIVE SPEED OR PRESSURE.

NOTE: Use of this product in any manner not consistent with this label may result in injury to persons, animals or crops, or have other unintended consequences.

5.1 Weed Resistance Management

GROUP	9	HERBICIDE

Glyphosate, the active ingredient in this product, is a Group 9 herbicide based on the mode of action classification system of the Weed Science Society of America. Any weed population may contain plants naturally resistant to Group 9 herbicides. Weed species resistant to Group 9 herbicides may be effectively managed utilizing another herbicide from a different Group or using other cultural or mechanical practices.

To minimize the occurrence of glyphosate-resistant biotypes observe the following general weed management recommendations:

- Scout your application site before and after herbicide applications.
- Control weeds early when they are relatively small.
- Incorporate other herbicides and cultural or mechanical practices as part of your weed control system where appropriate.
- Use the application rate for the most difficult weed in the site. Avoid tank-mixtures with other herbicides that reduce this product's efficacy (through antagonism) or with ones that encourage rates of this product below those specified on this label.
- Control weed escapes and prevent weeds from setting seeds.
- Clean equipment before moving from site to site to minimize spread of weed seed.
- Use new commercial seed as free of weed seed as possible.
- Report any incidence of repeated non-performance of this product on a particular weed to your Monsanto representative, local retailer, or county extension agent.

5.2 Management Recommendations for Glyphosate-Resistant Weed Biotypes

NOTE: Appropriate testing is critical in order to confirm weed resistance to glyphosate. Call 1-800-ROUNDUP (1-800-768-6387) or contact your Monsanto representative to determine if resistance in any particular weed biotype has been confirmed in your area or visit www.weedresistancemanagement.com or www.weedscience.org.

Directions for the control of biotypes confirmed to be resistant to glyphosate are made available on separately published supplemental labeling or Fact Sheets for this product and may be obtained from your local retailer or Monsanto representative.

Since the occurrence of new glyphosate-resistant weeds cannot be determined until after product use and scientific confirmation, Monsanto Company is not responsible for any losses that may result from the failure of this product to control glyphosate-resistant weed biotypes.

Follow good weed management practices to avoid the spread of confirmed resistant biotypes.

- If a naturally occurring resistant biotype is present at your site, this product may be tank-mixed or applied sequentially with an appropriately labeled herbicide with a different mode of action to achieve control.
- Cultural and mechanical control practices may also be used as appropriate.
- Scout treated sites after herbicide applications and control escapes of resistant biotypes before they set seed.
- Thoroughly clean equipment before leaving sites known to contain resistant biotypes.

6.0 MIXING

Spray solutions of this product should be mixed, stored and applied using only clean stainless steel, fiberglass, plastic or plastic-lined steel containers. Use caution to avoid siphoning back into the carrier source. Use approved anti-back-siphoning devices where required by State or local regulations.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS.

Clean sprayer parts immediately after using this product by thoroughly flushing with water.

6.1 Mixing with Water

NOTE: PRODUCT PERFORMANCE MAY BE REDUCED IF WATER CONTAINING SOIL SEDIMENT IS USED AS CARRIER. DO NOT MIX THIS PRODUCT WITH WATER FROM PONDS AND DITCHES THAT IS VISIBLY MUDDY OR MURKY.

This product mixes readily with clean water. Mix spray solutions of this product as follows: Begin filling the mixing tank or spray tank with the required amount of water. Add the labeled amount of this product near the end of the filling process and mix gently. Use caution to avoid siphoning back into the carrier source. Use approved anti-back-siphoning devices where required by state or local regulations. During mixing and application, foaming of the spray solution may occur. To prevent or minimize foam, avoid the use of mechanical agitators, terminate by-pass and return lines at the bottom of the tank and, if needed, use an approved anti-foam or defoaming agent.

6.2 Tank Mixing

This product does not provide residual weed control. This product may be tank-mixed with other herbicides to provide residual weed control, a broader weed control spectrum or an alternate mode of action. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

When this label lists a tank mixture with a generic active ingredient such as diuron, atrazine, 2,4-D, or dicamba the user is responsible for ensuring that the specific application being made is included on the label of the specific product being used in the tank mixture. Refer to all individual product labels, supplemental labeling and Fact Sheets for all products in the tank mixture, and observe all precautions and limitations on the label, including application timing restrictions, soil restrictions and use according to the most restrictive precautionary statements for each product in the tank mixture.

Keep by-pass line on or near the bottom of the tank to minimize foaming. Screen size in nozzle or line strainers should be no finer than 50-mesh.

Always predetermine the compatibility of labeled tank mixtures of this product with water carrier by mixing small proportional quantities in advance. Ensure that the specific tank mixture product is registered for application at the desired site.

When a tank mixture with a generic active ingredient, such as 2,4-D, atrazine, dicamba, diuron, or pendimethalin is listed in this label, the user is responsible for ensuring that the specific application being made is included on the label of the product being used in the tank-mix.

Refer to all individual product labels, supplemental labeling and Fact Sheets for all products in the tank mixture, and observe all precautions and limitations on the label, including application timing restrictions, soil restrictions, minimum re-cropping interval and rotational guidelines. Use according to the most restrictive precautionary statements for each product in the tank mixture.

Always predetermine the compatibility of all tank-mix products together in the carrier by mixing small proportional quantities in advance.

6.3 Mixing for Hand-Held Sprayers

Prepare the desired volume of spray solution by mixing the amount of this product in water as shown in the following table:

Spray Solution

Amount of Roundup PRO Concentrate Herbicide

Desired Volume	0.4%	0.8%	1.2%	1.6%	4.0%	8.0%
1 Gallon	0.5 oz	1.0 oz	1.6 oz	2.1 oz	5.2 oz	10.5 oz
25 Gallons	13.0 oz	0.8 qt	1.2 qt	1.6 qt	4.0 qt	8.0 qt
100 Gallons	1.6 qt	0.8 gal	1.2 gal	1.6 gal	4.0 gal	8.0 gal

2 tablespoons = 1 fluid ounce

For use in backpack, knapsack or pump-up sprayers, it is suggested that the required amount of this product be mixed with water in a larger container. Fill sprayer with the mixed solution.

6.4 Colorants or Dyes

Colorants or marking dyes may be added to spray solutions of this product; however they can reduce product performance, especially at lower rates or dilution. Use colorants or dyes according to the manufacturer's directions.

7.0 APPLICATION EQUIPMENT AND TECHNIQUES

Do not apply this product through any type of irrigation system.

APPLY SPRAY SOLUTIONS IN PROPERLY MAINTAINED AND CALIBRATED EQUIPMENT CAPABLE OF DELIVERING DESIRED VOLUMES.

7.1 Aerial Equipment

DO NOT APPLY THIS PRODUCT USING AERIAL SPRAY EQUIPMENT EXCEPT UNDER THE CONDITIONS SPECIFIED WITHIN THIS LABEL.

For aerial broadcast applications, unless otherwise specified, use this product at the rate of 0.8 to 1.6 quarts per acre for annual weeds, 1.6 to 4 quarts per acre for perennial weeds and 4 to 8 quarts per acre for woody brush and trees. Use the labeled rates of this herbicide in 3 to 25 gallons of water per acre. When used according to label directions, this product will give control or partial control of herbaceous weeds, woody brush and trees listed in the **WEEDS CONTROLLED** section of this label.

FOR AERIAL APPLICATION IN CALIFORNIA, REFER TO THE FEDERAL SUPPLEMENTAL LABELING FOR AERIAL APPLICATIONS OF THIS PRODUCT IN THAT STATE FOR SPECIFIC INSTRUCTIONS, RESTRICTIONS AND REQUIREMENTS. This product plus dicamba tank mixtures may not be applied by air in California.

When tank-mixing this product with 2,4-D, only 2,4-D amine formulations may be used for aerial application in California. Tank mixtures with 2,4-D amine formulations may be applied by air in California for fallow and reduced tillage systems, and for alfalfa and pasture renovation applications only.

Do not allow the herbicide solution to mist, drip, drift, or splash onto desirable vegetation since minute quantities of this product can cause severe damage or destruction to the crop, plants or other areas on which treatment was not intended.

Avoid direct application to any body of water.

Drift reduction additives may be used. When a drift reduction additive is used, read and carefully observe the cautionary statements and all other information appearing on the additive label.

Ensure uniform application–to avoid streaked, uneven or overlapped application, use appropriate marking devices.

PROLONGED EXPOSURE OF THIS PRODUCT TO UNCOATED STEEL SURFACES MAY RESULT IN CORROSION AND POSSIBLE FAILURE OF THE PART. The maintenance of an organic coating (paint) which meets aerospace specification MIL-C-38413 may prevent corrosion. To prevent corrosion of exposed parts, thoroughly wash aircraft after each day of spraying to remove residues of this product accumulated during spraying or from spills. Landing gear are most susceptible.

SPRAY DRIFT MANAGEMENT

AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS.

Do not allow the herbicide solution to mist, drip, drift or splash onto desirable vegetation since minute quantities of this product can cause severe damage or destruction to the crop, plants or other areas on which treatment was not intended.

Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment- and weather-related factors determines the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

AERIAL SPRAY DRIFT MANAGEMENT

The following drift management requirements must be followed to avoid off-target drift movement from aerial applications to agricultural field crops.

1. The distance of the outermost nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor.
2. Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees. Where states have more stringent regulations, they should be observed.

Importance of droplet size

The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see the **Wind, Temperature and Humidity**, and **Temperature Inversion** sections of this label).

Controlling droplet size

- **Volume:** Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with the higher rated flows produce larger droplets.
- **Pressure:** Use the lower spray pressures recommended for the nozzle. Higher pressure reduces droplet size and does not improve canopy penetration. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of nozzles:** Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle orientation:** Orienting nozzles so that the spray is released backwards, parallel to the airstream, will produce larger droplets than other orientations. Significant deflection from the horizontal will reduce droplet size and increase drift potential.
- **Nozzle type:** Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce larger droplets than other nozzle types.
- **Boom Length:** For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.
- **Application Height:** Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces the exposure of the droplets to evaporation and wind.

Swath Adjustment

When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller droplets, etc.).

Wind

Drift potential is lowest between wind speeds of 2 to 10 miles per hour. However, many factors, including droplet size and equipment type determine drift potential at any given speed. Application should be avoided below 2 miles per hour due to variable wind direction and high inversion potential. **NOTE:** Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect drift.

Temperature and Humidity

When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

Temperature Inversions

Applications should not occur during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

Sensitive Areas

The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

7.2 Ground Broadcast Equipment

For broadcast ground applications, unless otherwise specified use this product at the rate of 0.8 to 1.6 quarts per acre for annual weeds, 1.6 to 4 quarts per acre for perennial weeds and 4 to 8 quarts per acre for woody brush and trees. When used according to label directions, this product will give control or partial control of herbaceous weeds, woody brush and trees listed in the **WEEDS CONTROLLED** section of this label.

Use the labeled rates of this product in 3 to 40 gallons of water per acre as a broadcast spray unless otherwise specified. As density of weeds increases, spray volume should be increased within the specified range to ensure complete coverage. Carefully select proper nozzles to avoid spraying a fine mist. For best results with ground application equipment, use flat-fan nozzles. Check for even distribution of spray droplets.

7.3 Backpack or Hand-Held Equipment

Apply to foliage of vegetation to be controlled. For applications made on a spray-to-wet basis, spray coverage should be uniform and complete. Do not spray to the point of runoff. Use coarse sprays only.

For control of weeds listed in the **Annual Weeds** section of **WEEDS CONTROLLED**, apply a 0.4 percent solution of this product to weeds less than 6 inches in height or runner length. For annual weeds over 6 inches tall, or unless otherwise specified, use a 0.8 percent solution. Apply prior to seedhead formation in grass or bud formation in broadleaf weeds.

For best results, use a 1.6 percent solution on harder-to-control perennials, such as Bermudagrass, dock, field bindweed, hemp dogbane, milkweed and Canada thistle.

For low volume directed spray applications, use a 4 to 8 percent solution of this product for control or partial control of annual weeds, perennial weeds, or woody brush and trees. Spray coverage should be uniform with at least 50 percent of the foliage contacted. Coverage of the top one half of the plant is important for best results. To ensure adequate spray coverage, spray both sides of large or tall woody brush and trees, when foliage is thick and dense, or where there are multiple sprouts.

7.4 Selective Equipment

This product may be applied through recirculating spray systems, shielded applicators, hooded sprayers, wiper applicators or sponge bars after dilution and thorough mixing with water to listed weeds growing in any non-crop site specified on this label.

A recirculating spray system directs the spray solution onto weeds growing above desirable vegetation, while spray solution not intercepted by weeds is collected and returned to the spray tank for reuse.

AVOID CONTACT OF HERBICIDE WITH DESIRABLE VEGETATION, AS SERIOUS INJURY OR DEATH IS LIKELY TO OCCUR.

Application equipment used above desired vegetation should be adjusted so that the lowest spray stream or wiper contact point is at least 2 inches above the desirable vegetation. Droplets, mist, foam or splatter of the herbicide solution settling on desirable vegetation is likely to result in discoloration, stunting or destruction.

Better results may be obtained when more of the weed is exposed to the herbicide solution. Weeds not contacted by the herbicide solution will not be affected. This may occur in dense clumps, severe infestations or when the height of the weeds varies so that not all weeds are contacted. In these instances, repeat treatment may be necessary.

Shielded and Hooded Applicators

A shielded or hooded applicator directs the herbicide solution onto weeds, while shielding desirable vegetation from the herbicide.

Use nozzles that provide uniform coverage within the treated area. Keep shields on these sprayers adjusted to protect desirable vegetation. EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF HERBICIDE WITH DESIRABLE VEGETATION.

Wiper Applicators and Sponge Bars

A wiper or sponge applicator applies the herbicide solution onto weeds by rubbing the weed with an absorbent material containing the herbicide solution.

Equipment must be designed, maintained and operated to prevent the herbicide solution from contacting desirable vegetation. Operate this equipment at ground speeds no greater than 5 miles per hour. Performance may be improved by reducing speed in areas of heavy weed infestations to ensure adequate wiper saturation. Better results may be obtained if 2 applications are made in opposite directions.

Avoid leakage or dripping onto desirable vegetation. Adjust height of applicator to ensure adequate contact with weeds. Keep wiping surfaces clean. Be aware that, on sloping ground, the herbicide solution may migrate, causing dripping on the lower end and drying of the wicks on the upper end of a wiper applicator.

Do not use wiper equipment when weeds are wet.

Mix only the amount of solution to be used during a 1-day period, as reduced activity may result from use of leftover solutions. Clean wiper parts immediately after using this product by thoroughly flushing with water.

For Rope or Sponge Wick Applicators: Solutions ranging from 33 to 75 percent of this product in water may be used.

For Porous-Plastic Applicators and Pressure-Feed Systems: Solutions ranging from 33 to 100 percent of this product in water may be used.

When applied as directed, this product CONTROLS the following weeds:

Corn, volunteer	Sicklepod
Panicum, Texas	Spanishneedles
Rye, common	Starbur, bristly
Shattercane	

When applied as directed, this product SUPPRESSES the following weeds:

Beggarweed, Florida	Ragweed, common
Bermudagrass	Ragweed, giant
Dogbane, hemp	Smutgrass
Dogfennel	Sunflower
Guineagrass	Thistle, Canada
Johnsongrass	Thistle, musk
Milkweed	Vaseygrass
Nightshade, silverleaf	Velvetleaf
Pigweed, redroot	

7.5 Injection Systems

This product may be used in aerial or ground injection spray systems. It may be used as a liquid concentrate or diluted prior to injecting into the spray stream. Do not mix this product with the undiluted concentrate of other products when using injection systems unless specifically instructed.

7.6 CDA Equipment

The rate of this product applied per acre by controlled droplet application (CDA) equipment must not be less than the amount specified in this label when applied by conventional broadcast equipment. For vehicle-mounted CDA equipment, apply 3 to 15 gallons of water per acre.

CDA equipment produces a spray pattern which is not easily visible. Extreme care must be exercised to avoid spray or drift contacting the foliage or any other green tissue of desirable vegetation, as damage or destruction is likely to result.

8.0 SITE AND USE INSTRUCTIONS

This product may be used in non-crop areas such as airports, apartment complexes, commercial sites, ditch banks, driveways, dry ditches, dry canals, fencerows, golf courses, greenhouses, industrial sites, landscape areas, lumberyards, manufacturing sites, municipal sites, natural areas, office complexes, ornamentals, parks, parking areas, pastures, petroleum tank farms and pumping installations, railroads, rangeland, recreation areas, residential areas, rights-of-way, roadsides, schools, shadehouses, sports complexes, storage areas, substations, turfgrass areas, utility sites, warehouse areas and wildlife management areas.

This product may also be used in non-food crop sites such as Christmas tree farms, plant nurseries, sod or turf seed farms.

Unless otherwise specified, applications may be made to control any weeds listed in the **WEEDS CONTROLLED** section of this label.

8.1 Cut Stumps

Cut stump treatments may be made on any site listed on this label. This product will control many types of woody brush and tree species. Apply this product using suitable equipment to ensure coverage of the entire cambium. Cut trees or resprouts close to the soil surface. Apply a 50 to 100 percent solution of this product to the freshly-cut surface **immediately after** cutting. Delays in application may result in reduced performance. For best results, applications should be made during periods of active growth and full leaf expansion.

DO NOT MAKE CUT STUMP APPLICATIONS WHEN THE ROOTS OF DESIRABLE WOODY BRUSH OR TREES MAY BE GRAFTED TO THE ROOTS OF THE CUT STUMP. Some sprouts, stems, or trees may share the same root system. Adjacent trees having a similar age, height and spacing may signal shared roots. Whether grafted or shared, injury is likely to occur to non-treated stems/trees when one or more trees sharing common roots are treated.

8.2 Forestry Site Preparation

This product may be used for the control or partial control of woody brush, trees and herbaceous weeds in forestry or in preparing or establishing wildlife openings within these sites and maintaining logging roads.

This product may be used in site preparation prior to planting any tree species, including Christmas trees, eucalyptus, hybrid tree cultivars and silvicultural nursery sites.

Refer to the **WEEDS CONTROLLED** section of this label for specific application rates and instructions. Use higher rates of this product within the specified range for control or partial control of woody brush, trees and hard-to-control perennial herbaceous weeds. For best results, apply to actively growing woody brush and trees after full leaf expansion and before fall color and leaf drop. Increase rates within the specified range for control of perennial herbaceous weeds any time after emergence and before seedheads, flowers or berries appear.

Use the lower rates of this product within the labeled range for control of annual herbaceous weeds and actively growing perennial herbaceous weeds after seedheads, flowers or berries appear. Apply to the foliage of actively growing annual herbaceous weeds any time after emergence.

This product has no herbicidal or residual activity in the soil.

Unless otherwise directed, do not apply this product as an over-the-top broadcast spray for forestry conifer or hardwood release.

TANK MIXTURES: Tank mixtures of this product may be used to increase the spectrum of vegetation controlled. This product may be tank mixed with the following products provided that the specific product is registered for use on the target site. Refer to these product labels for approved sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

NOTE: For forestry site preparation, make sure the tank-mix product is approved for use prior to planting the desired species. Observe planting interval restrictions.

This product may be used in a tank mix with the following products for forestry site preparation.

Arsenal Applicators Concentrate	Garlon 3A
Chopper	Garlon 4
Escort	Oust
Escort XP	Oust XP

For control of herbaceous weeds, use the lower labeled tank mixture rates. For control of dense stands or tough-to-control woody brush and trees, use the higher labeled rates.

8.3 Non-Crop Areas and Industrial Sites

Use in areas such as airports, apartment complexes, Christmas tree farms, commercial sites, Conservation Reserve Program (CRP) areas, ditch banks, driveways, dry ditches, dry canals, fencerows, golf courses, greenhouses, industrial sites, landscape areas, lumberyards, manufacturing sites, municipal sites, natural areas, office complexes, ornamentals, parks, parking areas, pastures, petroleum tank farms and pumping installations, plant nurseries, railroads, rangelands, recreational areas, residential areas, rights-of-way, roadsides, schools, sod or turf seed farms, sports complexes, storage areas, substations, turfgrass areas, utility sites, warehouse areas, and wildlife management areas.

General Weed Control, Trim-and-Edge and Bare Ground

This product may be used in general non-crop and non-food crop areas. It may be applied with any application equipment described in this label. This product may be used to trim-and-edge around objects in non-crop sites, for spot treatment of unwanted vegetation and to eliminate unwanted weeds growing in established shrub beds or ornamental plantings. This product may be used prior to planting an area to ornamentals, flowers, turfgrass (sod or seed), or prior to laying asphalt or beginning construction projects.

Repeated applications of this product may be used, as weeds emerge, to maintain bare ground.

TANK MIXTURES: This product may be tank mixed with the following products provided that the specific product is registered for use on the target site. Refer to these product labels for approved sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

User is responsible for ensuring that the mixture product's label allows the specific applications when tank mixing with a generic active ingredient listed below.

2,4-D[1]	Gallery 75 DF	Ronstar 50 WP
Arsenal	Garlon 3A	Sahara DG
atrazine[1]	Garlon 4	Surflan AS
Banvel	Goal 2XL	Surflan WDG
Barricade 65WG	Krovar I DF	simazine[1]
dicamba	Oust	Telar DF
diuron	Oust XP	Transline
Endurance	Outrider	
Escort	pendimethalin[1]	
Escort XP	Plateau	

[1] Tank mixtures with products containing this generic active ingredient may be made provided the specific product is registered for this use.

When applied as a tank mixture for bare ground, this product provides control of the emerged annual weeds and control or partial control of emerged perennial weeds, woody brush and trees.

For control or partial control of the following perennial weeds, apply 0.8 to 1.6 quarts of this product plus 2 to 4 ounces of Oust XP per acre.

Bahiagrass	Dock, curly	Poorjoe
Bermudagrass	Dogfennel	Quackgrass
Broomsedge	Fescue, tall	Vaseygrass
Dallisgrass	Johnsongrass	Vervain, blue

Chemical Mowing - Perennials

This product will suppress perennial grasses listed in this section to serve as a substitute for mowing. Use 6.4 fluid ounces of this product per acre when treating tall fescue, fine fescue, orchardgrass, quackgrass or reed canarygrass covers. Use 5 fluid ounces of this product per acre when treating Kentucky bluegrass. Apply treatments in 10 to 40 gallons of spray solution per acre.

Use only in areas where some temporary injury or discoloration of perennial grasses can be tolerated.

Chemical Mowing - Annuals

For growth suppression of some annual grasses, such as annual ryegrass, wild barley and wild oats growing in coarse turf on roadsides or other industrial areas, apply 3 to 4 fluid ounces of this product in 10 to 40 gallons of spray solution per acre. Applications should be made when annual grasses are actively growing and before the seedheads are in the boot stage of development. Treatments may cause injury to the desired grasses.

Dormant Turfgrass

This product may be used to control or suppress many winter annual weeds and tall fescue for effective release of dormant Bermudagrass and bahiagrass turf. Treat only when turf is dormant and prior to spring greenup.

Apply 6.4 to 51 fluid ounces of this product per acre. Apply the labeled rates in 10 to 40 gallons of water per acre. Use only in areas where Bermudagrass or bahiagrass are desirable ground covers and where some temporary injury or discoloration can be tolerated.

Treatments in excess of 13 fluid ounces per acre may result in injury or delayed greenup in highly maintained areas, such as golf courses and lawns. DO NOT apply tank mixtures of this product plus Oust XP in highly maintained turfgrass areas. For further uses, refer to the **Roadsides** section of this label, which gives rates for dormant Bermudagrass and bahiagrass treatments.

Actively Growing Bermudagrass

This product may be used to control or partially control many annual and perennial weeds for effective release of actively growing Bermudagrass. DO NOT apply more than 13 fluid ounces of this product per acre in highly maintained turfgrass areas. DO NOT apply tank mixtures of this product plus Oust XP in highly maintained turfgrass areas. For further uses, refer to the **Roadsides** section of this label, which gives rates for actively growing Bermudagrass treatments. Use only in areas where some temporary injury or discoloration can be tolerated.

Turfgrass Renovation, Seed, or Sod Production

This product controls most existing vegetation prior to renovating turfgrass areas or establishing turfgrass grown for seed or sod. For maximum control of existing vegetation, delay planting or sodding to determine if any regrowth from escaped underground plant parts occurs. Where repeat treatments are necessary, sufficient regrowth must be attained prior to application. For warm-season grasses such as Bermudagrass, summer or fall applications provide the best control. Where existing vegetation is growing under mowed turfgrass management, apply this product after omitting at least one regular mowing to allow sufficient growth for good interception of the spray.

Desirable turfgrasses may be planted following the above procedures.

Hand-held equipment may be used for spot treatment of unwanted vegetation growing in existing turfgrass. Broadcast or hand-held equipment may be used to control sod remnants or other unwanted vegetation after sod is harvested.

PRECAUTIONS; RESTRICTIONS: Do not disturb soil or underground plant parts before treatment. Tillage or renovation techniques such as vertical mowing, coring or slicing should be delayed for 7 days after application to allow translocation into underground plant parts. If application rates total 2.4 quarts per acre or less, no waiting period between treatment and feeding or livestock grazing is required. If the rate is greater than 2.4 quarts per acre, remove domestic livestock before application and wait 8 weeks after application before grazing or harvesting.

Do not feed or graze turfgrass grown for seed or sod production for 8 weeks following application.

8.4 Habitat Management

Habitat Restoration and Management

This product may be used to control exotic and other undesirable vegetation in habitat management and natural areas, including rangeland and wildlife refuges. Applications can be made to allow recovery of native plant species, prior to planting desirable native species, and for similar broad-spectrum vegetation control requirements. Spot treatments can be made to selectively remove unwanted plants for habitat management and enhancement.

Wildlife Food Plots

This product may be used as a site preparation treatment prior to planting wildlife food plots. Any wildlife food species may be planted after applying this product, or native species may be allowed to repopulate the area. If tillage is needed to prepare a seedbed, wait 7 days after application before tillage to allow translocation into underground plant parts.

8.5 Hollow Stem Injection

This product may be applied through hand-held injection devices that deliver the specified amounts of this product into targeted hollow-stem plants growing in any site specified on this label.

For control of the following hollow-stem plants, follow the use instructions below:

Castorbean, *Ricinus communis*

Inject 4 ml per plant of this product into the lower portion of the main stem.

Hemlock, Poison, *Conium maculatum*

Inject one leaf cane per plant 10 to 12 inches above the root crown with 5 ml of a 5% v/v solution of this product.

Hogweed, Giant, *Hercleum mantegazzianum*

Inject one leaf cane per plant 12 inches above the root crown with 5 ml of a 5% v/v solution of this product.

Horsetail, Field, *Equisetum arvense*

Inject one segment above the root crown with 0.5 ml per stem of this product. Use a small syringe that calibrates to this rate.

Knotweed, Bohemian, *Polygonum bohemicum*

Inject 5 ml per stem of this product between the second and third internode.

Knotweed, Giant, *Polygonum sachalinense*

Inject 5 ml per stem of this product between second and third internode.

Knotweed, Japanese, *Polygonum cuspidatum*

Inject 5 ml per stem of this product between second and third internode.

Reed, Giant, *Arundo donax*

Inject 6 ml per stem of this product between second and third internode.

Thistle, Canada, *Circsum arvense*

Cut 8 to 9 of the tallest plants at bud stage in a clump with clippers. Use a cavity needle that is pushed into the stem center and then slowly removed as 0.5 ml per stem of this product is injected into the stem.

NOTE: The combined total for all treatments must not exceed 7 quarts of this product per acre. At 5 ml per stem, 7 quarts should treat approximately 1300 stems per acre.

8.6 Foliar or Broadcast Application to Japanese Knotweed and Oriental Bittersweet

Japanese Knotweed

For control of Japanese knotweed (*Polygonum cuspidatum*), this product may be applied as a 2.0% v/v spray-to-wet solution. Ensure thorough coverage when using spray-to-wet treatments using hand-held equipment.

For broadcast applications, apply 3.25 quarts of this product in 3 to 40 gallons per acre as a broadcast treatment.

Late summer or fall application is ideal, while leaves are still green and after fruit formation.

Oriental Bittersweet

For control of Oriental bittersweet (*Celastrus orbiculatus*), this product may be applied as a 2.0% v/v spray-to-wet solution. Ensure thorough coverage when using spray-to-wet treatments using hand-held equipment.

For broadcast applications, apply 2.5 quarts of this product in 3 to 40 gallons per acre as a broadcast treatment.

Late summer or fall application is ideal, while leaves are still green and after fruit formation.

8.7 Injection and Frill (Woody Brush and Trees)

This product may be used to control woody brush and trees by injection or frill applications. Apply this product using suitable equipment which must penetrate into the living tissue. Apply the equivalent of 1 ml of this product per each 2 to 3 inches of trunk diameter at breast height (DBH). This is best achieved by applying a 50 to 100 percent concentration of this product either to a continuous frill around the tree or as cuts evenly spaced around the tree below all branches. As tree diameter increases in size, better results are achieved by applying diluted material to a continuous frill or more closely spaced cuttings. Avoid application techniques that allow runoff to occur from frilled or cut areas in species that exude sap freely. In species such as this, make the frill or cuts at an oblique angle to produce a cupping effect and use a 100 percent concentration of this product. For best results, application should be made during periods of active growth and after full leaf expansion.

8.8 Ornamentals, Plant Nurseries and Christmas Trees

Post-directed, Trim-and-Edge

This product may be used as a post-directed spray around established woody ornamental species such as arborvitae, azalea, boxwood, crabapple, eucalyptus, euonymus, fir, douglas fir, jojoba, hollies, lilac, magnolia, maple, poplar, oak, privet, pine, spruce and yew. This product may also be used to trim-and-edge around trees, buildings, sidewalks and roads, potted plants and other objects in a nursery setting.

Desirable plants may be protected from the spray solution by using shields or coverings made of cardboard or other impermeable material. DO NOT USE THIS PRODUCT AS AN OVER-THE-TOP BROADCAST SPRAY IN ORNAMENTALS AND CHRISTMAS TREES. Care must be exercised to avoid contact of spray, drift or mist with foliage or bark of established ornamental species.

Site Preparation

This product may be used prior to planting any ornamental, nursery or Christmas tree species.

Wiper Applicators

This product may be used through wick or other suitable wiper applicators to control or partially control undesirable vegetation around established eucalyptus or poplar tees. See the **Selective Equipment** section of this label for further information about the proper use of wiper applicators.

Greenhouse/Shadehouse

This product may be used to control weeds growing in and around greenhouses and shadehouses. Desirable vegetation must not be present during application and air circulation fans must be turned off.

8.9 Parks, Recreational and Residential Areas

This product may be used in parks, recreational and residential areas. It may be applied with any application equipment described in this label. This product may be used to trim-and-edge around trees, fences, paths, around buildings, sidewalks, and other objects in these areas. This product may be used for spot treatment of unwanted vegetation. This product may be used to eliminate unwanted weeds growing in established shrub beds or ornamental plantings. This product may be used prior to planting an area to ornamentals, flowers, turfgrass (sod or seed), or prior to laying asphalt or beginning construction projects.

All of the instructions in the **Non-Crop Areas and Industrial Sites** section apply to park and recreational areas.

8.10 Railroads

The instructions in the **Non-Crop Areas and Industrial Sites** section may be used on railroads.

Bare Ground, Ballast and Shoulders, Crossings, and Spot Treatment

This product may be used to maintain bare ground on railroad ballast and shoulders. Repeat applications of this product may be used, as weeds emerge, to maintain bare ground. This product may be used to control tall-growing weeds to improve line-of-sight at railroad crossings and reduce the need for mowing along rights-of-way. For crossing applications, up to 80 gallons of spray solution per acre may be used.

TANK MIXTURES: This product may be tank mixed with the following products for ballast, shoulder, spot, bare ground and crossing treatments provided that the specific product is registered for use on such sites. Refer to these product labels for approved non-crop sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

User is responsible for ensuring that the mixture product's label allows the specific applications when tank mixing with a generic active ingredient listed below.

Arsenal	Hyvar X	simazine[1]
atrazine[1]	Hyvar X-L	Spike 80DF
dicamba[1]	Krovar I DF	Telar DF
Escort	Oust	Transline
Escort XP	Oust XP	Velpar DF
Garlon 3A	Outrider	Velpar L
Garlon 4	Sahara DG	2,4-D[1]

[1]Tank mixtures with products containing this generic active ingredient may be made provided the specific product is registered for this use.

Brush Control

This product may be used to control woody brush and trees on railroad rights-of-way. Apply 3 to 8 quarts of this product per acre as a broadcast spray, using boom-type or boomless nozzles. Up to 80 gallons of spray solution per acre may be used. Apply a 0.8 to 1.6 percent solution of this product when using high-volume spray-to-wet applications. Apply a 4 to 8 percent solution of this product when using low volume directed sprays for spot treatment. This product may be mixed with the following products for enhanced control of woody brush and trees:

Arsenal	Telar DF	Vanquish
Escort	Krenite	Velpar DF
Escort XP	Tordon K	Velpar L
Garlon 3A	Tordon 22K	
Garlon 4	Transline	

Bermudagrass Release

This product may be used to control or partially control many annual and perennial weeds for effective release of actively growing Bermudagrass. Apply 13 to 38 fluid ounces of this product in up to 80 gallons of spray solution per acre. Use the lower rate when treating annual weeds below 6 inches in height (or runner length). Use the higher rate as weeds increase in size or as they approach flower or seedhead formation. These rates will also provide partial control of the following perennial species:

Bahiagrass	Johnsongrass
Bluestem, silver	Trumpetcreeper
Fescue, tall	Vaseygrass

Apply 6.4 to 51 fluid ounces of this product in a tank mixture with 0.75 to 1.33 ounces of Outrider herbicide per acre. Read and follow all label directions for Outrider herbicide.

This product may be tank mixed with Oust XP. If tank mixed, use no more than 13 to 38 fluid ounces of this product with 1 to 2 ounces of Oust XP per acre. Use the lower rates of each product to control annual weeds less than 6 inches in height (or runner length) that are listed in this label and the Oust XP label. Use the higher rates as annual weeds increase in size and approach the flower or seedhead stages. These rates will also provide partial control of the following perennial weeds:

Bahiagrass	Fescue, tall
Blackberry	Johnsongrass
Bluestem, silver	Poorjoe
Broomsedge	Raspberry
Dallisgrass	Trumpetcreeper
Dewberry	Vaseygrass
Dock, curly	Vervain, blue
Dogfennel	

Use only on well-established Bermudagrass. Bermudagrass injury may result from the treatment, but regrowth will occur under moist conditions. Repeat applications in the same season may cause severe injury.

8.11 Roadsides

The instructions in the **Non-Crop Areas and Industrial Sites** section may apply to roadsides.

Shoulder Treatments

This product may be used on road shoulders. It may be applied with boom sprayers, shielded boom sprayers, high-volume off-center nozzles, hand-held equipment, and similar equipment.

Guardrails and Other Obstacles to Mowing

This product may be used to control weeds growing under guardrails and around signposts and other objects along the roadside.

Spot Treatment

This product may be used as a spot treatment to control unwanted vegetation growing along roadsides.

TANK MIXTURES: This product may be tank mixed with the following products for shoulder, guardrail, spot and bare ground treatments provided that the specific product is registered for use on such sites. Refer to these product labels for approved non-crop sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

User is responsible for ensuring that the mixture product's label allows the specific applications when tank mixing with a generic active ingredient listed below.

atrazine[1]	Landmark II MP	Sahara DG
Crossbow L	Landmark XP	simazine[1]
dicamba	Oust	Surflan AS
diuron	Oust XP	Surflan WDG
Escort	Outrider	Telar DF
Escort XP	pendimethalin[1]	Velpar DF
Endurance	Plateau	Velpar L
Gallery 75 DF	Plateau DG	2,4-D[1]
Krovar I DF	Poast	
Landmark MP	Ronstar 50 WSP	

[1]Tank mixtures with products containing this generic active ingredient may be made provided the specific product is registered for this use.

Release of Bermudagrass or Bahiagrass

Dormant Applications

This product may be used to control or partially control many winter annual weeds and tall fescue for effective release of dormant Bermudagrass or bahiagrass. Treat only when turf is dormant and prior to spring greenup. This product may also be tank mixed with Outrider or Oust XP for residual control. Tank mixtures of this product with Oust XP may delay greenup.

For best results on winter annuals, treat when plants are in an early growth stage (below 6 inches in height) after most have germinated. For best results on tall fescue, treat when fescue is at or beyond the 4- to 6-leaf stage.

Apply 6.4 to 51 fluid ounces of this product in a tank mixture with 0.75 to 1.33 ounces of Outrider herbicide per acre. Read and follow all label directions for Outrider herbicide.

Apply 6.4 to 51 fluid ounces of this product per acre alone or in a tank mixture with 0.25 to 1 ounce per acre of Oust XP. Apply the labeled rates in 10 to 40 gallons of water per acre. Use only in areas where Bermudagrass or bahiagrass are desirable ground covers and where some temporary injury or discoloration can be tolerated. To avoid delays in greenup and minimize injury, add no more than 1 ounce of Oust XP per acre on Bermudagrass and no more than 0.5 ounce of Oust XP per acre on bahiagrass and avoid treatments when these grasses are in a semi-dormant condition.

Actively Growing Bermudagrass

This product may be used to control or partially control many annual and perennial weeds for effective release of actively growing Bermudagrass. Apply 13 to 38 fluid ounces of this product in 10 to 40 gallons of spray solution per acre. Use the lower rate when treating annual weeds below 6 inches in height (or runner length). Use the higher rate as weeds increase in size or as they approach flower or seedhead formation. These rates will also provide partial control of the following perennial species:

Bahiagrass	Johnsongrass
Bluestem, silver	Trumpetcreeper
Fescue, tall	Vaseygrass

This product may be tank mixed with Outrider herbicide for control or partial control of Johnsongrass and other weeds listed in the Outrider label. Use 6.4 to 26 fluid ounces of this product with 0.75 to 1.33 ounces of Outrider. Use the higher rates of both products for control of perennial weeds or annual weeds greater than 6 inches in height.

This product may be tank mixed with Oust XP. If tank mixed, use no more than 13 to 26 fluid ounces of this product with 1 to 2 ounces of Oust XP per acre. Use the lower rates of each product to control annual weeds less than 6 inches in height (or runner length) that are listed in this label and the Oust XP label. Use the higher rates as annual weeds increase in size and approach the flower or seedhead stages. These rates will also provide partial control of the following perennial weeds:

Bahiagrass	Fescue, tall
Bluestem, silver	Johnsongrass
Broomsedge	Poorjoe
Dallisgrass	Trumpetcreeper
Dock, curly	Vaseygrass
Dogfennel	Vervain, blue

Use only on well-established Bermudagrass. Bermudagrass injury may result from the treatment, but regrowth will occur under moist conditions. Repeat applications of the tank mix in the same season may cause severe injury.

Actively Growing Bahiagrass

For suppression of vegetative growth and seedhead inhibition of bahiagrass for approximately 45 days, apply 5 fluid ounces of this product in 10 to 40 gallons of water per acre. Apply 1 to 2 weeks after full greenup or after mowing to a uniform height of 3 to 4 inches. This application must be made prior to seedhead emergence.

For suppression up to 120 days, apply 3 fluid ounces of this product per acre, followed by an application of 1.5 to 3 fluid ounces per acre about 45 days later. Make no more than 2 applications per year.

This product may be used for control or partial control of Johnsongrass and other weeds listed on the Outrider label in actively growing bahiagrass. Apply 5 ounces of this product with 0.75 to 2.0 ounces of Outrider per acre. Use only on well-established bahiagrass.

A tank mixture of this product plus Oust XP may be used. Apply 5 fluid ounces of this product plus 0.5 to 1.0 ounce of Oust XP per acre 1 to 2 weeks following an initial spring mowing. Make only one application per year.

8.12 *Bromus* Species and Medusahead in Pastures and Rangelands

***Bromus* species:**

This product may be used to treat downy brome (*Bromus tectorum*), Japanese brome (*Bromus japonicus*), soft chess (*Bromus mollis*) and cheatgrass (*Bromus secalinus*) found in industrial, rangeland and pasture sites. Apply 6.5 to 13 fluid ounces of this product per acre on a broadcast basis.

For best results, treatment should coincide with early seedhead emergence of the most mature plants. Delaying the application until this growth stage will maximize the emergence of other weedy grass flushes. Applications should be made to the same site each year until seed banks are depleted and the desirable perennial grasses can become reestablished on the site.

Medusahead:

To treat medusahead, apply 13 fluid ounces of this product per acre as soon as plants are actively growing, and prior to the 4-leaf stage. Applications may be made in the fall or spring.

Applications to brome and medusahead may be made using ground or aerial equipment. Aerial applications for these uses may be made using fixed wing or helicopter equipment. For aerial applications, apply in 2 to 10 gallons of water per acre. For applications using ground equipment, apply in 10 to 20 gallons of water per acre. When applied as directed in this label, there are no grazing restrictions.

8.13 Utility Sites

In utilities, this product may be used along electrical power, pipeline and telephone rights-of-way, and in other sites associated with these rights-of-way, such as substations, roadsides, railroads or similar rights-of-way that run in conjunction with utilities.

This product may be used in utility sites and substations for bare ground, trim-and-edge around objects, spot treatment of unwanted vegetation and to eliminate unwanted weeds growing in established shrub beds or ornamental plantings. This product may be used prior to planting a utility site to ornamentals, flowers, turfgrass (sod or seed), or beginning construction projects.

Repeated applications of this product may be used, as weeds emerge, to maintain bare ground.

This product may also be used in preparing or establishing wildlife openings within these sites, maintaining access roads and for side trimming along utility rights-of-way.

TANK MIXTURES: Tank mixtures of this product may be used to increase the spectrum of control for herbaceous weeds, woody brush and trees. This product may be tank mixed with the following products. Refer to these products' labels for approved non-crop sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

User is responsible for ensuring that the mixture product's label allows the specific applications when tank mixing with a generic active ingredient listed below.

Arsenal	Krenite	Surflan AS
atrazine[1]	Krovar I DF	Surflan WDG
dicamba[1]	Oust	Telar DF
diuron[1]	Oust XP	Transline
Endurance	Outrider	Vanquish
Escort	pendimethalin[1]	Velpar DF
Escort XP	Plateau	Velpar L
Garlon 3A	Sahara DG	2,4-D[1]
Garlon 4[2]	simazine[1]	

[1]Tank mixtures with products containing this generic active ingredient may be made provided the specific product is registered for this use.

[2]For side trimming treatments, use this product alone or in a tank mixture with Garlon 4.

8.14 Conservation Reserve Program (CRP)

This product may be used to prepare CRP land for crop production. Refer to Federal, state or local use guides for CRP renovation guidance. For any crop not listed for treatment in this label, applications must be made at least 30 days prior to planting.

Renovation (Rotating out of CRP), Site Preparation, Postemergence Weed Control in Dormant CRP Grasses, Over-the-Top Wiper Applications

This product may be used to suppress competitive growth and seed production of undesirable vegetation in CRP acres. Such applications may be made with wiper application equipment or as a broadcast or spot treatment to dormant CRP grasses. For selective applications with broadcast spray equipment, apply 10 to 13 fluid ounces of this product per acre in early spring before desirable CRP grasses, such as crested and tall wheatgrass, break dormancy and initiate green growth. Late fall applications can be made after desirable perennial grasses have reached dormancy.

Some stunting of CRP perennial grasses will occur if broadcast applications are made when plants are not dormant. No waiting period is required between application and grazing or harvesting for feed. Do not apply more than 2.25 quarts per acre per year onto CRP grasses.

8.15 Grass Seed or Sod Production

Preplant, Preemergence, At-Planting, Renovation, Removal of Established Stands, Site Preparation

This product controls most existing vegetation prior to renovating turf or forage grass seed areas or establishing turfgrass grown for sod. It may also be used to destroy remaining undesired grass vegetation when production fields are converted to alternate species or crops. Make applications before, during, or after planting or for renovation. For maximum control of existing vegetation, delay planting to determine if any regrowth from escaped underground plant parts occurs. Where existing vegetation is growing under mowed turfgrass management, apply this product after omitting at least one regular mowing to allow sufficient growth for good interception of the spray. Where repeat treatments are necessary, sufficient regrowth must be attained prior to application. For warm-season grasses, such as Bermudagrass, summer or fall applications provide best control. Broadcast equipment may be used to control sod remnants or other unwanted vegetation after sod is harvested. Application rates up to 4 quarts per acre may be used to totally remove established stands of tough to kill grass species.

Do not disturb soil or underground plant parts before treatment. Tillage or renovation techniques such as vertical mowing, coring or slicing should be delayed for 7 days after application to allow proper translocation into underground plant parts. If application rates total 2.25 quarts per acre or less, no waiting period between treatment and feeding or

livestock grazing is required. If the rate is greater than 2.25 quarts per acre, remove domestic livestock before application and wait 8 weeks after application before grazing or harvesting. For any crop not listed for treatment in this label, applications must be made at least 30 days prior to planting. Applications must be made prior to the emergence of the crop to avoid crop injury.

Shielded Sprayers

Apply 26 fluid ounces to 2.4 quarts of this product in 10 to 20 gallons of water per acre to control weeds between grass seed rows. Uniform planting in straight rows aids in shielded sprayer applications. Best results are obtained when the grass seed crop is small enough to easily pass by the protective shields.

Contact of this product in any manner to any vegetation to which treatment is not intended may cause damage. Such damage shall be the sole responsibility of the applicator.

Over-the-Top Wiper Applications

Applicators should be adjusted so that the wiper contact point is at least 2 inches above the desirable vegetation. Weeds should be a minimum of 6 inches above the desirable vegetation. Better results may be obtained when more of the weed is exposed to the herbicide solution. Weeds not contacted by the herbicide solution will not be affected. This may occur in dense clumps, severe infestations, or when height of weeds varies so that not all weeds are contacted. In these instances, repeat treatments may be necessary. Contact of the herbicide solution with desirable vegetation may result in damage or destruction.

Spot Treatment

Use a 1.0 to 1.6 percent solution. Apply this product prior to heading of grasses grown for seed. The crop receiving the spray in the treated area will be killed. Take care to avoid drift or spray outside the target area for the same reason. Hand-held equipment may be used to control sod remnants or other unwanted vegetation after sod is harvested.

Creating Rows in Annual Ryegrass

Use 13 to 26 fluid ounces of this product per acre. Use the higher rate when the ryegrass is greater than 6 inches tall. Best results are obtained when applications are made before the ryegrass reaches 6 inches in height.

Set nozzle heights to allow the establishment of the desired row spacing while preventing spray droplets, spray fines, or drift to contact the ryegrass plants not treated. Use low-pressure nozzles, or drop nozzles designed to target the application over a narrow band.

Grower assumes all responsibility for crop losses from misapplication.

8.16 Pastures

LABELED GRASSES: Any pasture grass (*Gramineae* family), including bahiagrass, Bermudagrass, bluegrass, brome, fescue, guineagrass, kikuyugrass, orchardgrass, pangola grass, ryegrass, timothy, wheatgrasses.

TYPES OF APPLICATIONS: Spot Treatment, Over-the-Top Wiper Applications, Preplant, Preemergence, Pasture Renovation, Postemergent Broadcast.

Preplant, Preemergence, Pasture Renovation

This product may be applied prior to planting or emergence of forage grasses including bahiagrass, Bermudagrass, bluegrass, brome, fescue, guineagrass, kikuyugrass, orchardgrass, pangola grass, ryegrass, timothy, wheatgrass.

In addition, this product may be used to control perennial pasture species listed on this label prior to replanting.

If application rates total 2.25 quarts per acre or less, no waiting period between treatment and feeding or livestock grazing is required. If the rate is greater than 2.25 quarts per acre, remove domestic livestock before application and wait 8 weeks after application before grazing.

Spot Treatment, Over-the-Top Wiper Applications

This product may be applied as a spot treatment or with wiper applicators in pastures. Applications may be made in the same area at 30-day intervals.

For spot treatments or wiper application methods using rates of 2.25 quarts per acre or less, the entire field or any portion of it may be treated. When spot treatments or wiper application are made using rates above 2.25 quarts per acre, no more than 10 percent of the total pasture may be treated at any one time. To achieve maximum performance, remove domestic livestock before application and wait 7 days after application before grazing livestock or harvesting.

Postemergent Weed Control (Broadcast Treatments)

This product may be used to suppress competitive growth and seed production of annual weeds and undesirable vegetation in pastures. For selective applications with broadcast spray equipment, apply 10 to 13 fluid ounces of this product per acre in early spring before desirable perennial grasses break dormancy and initiate green growth. Late fall applications can be made after desirable perennial grasses have reached dormancy.

Some stunting of perennial grasses will occur if broadcast applications are made when plants are not dormant. No waiting period is required between application and grazing or harvesting for feed. Use of higher application rates will cause stand reductions. Do not apply more than 2.25 quarts per acre per year onto pasture grasses except for renovation uses (see instructions above). If replanting is needed due to severe stand reduction, applications must be made at least 30 days prior to planting any crop not listed for treatment in this label.

9.0 WEEDS CONTROLLED

Always use the higher rate of this product per acre within the specified range when weed growth is heavy or dense or weeds are growing in an undisturbed (noncultivated) area. Reduced results may occur when treating weeds heavily covered with dust. For weeds that have been mowed, grazed or cut, allow regrowth to occur prior to treatment.

Refer to the following label sections for rates for the control of annual and perennial weeds and woody brush and trees. For difficult to control perennial weeds and woody brush and trees, where plants are growing under stressed conditions, or where infestations are dense, this product may be used at 4 to 8 quarts per acre for enhanced results.

9.1 Annual Weeds

Use 26 fluid ounces per acre if weeds are less than 6 inches in height or runner length and 1.2 to 3.2 quarts per acre if weeds are over 6 inches in height or runner length or when weeds are growing under stressed conditions. Use the higher rate for tough-to-control species regardless of the weed size at application. Treat tough-to-control weeds early when they are relatively small. This product may be tank mixed provided that the specific tank mix product is registered for use on the target site. Refer to these product labels for approved sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

For spray-to-wet applications, apply a 0.4 percent solution of this product to weeds less than 6 inches in height or runner length. Apply prior to seedhead formation in grass or bud formation in broadleaf weeds. For annual weeds over 6 inches tall, or for smaller weeds growing under stressed conditions, use a 0.8 to 1.6 percent solution. Use the higher rate for tough-to-control species or for weeds over 24 inches tall.

Weed Species	
Anoda, spurred	Kochia
Barley*	Lamb's-quarters*
Barnyardgrass*	Little barley*
Bittercress*	London rocket*
Black nightshade*	Mayweed
Bluegrass, annual*	Medusahead*
Bluegrass, bulbous*	Morningglory (*Ipomoea spp.*)
Bassia, fivehook	Mustard, blue*
Brome, downy*	Mustard, tansy*
Brome, Japanese*	Mustard, tumble*
Browntop panicum*	Mustard, wild*
Buttercup*	Oats
Carolina foxtail*	Pigweed*
Carolina geranium	Plains/Tickseed coreopsis*
Castor bean	Prickly lettuce*
Cheatgrass*	Puncturevine
Cheeseweed (*Malva parviflora*)	Purslane, common
Chervil*	Ragweed, common*
Chickweed*	Ragweed, giant
Cocklebur*	Red rice
Copperleaf, hophornbeam	Russian thistle
Corn*	Rye*
Corn speedwell*	Ryegrass*
Crabgrass*	Sandbur, field*
Dwarfdandelion*	Shattercane*
Eastern mannagrass*	Shepherd's-purse*
Eclipta*	Sicklepod
Fall panicum*	Signalgrass, broadleaf*
Falsedandelion*	Smartweed, ladysthumb*
Falseflax, smallseed*	Smartweed, Pennsylvania*
Fiddleneck	Sowthistle, annual
Field pennycress*	Spanishneedles
Filaree	Speedwell, purslane*
Fleabane, annual*	Sprangletop*
Fleabane, hairy (*Conyza bonariensis*)*	Spurge, annual
	Spurge, prostrate*
Fleabane, rough*	Spurge, spotted*
Florida pusley	Spurry, umbrella*
Foxtail*	Starthistle, yellow
Goatgrass, jointed*	Stinkgrass*
Goosegrass	Sunflower*
Grain sorghum (milo)*	Teaweed/Prickly sida
Groundsel, common*	Texas panicum*
Hemp sesbania	Velvetleaf
Henbit	Virginia copperleaf
Horseweed/Marestail (*Conyza canadensis*)	Virginia pepperweed*
	Wheat*
Itchgrass*	Wild oats*
Johnsongrass, seedling	Witchgrass*
Junglerice	Woolly cupgrass*
Knotweed	Yellow rocket

*When using field broadcast equipment (aerial applications or boom sprayers using flat-fan nozzles) these species will be controlled or partially controlled using 13 fluid ounces of this product per acre. Applications must be made using 3 to 10 gallons of carrier volume per acre. Use nozzles that ensure thorough coverage of foliage and treat when weeds are in an early growth stage.

9.2 Perennial Weeds

Best results are obtained when perennial weeds are treated after they reach the reproductive stage of growth (seedhead initiation in grasses and bud formation in broadleaves). For non-flowering plants, best results are obtained when the plants

reach a mature stage of growth. In many situations, treatments are required prior to these growth stages. Under these conditions, use the higher application rate within the specified range.

Ensure thorough coverage when using spray-to-wet treatments using hand-held equipment. When using hand-held equipment for low volume directed spot treatments, apply a 4 to 8 percent solution of this product.

Allow 7 or more days after application before tillage.

Weed Species	Rate (QT/A)	Hand-Held % Solution
Alfalfa*	0.8	1.6
Alligatorweed*	3.2	1.2
Anise (fennel)	1.6 - 3.2	0.8 - 1.6
Bahiagrass	2.4 - 4	1.6
Beachgrass, European (*Ammophila arenaria*)	–	4
Bentgrass*	1.2	1.6
Bermudagrass	4	1.6
Bermudagrass, water (knotgrass)	1.2	1.6
Bindweed, field	3.2 - 4	1.6
Bluegrass, Kentucky	1.6	1.6
Blueweed, Texas	3.2 - 4	1.6
Brackenfern	2.4 - 3.2	0.8 - 1.2
Bromegrass, smooth	1.6	1.6
Bursage, woolly-leaf	–	1.6
Canarygrass, reed	1.6 - 2.4	1.6
Cattail	2.4 - 4	1.6
Clover; red, white	2.4 - 4	1.6
Cogongrass	2.4 - 4	1.6
Dallisgrass	2.4 - 4	1.6
Dandelion	2.4 - 4	1.6
Dock, curly	2.4 - 4	1.6
Dogbane, hemp	3.2	1.6
Fescue (except tall)	2.4 - 4	1.6
Fescue, tall	0.8 - 2.4	1.6
German ivy	1.6 - 3.2	0.8 - 1.6
Guineagrass	2.4	0.8
Horsenettle	2.4 - 4	1.6
Horseradish	3.2	1.6
Iceplant	1.6	1.2 - 1.6
Jerusalem artichoke	2.4 - 4	1.6
Johnsongrass	1.6 - 2.4	0.8
Kikuyugrass	1.6 - 2.4	1.6
Knapweed	3.2	1.6
Lantana	–	0.8 - 1
Lespedeza	2.4 - 4	1.6
Milkweed, common	2.4	1.6
Muhly, wirestem	1.6	1.6
Mullein, common	2.4 - 4	1.6
Napiergrass	2.4 - 4	1.6
Nightshade, silverleaf	1.6	1.6
Nutsedge; purple, yellow	2.4	0.8 - 1.6
Orchardgrass	1.6	1.6
Pampasgrass	2.4 - 4	1.2 - 1.6
Paragrass	2.4 - 4	1.6
Pepperweed, perennial	3.2	1.6
Phragmites*	2.4 - 4	0.8 - 1.6
Poison hemlock	1.6 - 3.2	0.8 - 1.6
Quackgrass	1.6 - 2.4	1.6
Redvine*	1.6	1.6
Reed, giant	3.2 - 4	1.6
Ryegrass, perennial	1.6 - 2.4	0.8
Smartweed, swamp	2.4 - 4	1.6
Spurge, leafy*	–	1.6
Sweet potato, wild*	–	1.6
Thistle, artichoke	1.6 - 2.4	0.8 - 1.6
Thistle, Canada	1.6 - 2.4	1.6
Timothy	1.6 - 2.4	1.6
Torpedograss*	3.2 - 4	1.6
Trumpetcreeper*	1.6 - 2.4	1.6
Vaseygrass	2.4 - 4	1.6
Velvetgrass	2.4 - 4	1.6
Wheatgrass, western	1.6 - 2.4	1.6

*Partial control

9.3 Woody Brush and Trees

Apply this product after full leaf expansion, unless otherwise directed. Use the higher rate for larger plants and/or dense areas of growth. On vines, use the higher rate for plants that have reached the woody stage of growth. Best results are obtained when application is made in late summer or fall after fruit formation.

In arid areas, best results are obtained when applications are made in the spring to early summer when brush species are at high moisture content and are flowering.

Ensure thorough coverage when using spray-to-wet treatments using hand-held equipment. When using hand-held equipment for low volume directed-spray spot treatments, apply a 4 to 8 percent solution of this product.

Symptoms may not appear prior to frost or senescence with fall treatments.

Allow 7 or more days after application before tillage, mowing or removal. Repeat treatments may be necessary to control plants regenerating from underground parts or seed. Some autumn colors on undesirable deciduous species are acceptable provided no major leaf drop has occurred. Reduced performance may result if fall treatments are made following a frost.

Weed Species	Broadcast Rate (QT/A)	Hand-Held Spray-to-Wet % Solution
Alder	2.4 - 3.2	0.8 - 1.2
Ash*	1.6 - 4	0.8 - 1.6
Aspen, quaking	1.6 - 2.4	0.8 - 1.2
Bearclover (Bearmat)*	1.6 - 4	0.8 - 1.6
Beech*	1.6 - 4	0.8 - 1.6
Birch	1.6	0.8
Blackberry	2.4 - 3.2	0.8 - 1.2
Blackgum	1.6 - 4	0.8 - 1.6
Bracken	1.6 - 4	0.8 - 1.6
Broom; French, Scotch	1.6 - 4	1.2 - 1.6
Buckwheat, California*	1.6 - 3.2	0.8 - 1.6
Cascara*	1.6 - 4	0.8 - 1.6
Catsclaw*	–	0.8 - 1.2
Ceanothus*	1.6 - 4	0.8 - 1.6
Chamise*	1.6 - 4	0.8
Cherry; bitter, black, pin	1.6 - 2.4	0.8 - 1.2
Coyote brush	2.4 - 3.2	1.2 - 1.6
Deerweed	1.6 - 4	0.8
Dogwood*	1.6 - 4	0.8 - 1.6
Elderberry	1.6	0.8
Elm*	1.6 - 4	0.8 - 1.6
Eucalyptus	–	1.6
Gorse*	1.6 - 4	0.8 - 1.6
Hasardia*	1.6 - 3.2	0.8 - 1.6
Hawthorn	1.6 - 2.4	0.8 - 1.2
Hazel	1.6	0.8
Hickory*	1.6 - 4	0.8 - 1.6
Honeysuckle	2.4 - 3.2	0.8 - 1.2
Hornbeam, American*	1.6 - 4	0.8 - 1.6
Kudzu	3.2	1.6
Locust, black*	1.6 - 3.2	0.8 - 1.6
Madrone resprouts*	–	1.6
Manzanita*	1.6 - 4	0.8 - 1.6
Maple, red	1.6 - 3.2	0.8 - 1.2
Maple, sugar	–	0.8 - 1.2
Monkey flower*	1.6 - 3.2	0.8 - 1.6
Oak; black, white*	1.6 - 3.2	0.8 - 1.6
Oak, post	2.4 - 3.2	0.8 - 1.2
Oak; northern, pin	1.6 - 3.2	0.8 - 1.2
Oak, scrub*	1.6 - 3.2	0.8 - 1.2
Oak; southern red	1.6 - 2.4	0.8 - 1.2
Peppertree, Brazilian (Florida holly)*	1.6 - 4	0.8 - 1.6
Persimmon*	1.6 - 4	0.8 - 1.6
Pine	1.6 - 4	0.8 - 1.6
Poison ivy	3.2 - 4	1.6
Poison oak	3.2 - 4	1.6
Poplar, yellow*	1.6 - 4	0.8 - 1.6
Redbud, eastern	1.6 - 4	0.8 - 1.6
Rose, multiflora	1.6	0.8
Russian olive*	1.6 - 4	0.8 - 1.6
Sage, black	1.6 - 3.2	0.8
Sage, white*	1.6 - 3.2	0.8 - 1.6
Sage brush, California	1.6 - 3.2	0.8
Salmonberry	1.6	0.8
Saltcedar*	1.6 - 4	0.8 - 1.6
Sassafras*	1.6 - 4	0.8 - 1.6
Sourwood*	1.6 - 4	0.8 - 1.6
Sumac; laurel, poison, smooth, sugarbush, winged*	1.6 - 3.2	0.8 - 1.6
Sweetgum	1.6 - 2.4	0.8 - 1.2
Swordfern*	1.6 - 4	0.8 - 1.6
Tallowtree, Chinese	–	0.8

Weed Species	Broadcast Rate (QT/A)	Hand-Held Spray-to-Wet % Solution
Tan oak resprouts*	–	1.6
Thimbleberry	1.6	0.8
Tobacco, tree*	1.6 - 3.2	0.8 - 1.6
Toyon*	–	1.6
Trumpetcreeper	1.6 - 2.4	0.8 - 1.2
Vine maple*	1.6 - 4	0.8 - 1.6
Virginia creeper	1.6 - 4	0.8 - 1.6
Waxmyrtle, southern*	1.6 - 4	0.8 - 1.6
Willow	2.4	0.8
Yerba Santa*	–	1.6

*Partial control

10.0 LIMIT OF WARRANTY AND LIABILITY

Monsanto Company warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes set forth in the Complete Directions for Use label booklet ("Directions") when used in accordance with those Directions under the conditions described therein. NO OTHER EXPRESS WARRANTY OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE. This warranty is also subject to the conditions and limitations stated herein.

Buyer and all users shall promptly notify this Company of any claims whether based in contract, negligence, strict liability, other tort or otherwise.

To the fullest extent permitted by law, buyer and all users are responsible for all loss or damage from use or handling which results from conditions beyond the control of this Company, including, but not limited to, incompatibility with products other than those set forth in the Directions, application to or contact with desirable vegetation, unusual weather, weather conditions which are outside the range considered normal at the application site and for the time period when the product is applied, as well as weather conditions which are outside the application ranges set forth in the Directions, application in any manner not explicitly set forth in the Directions, moisture conditions outside the moisture range specified in the Directions, or the presence of products other than those set forth in the Directions in or on the soil, crop or treated vegetation.

This Company does not warrant any product reformulated or repackaged from this product except in accordance with this Company's stewardship requirements and with express written permission from this Company.

THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF THE LIABILITY OF THIS COMPANY OR ANY OTHER SELLER FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT (INCLUDING CLAIMS BASED IN CONTRACT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE) SHALL BE THE PURCHASE PRICE PAID BY THE USER OR BUYER FOR THE QUANTITY OF THIS PRODUCT INVOLVED, OR, AT THE ELECTION OF THIS COMPANY OR ANY OTHER SELLER, THE REPLACEMENT OF SUCH QUANTITY, OR, IF NOT ACQUIRED BY PURCHASE, REPLACEMENT OF SUCH QUANTITY. TO THE FULLEST EXTENT PERMITTED BY LAW, IN NO EVENT SHALL THIS COMPANY OR ANY OTHER SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES.

Upon opening and using this product, buyer and all users are deemed to have accepted the terms of this LIMIT OF WARRANTY AND LIABILITY which may not be varied by any verbal or written agreement. If terms are not acceptable, return at once unopened.

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This product is protected by U.S. Patent No. 4,405,531. Other patents pending. No license granted under any non-U.S. patent(s).

EPA Reg. No. 524-529

In case of an emergency involving this product,
Call Collect, day or night, (314) 694-4000.

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El herbicida profesional post-emergencia de amplio espectro completo para control de malezas en cultivos industriales, césped y plantas ornamentales.

Instrucciones completas para el uso

EVITE EL CONTACTO DEL HERBICIDA CON EL FOLLAJE, TALLOS VERDES, RAÍCES NO LEÑOSAS EXPUESTAS O FRUTOS EXPUESTOS DE LOS CULTIVOS, PLANTAS Y ÁRBOLES DESEABLES. EN CASO CONTRARIO ES PROBABLE QUE SUFRAN GRAVES DAÑOS O SEAN DESTRUIDOS TOTALMENTE.

Registro en la EPA Nº 524-529 2010-1

GRUPO	9	HERBICIDA

Antes de usar este producto, lea la etiqueta en su totalidad.

Úselo solamente de acuerdo con las instrucciones de la etiqueta.

No todos los productos recomendados en esta etiqueta han sido registrados para su uso en California.

Verifique el estado de registro de cada producto en California antes de utilizarlo.

Antes de comprar o usar el producto, lea "LIMITES EN LA GARANTÍA Y EN LA RESPONSABILIDAD" en la última sección de la etiqueta. Si las condiciones son inaceptables para usted, devuelva el producto inmediatamente sin abrir el recipiente.

ESTE ES UN PRODUCTO PARA USARSE TAL Y COMO ESTA PREPARADO. MONSANTO NO LO HA DISEÑADO NI LO HA REGISTRADO PARA QUE SEA REFORMULADO. VEA LA ETIQUETA DEL ENVASE INDIVIDUAL PARA ENTERARSE DE LAS LIMITACIONES DE REEMPAQUE.

1.0 INGREDIENTES

INGREDIENTE ACTIVO:
* Glifosato, N-(fosfonometil)glicina, en forma de su sal de isopropilamina 50.2%
OTROS INGREDIENTES (incluyendo 13% de surfactante): 49.8%
100.0%

*Contiene 600 gramos por litro o 5 libras por galón americano del ingrediente activo glifosato, en forma de su sal de isopropilamina. Equivalente a 445 gramos por litro o 3.7 libras por galón americano del ácido, glifosato.

Este producto está protegido por la patente de los Estados Unidos No. 4,405,531. Otros patentes en trámite. No se han otorgado licencias bajo ninguna patente que no sea de los Estados Unidos.

2.0 TELÉFONOS IMPORTANTES

1. PARA INFORMACIÓN SOBRE EL PRODUCTO O AYUDA PARA UTILIZAR ESTE PRODUCTO, LLAME GRATIS AL
1-800-332-3111
2. EN CASO DE QUE SE PRESENTE UNA EMERGENCIA RELACIONADA CON ESTE PRODUCTO, O PARA OBTENER AYUDA MEDICA, LLAME POR COBRAR A CUALQUIER HORA DEL DIA O DE LA NOCHE, AL TELÉFONO,
(314)-694-4000

3.0 DECLARACIONES PREVENTIVAS

3.1 Riesgos para seres humanos y animales domésticos

Manténgase fuera del alcance de los niños.

¡PRECAUCIÓN!

CAUSA IRRITACIÓN MODERADA A LOS OJOS

Evite el contacto con los ojos, y con la ropa.

PRIMEROS AUXILIOS: Llame al centro de envenenamientos o a un médico para que le indique el tratamiento.	
SI ENTRA EN CONTACTO CON LOS OJOS	• Mantenga abiertos los ojos y enjuague lenta y cuidadosamente con agua durante 15 a 20 minutos. • Si usa lentes de contacto, quíteselos después de los primeros 5 minutos, y continúe enjuagando los ojos.
• Tenga a mano el envase o la etiqueta del producto cuando llame al centro de envenenamientos o al médico, o cuando vaya a procurarse tratamiento. • También puede llamar por cobrar al teléfono **(314) 694-4000**, día o noche, para obtener información sobre el tratamiento médico de urgencia. • Este producto está identificado como herbicida **Roundup PRO® Concentrate, Registro de la EPA Nº 524-529.**	

ANIMALES DOMÉSTICOS: Este producto se considera relativamente no tóxico para los perros y otros animales domésticos; sin embargo, la ingestión de este producto o de grandes cantidades de vegetación recientemente tratada puede resultar en una irritación gastrointestinal temporal (vómito, diarrea, cólico, etc.). Si se observan dichos síntomas, dé al animal suficiente cantidad de líquidos para evitar la deshidratación. Si los síntomas continúan por más de 24 horas, llame al veterinario.

Equipo de protección personal (PPE)

Las personas a cargo de aplicar y manipular este producto deben utilizar: camisas de mangas largas y pantalones largos, además de zapatos y calcetines. Respete las instrucciones del fabricante para limpiar y mantener los equipos de protección personal

(PPE). Si no tiene las instrucciones para productos que se pueden lavar, utilice detergente y agua caliente. Conserve y lave los equipos de protección personal separados del resto de la ropa.

Deseche la ropa y otros materiales absorbentes que se hayan empapado o que se hayan contaminado mucho con el concentrado de este producto. No vuelva a utilizarlos.

En los casos en los cuales el personal encargado de manejar el producto lo hace en ambientes cerrados, cabinas cerradas o aviones, de manera tal que se cumplan los requisitos listados en "Worker Protection Standard (WPS) for agricultural pesticides" (Normas para la Protección de los Trabajadores que trabajan con pesticidas usados en la agricultura) [40 CFR 170.240 (d) (4-6)], los requisitos para el equipo de protección personal del trabajador pueden ser reducidos o modificados de acuerdo a lo que se especifica en las normas WPS.

IMPORTANTE: En los casos en que se utilice equipo de protección personal reducido debido al uso de un sistema cerrado, se debe suministrar a los trabajadores todo el equipo de protección personal detallado más arriba para "aplicadores y otros trabajadores" y deben tener el equipo disponible de inmediato para usar en una emergencia, por ejemplo un derrame o rotura de equipo.

Recomendaciones de seguridad para el usuario
El usuario debe:
- Lavarse las manos antes de comer, beber, mascar goma, usar tabaco o de usar el servicio higiénico.
- Quitarse la ropa inmediatamente en caso de que el pesticida entre dentro de ésta. Luego debe lavarse muy bien y ponerse ropa limpia.

3.2 Riesgos al medio ambiente

No aplique directamente al agua, en áreas donde el agua superficial esté presente o en áreas donde haya mareas altas y bajas por debajo del nivel medio de mareas altas. No contamine el agua cuando lave los equipos ni cuando elimine las aguas de lavado de los mismos.

3.3 Riesgos de orden físico o químico

Para mezclar, almacenar y aplicar la solución de rocío de este producto, se deben usar solamente recipientes de acero inoxidable, fibra de vidrio, plástico o recipientes de acero recubiertos internamente con plástico.

NO MEZCLE, ALMACENE O APLIQUE ESTE PRODUCTO O SUS SOLUCIONES DE ROCÍO EN RECIPIENTES O TANQUES ROCIADORES DE ACERO GALVANIZADO O DE ACERO NO RECUBIERTO (EXCEPTO SI ES ACERO INOXIDABLE). Este producto o la solución de rocío reaccionan con el material de dichos recipientes y tanques, lo cual produce hidrógeno, que puede formar una mezcla de gases altamente combustibles. Si esta mezcla de gases entra en contacto con llamas, chispas, el soplete de un soldador, un cigarrillo encendido o cualquier otra fuente de encendido, puede inflamarse o explotar y causar heridas graves a personas.

INSTRUCCIONES PARA EL USO

El uso de este producto de cualquier manera que sea inconsistente con las instrucciones dadas en la etiqueta es una violación de las leyes federales. Este producto sólo puede utilizarse de acuerdo con las indicaciones sobre el modo de empleo que figuran en esta etiqueta o en las etiquetas o fichas técnicas adicionales de Monsanto publicadas por separado. Puede consultar las etiquetas adicionales en Internet en www.agrian.com, www.cdms.net o www.greenbook.net, o bien puede solicitarlas a su vendedor minorista autorizado de Monsanto o a su representante de Monsanto Company.

No aplique este producto de alguna manera que entre en contacto con los trabajadores u otras personas, ya sea directamente o por medio de alguna corriente de aire. Solamente las personas que los manipulen y que usen equipo protector podrán estar en el área durante su aplicación. Para verificar requisitos específicos de su tribu o estado, consulte con la agencia responsable de la regulación del uso de pesticidas.

Requisitos para el uso en la agricultura

Use este producto siguiendo estrictamente las instrucciones de la etiqueta y de acuerdo con "Worker Protection Standard", 40 CFR Sección 170. Estas normas contienen los requisitos para proteger a los trabajadores agrícolas en haciendas, bosques, viveros e invernaderos, así como a aquellos trabajadores que manejan pesticidas usados en la agricultura. Las normas contienen los requisitos para entrenar, descontaminar, para dar aviso y para asistencia de emergencia. También contienen instrucciones específicas y excepciones que tienen que ver con el contenido de esta etiqueta en lo relacionado con el equipo para la protección personal (PPE) e intervalos de entrada restringida. Los requisitos mencionados en este envase se aplican únicamente a los usos de este producto que están regulados por las Normas para la Protección de los Trabajadores (WPS).

No entre ni permita la entrada de personal a las áreas tratadas durante el intervalo de entrada restringida (REI) de 4 horas.

El equipo de protección personal (PPE) permitido por el Estándar de Protección al Trabajador necesario para una entrada prematura a lugares tratados y que implique el contacto con cualquier cosa que haya sido tratada como plantas, suelo o agua, es: overoles /monos, zapatos y calcetines y guantes resistentes a los productos químicos hechos de cualquier material impermeable.

Requisitos para usos no agrícolas

Los requisitos en este envase son para los usos de este producto que NO están cubiertos por WPS (40 CFR Sección 170) para el uso de pesticidas en la agricultura. Las regulaciones del WPS se aplican cuando el producto se usa para obtener productos agrícolas en haciendas, bosques, viveros e invernaderos.

Mantenga a las personas y a los animales domésticos fuera de las áreas tratadas hasta que la solución de rocío se haya secado.

4.0 ALMACENAMIENTO Y ELIMINACIÓN

Son fundamentales el almacenamiento y la eliminación adecuados de los pesticidas para evitar la exposición de las personas y el medio ambiente como consecuencia de pérdidas y derrames del producto, excedentes o desechos y actos de vandalismo. No permita que este producto contamine el agua, los alimentos de las personas y animales o las semillas por medio del almacenamiento y la eliminación.

ALMACENAMIENTO DEL PESTICIDA: Guarde los pesticidas lejos de los alimentos para personas, los alimentos para mascotas, los alimentos para animales, las semillas, los fertilizantes y los materiales de uso veterinario. Mantenga el envase bien cerrado para evitar derramamientos y contaminación.

ELIMINACIÓN DEL PESTICIDA: Para evitar desechos, use todo el material contenido es este envase, incluyendo los residuos del enjuague, aplicándolo según las indicaciones de la etiqueta. Si no es posible evitar los desechos, ofrezca el producto restante a una planta de eliminación de desechos o a un programa de eliminación de pesticidas. Estos programas suelen ser manejados por gobiernos estatales o locales o por la industria. Todos los desechos deben seguir los procedimientos federales, estatales y locales aplicables.

ELIMINACIÓN DEL ENVASE: [PARA ENVASES DE PLÁSTICO RÍGIDO DE 2.5 GALONES U OTROS </= 5 GALONES]

Envase no rellenable. No vuelva a usar este envase para contener materiales que no sean pesticidas o pesticidas diluidos (residuos del enjuague). Después de vaciar y limpiar el envase, puede contener temporalmente residuos del enjuague u otros materiales relacionados con pesticidas. Contacte al organismo de reglamentación de su estado para determinar las prácticas permitidas en su estado.

MANIPULACIÓN DEL ENVASE: Enjuague tres veces o enjuague por presión el envase (o equivalente) inmediatamente una vez vacío.

Enjuague tres veces de la siguiente forma: Vacíe el contenido restante del envase en el equipo de aplicación o en un tanque de mezcla y drene durante 10 segundos después de que el flujo comience a gotear. Llene el envase con agua hasta un 1/4 de su capacidad. Vuelva a colocar la tapa y ajústela bien. Agite durante 10 segundos. Vierta los residuos del enjuague en el equipo de aplicación o tanque de mezcla o guárdelo para uso o eliminación posterior. Drene durante 10 segundos después de que el flujo comience a gotear. Repita este procedimiento dos veces más.

Enjuague por presión de la siguiente forma: Vacíe el contenido restante del envase en el equipo de aplicación o en un tanque de mezcla y continúe drenando durante 10 segundos después de que el flujo comience a gotear. Sostenga el envase en posición invertida sobre el equipo de aplicación o el tanque de mezcla o recoja los residuos del enjuague para su uso o eliminación posterior. Inserte la boquilla de enjuague por presión en la parte lateral del envase y enjuague a una presión de aproximadamente 40 PSI durante 30 segundos como mínimo. Drene durante 10 segundos después de que el flujo comience a gotear.

Una vez limpios, algunos envases de pesticida de plástico pueden llevarse a un centro de acopio de envases o ser recogidos para su reciclaje. Para encontrar el centro más cercano, póngase en contacto con su distribuidor de productos químicos o con Monsanto en el 1-800-768-6387. Si no es posible reciclar el envase, perfore el envase y deséchelo en un relleno sanitario.

[PARA ENVASES DE PLÁSTICO RÍGIDO DE 30 GALONES U OTROS ENVASES DE MÁS DE 5 GALONES]

ELIMINACIÓN DEL ENVASE: Envase no rellenable. No vuelva a usar este envase para contener materiales que no sean pesticidas o pesticidas diluidos (residuos del enjuague). Después de vaciar y limpiar el envase, puede contener temporalmente residuos del enjuague u otros materiales relacionados con pesticidas. Contacte al organismo de reglamentación de su estado para determinar las prácticas permitidas en su estado.

MANIPULACIÓN DEL ENVASE: Enjuague tres veces o enjuague por presión el envase (o equivalente) inmediatamente una vez vacío.

Enjuague tres veces de la siguiente forma: Vacíe el contenido restante del envase en el equipo de aplicación o en un tanque de mezcla. Llene el envase con agua hasta un 1/4 de su capacidad. Vuelva a colocar la tapa y ajústela bien. Incline el envase sobre la parte lateral y hágalo rodar hacia atrás y hacia adelante durante 30 segundos, asegurándose de que dé al menos un giro completo. Apoye el envase sobre uno de los extremos e inclínelo hacia atrás y hacia adelante varias veces. Invierta el envase apoyándolo sobre el otro extremo e inclínelo hacia adelante y hacia atrás varias veces. Vierta los residuos del enjuague en el equipo de aplicación o en un tanque de mezcla o conserve los residuos del enjuague para su uso o eliminación posterior. Repita este procedimiento dos veces más.

Enjuague por presión de la siguiente forma: Vacíe el contenido restante del envase en el equipo de aplicación o en un tanque de mezcla y continúe drenando durante 10 segundos después de que el flujo comience a gotear. Sostenga el envase en posición invertida sobre el equipo de aplicación o el tanque de mezcla o recoja los residuos del enjuague para su uso o eliminación posterior. Inserte la boquilla de enjuague por presión en la parte lateral del envase y enjuague a una presión de aproximadamente 40 PSI durante 30 segundos como mínimo. Drene durante 10 segundos después de que el flujo comience a gotear.

Una vez limpios, algunos envases de pesticida de plástico pueden llevarse a un centro de acopio de envases o ser recogidos para su reciclaje. Para encontrar el centro más cercano, póngase en contacto con su distribuidor de productos químicos o con Monsanto en el 1-800-768-6387. Si no es posible reciclar el envase, perfore el envase y deséchelo en un relleno sanitario.

[IDIOMA DE LA ETIQUETA DEL ENVASE PARA RECIPIENTES PARA TRANSPORTE SEGÚN 40 CFR §156.3]

ELIMINACIÓN DEL ENVASE: Los envases vacíos conservan vapor y residuos del producto. Respete todas las precauciones indicadas en la etiqueta hasta que el envase haya sido limpiado, reacondicionado o destruido.

MANIPULACIÓN DEL ENVASE: Antes de rellenar, inspeccione con cuidado en busca de daños tales como rajaduras, perforaciones, desgastes y roscas o tapas gastados. Limpie minuciosamente antes de volver a usar para transportar un material de composición diferente o antes de retirar de servicio este recipiente para transporte.

5.0 INFORMACIÓN GENERAL

Descripción del producto: Este producto es un herbicida sistémico de aplicación post-emergencia foliar, sin actividad residual en el suelo. Controla un amplio espectro de malezas anuales, malezas perennes, matorrales leñosos y árboles. Está formulado como un líquido soluble en agua con surfactante.

Aparición de los síntomas: Este producto se mueve dentro de la planta desde el punto de aplicación sobre el follaje hasta las raíces. Los efectos visibles en la mayoría de las malezas anuales se pueden apreciar entre los 2 y los 4 días después de la aplicación, pero en la mayoría de las malezas perennes es posible que no se observen hasta después de 7 días o más. El frío extremo o el cielo muy nublado después de la aplicación pueden retardar la actividad del producto y hacer que el efecto visual se demore. Los efectos visibles incluyen que la planta se marchita y se vuelve amarilla de forma gradual, hasta que la parte exterior se torna completamente color café y las partes de la planta que están bajo tierra se deterioran completamente.

Modo de acción en las plantas: El ingrediente activo de este producto inhibe una enzima hallada sólo en las plantas que es esencial para la formación de aminoácidos específicos.

Prácticas culturales: Se podrá observar una reducción en el efecto si se aplica el producto a malezas anuales o perennes que hayan sido segadas, que hayan servido de alimento para animales o hayan sido cortadas, y que no hubiesen crecido nuevamente hasta el nivel recomendado para el tratamiento.

Resistencia a la lluvia: La lluvia torrencial poco después de la aplicación podrá lavar el producto del follaje y se requerirá una nueva aplicación para obtener un control adecuado.

No actividad en el suelo: Las malezas deben haber emergido en el momento de la aplicación para poder ser controladas por este producto. Las malezas que germinen de semillas después de la aplicación no serán controladas. Las plantas no emergidas con rizomas o raíces subterráneas de malezas perennes no conectadas no se verán afectadas por el herbicida.

Mezcla de tanque: Este producto no proporciona control de malezas residuales.Para realizar un control posterior de malezas residuales, siga un programa de herbicida aprobado en la etiqueta. Lea y siga cuidadosamente las indicaciones y toda la información en las etiquetas de todos los herbicidas utilizados. Utilice conforme con las declaraciones preventivas más restrictivas de cada producto en la mezcla de tanque.

Cuando en esta etiqueta se recomienda una mezcla de tanque con un ingrediente activo genérico como diuron, 2,4-D, o dicamba, el usuario asume la responsabilidad de asegurarse de que la aplicación específica que está preparando está incluida en la etiqueta del producto.

El comprador y todos los usuarios son responsables de todas las pérdidas o daños en relación con el uso o la manipulación de mezclas de este producto con herbicidas, u otros materiales que no se recomiendan expresamente en esta etiqueta. La mezcla de este producto con herbicidas u otros materiales no recomendados en esta etiqueta puede dar como resultado una reducción en su rendimiento.

Cantidades de aplicación máximas: Las cantidades de aplicación o uso máximas especificadas en esta etiqueta están expresadas en unidades de volumen (onzas líquidas o cuartos de galón) de este producto por acre. No obstante, las dosis máximas de aplicación permitidas corresponden al uso de este producto en combinación con todos herbicidas que contienen glifosato como principio activo, tanto si son aplicados como mezclas de tanque o por separado, en función de las libras totales de glifosato (libras de ácido equivalente) por acre. Si se aplica más de un producto que contiene glifosato al mismo sitio dentro del mismo año, debe asegurarse de que el uso total de glifosato (libras de ácido equivalente) no exceda el máximo permitido. Vea en la sección "INGREDIENTES" de esta etiqueta información importante sobre el producto.

Excepto como se especifica, el total combinado de todos los tratamientos no debe exceder los 8.5 cuartos de galón de este producto (8 libras de ácido de glifosato) por acre por año.

ATENCIÓN

EVITE EL CONTACTO DEL HERBICIDA CON EL FOLLAJE, TALLOS VERDES, RAÍCES NO LEÑOSAS EXPUESTAS O FRUTOS EXPUESTOS DE LOS CULTIVOS, PLANTAS Y ÁRBOLES DESEABLES. EN CASO CONTRARIO ES PROBABLE QUE SUFRAN GRAVES DAÑOS O SEAN DESTRUIDOS TOTALMENTE.

EVITE LA DISPERSIÓN. TENGA MUCHO CUIDADO CUANDO APLIQUE ESTE PRODUCTO PARA EVITAR DAÑOS A PLANTAS Y CULTIVOS DESEABLES.

No permita que la solución de herbicida pulverice, gotee, se derive o salpique sobre la vegetación deseada, ya que minúsculas cantidades de este producto pueden causar daños graves o destrucción del cultivo, plantas u otras áreas que no se pretendía tratar. Las probabilidades de daño causado por el uso de este producto aumentan cuando hay viento con ráfagas, cuando la velocidad del viento aumenta, cuando la dirección del viento cambia constantemente o cuando hay otras condiciones meteorológicas que favorecen la deriva por rocío. Al rociar, evite las combinaciones de presión y tipo de boquillas que resulten en salpicaduras o partículas finas (niebla) que es probable que se dispersen. EVITE APLICAR A UNA VELOCIDAD O PRESIÓN EXCESIVA.

NOTA: El uso de este producto de cualquier manera contraria a las indicaciones contenidas en esta etiqueta, puede resultar en lesiones a personas, animales o cultivos o pueden ocurrir otras consecuencias no deseadas.

5.1 Gestión de resistencia de malezas

GRUPO	9	HERBICIDA

El glifosato, el principio activo de este producto, es un herbicida del grupo 9 según el sistema de clasificación de efecto de la Weed Science Society of America. Todas las poblaciones de malezas pueden contener plantas naturalmente resistentes a los herbicidas del grupo 9. Las especies de malezas resistentes a los herbicidas del grupo 9 pueden tratarse con buenos resultados utilizando herbicidas de otro grupo o adoptando otras prácticas culturales o mecánicas.

Para reducir al mínimo la incidencia de biotipos resistentes al glifosato, respete las siguientes recomendaciones generales con respecto a la gestión de malezas:

- Haga un reconocimiento del sitio de la aplicación antes y después de haber aplicado herbicidas.
- Comience a controlar las malezas cuanto antes, cuando sean todavía relativamente pequeñas.
- Incorpore otros herbicidas y prácticas de cultivo o mecánicas como parte de su sistema de control de malezas cuando sea adecuado.
- Utilice la cantidad indicada en la etiqueta para las malezas más difíciles de controlar en el sitio. Evite las mezclas de tanque con otros herbicidas que reducen la eficacia de este producto (por antagonismo) o las recomendaciones de mezclas de tanque que alientan la utilización de cantidades de este producto inferiores a las recomendaciones de esta etiqueta.
- Controle las malezas omitidas e impida que echen semilla.
- Limpie los equipos antes de trasladarse de un sitio a otro para reducir al mínimo la propagación de semillas de malezas.
- Utilice semillas comerciales nuevas con la menor cantidad posible de semillas de malezas.
- Informe todo incidente por falta de rendimiento reiterado de este producto en una maleza determinada al representante de Monsanto, vendedor minorista de su localidad o agente de extensión del condado.

5.2 Recomendaciones de gestión de biotipos de malezas resistentes al glifosato

NOTA: Es fundamental realizar las pruebas adecuadas para confirmar la resistencia de la maleza al glifosato. Llame al 1-800-ROUNDUP (1-800-768-6387) o póngase en contacto con su representante de Monsanto para determinar si se confirmó la resistencia de algún biotipo de maleza en particular en su región, o visite en Internet www.weedresistancemanagement.com o www.weedscience.org.

Las recomendaciones de control para biotipos confirmados como resistentes al glifosato se dan a conocer con la publicación de etiquetas o fichas técnicas complementarias para este producto y puede solicitarlas al vendedor minorista o a su representante de Monsanto.

Debido a que no es posible determinar la existencia de nuevas malezas resistentes al glifosato hasta que se haya utilizado el producto y se cuente con la confirmación científica correspondiente, Monsanto Company no será responsable de ninguna pérdida que pudiera tener lugar en el caso de que este producto no lograra controlar de forma eficaz los biotipos demalezas resistentes al glifosato.

Siga buenas prácticas de gestión de malezas para evitar la propagación de biotipos resistentes confirmados.

- Si en su zona existe naturalmente un biotipo resistente, para lograr su control puede mezclar este producto en un tanque o aplicarlo secuencialmente con un herbicida debidamente etiquetado con efecto diferente.
- También se pueden utilizar prácticas de control culturales y mecánicas según corresponda.
- Haga un reconocimiento de los lugares tratados después de las aplicaciones de herbicida y controle las omisiones de biotipos resistentes antes de que echen semilla.
- Limpie minuciosamente los equipos antes de abandonar los lugares que se saben que contienen biotipos resistentes.

6.0 MEZCLA

Las soluciones de rocío de este producto se deben mezclar, almacenar y aplicar utilizando únicamente envases limpios de acero inoxidable, fibra de vidrio, plástico o acero revestido con plástico. Tenga cuidado para evitar que se forme un sifón de retorno hacia la sustancia vehicular. Use dispositivos aprobados para evitar la formación de sifones de retorno cuando corresponda según las reglamentaciones estatales o locales.

NO MEZCLE, ALMACENE NI APLIQUE ESTE PRODUCTO NI SOLUCIONES DE ROCÍO DE ESTE PRODUCTO EN ENVASES DE ACERO GALVANIZADO O ACERO NO REVESTIDO (SALVO ACERO INOXIDABLE) NI EN TANQUES DE ROCÍO.

Limpie las piezas del rociador inmediatamente después de su utilización lavándolas bien con agua.

6.1 Mezcla con agua

NOTA: EL RENDIMIENTO DEL PRODUCTO PODRÍA REDUCIRSE CONSIDERABLEMENTE SI SE UTILIZA AGUA CON SEDIMENTOS DE TIERRA COMO SUSTANCIA VEHICULAR. NO MEZCLE ESTE PRODUCTO CON AGUA VISIBLEMENTE EMBARRADA O AGUA NO TRANSPARENTE DE ESTANQUES O ACEQUIAS.

Este producto se mezcla fácilmente con agua. La solución de rocío se debe mezclar de la siguiente manera: Ponga la cantidad requerida de agua en el tanque en el cual se va a preparar la mezcla o el tanque del rocío. Agregue la cantidad recomendada de este producto cuando ya está cerca de completarse el llenado con agua y mezcle con cuidado. Tenga cuidado para evitar que se forme un sifón de retorno hacia la sustancia vehicular. Use dispositivos aprobados para evitar la formación de sifones de retorno cuando corresponda

según las reglamentaciones estatales o locales.Es posible que durante la mezcla, la solución de rocío produzca espuma. Para evitar o minimizar la formación de espuma, mezcle con cuidado, tapone las derivaciones y mangueras de retorno en el fondo del tanque y, si es necesario, use compuestos aprobados para evitar la formación de espuma o para eliminar la espuma ya formada.

6.2 Mezclas de tanque

Este producto no proporciona control de malezas residuales. Este producto puede mezclarse en un tanque con otros herbicidas para lograr el control de malezas residuales, un espectro de control de malezas más amplio o un efecto alternativo. Lea y siga siempre las indicaciones de las etiquetas de todos los productos utilizados en la mezcla de tanque. Utilice conforme con las declaraciones preventivas más restrictivas de cada producto en la mezcla.

Cuando en esta etiqueta se recomienda una mezcla de tanque con un ingrediente activo genérico como diuron, atrazina, 2,4-D, o dicamba, el usuario asume la responsabilidad de asegurarse de que la aplicación específica que está preparando está incluida en la etiqueta del producto que está utilizando en la mezcla de tanque. Consulte todas las etiquetas de cada uno de los productos, las etiquetas complementarias y las Fichas Técnicas de todos los productos de la mezcla de tanque, y respete todas las precauciones y limitaciones de la etiqueta, incluidas las restricciones de la época de aplicación, las restricciones de la tierra, y utilice conforme con las declaraciones preventivas más restrictivas de cada producto en la mezcla de tanque.

A fin de minimizar la formación de espuma, mantenga las tuberías de retorno lo más cerca del fondo del tanque. La malla de la rejilla en la boquilla o en los coladores de las mangueras no debería ser de menos de 50 hilos.

Siempre determine con anticipación la compatibilidad de todos los productos de la mezcla de tanque juntos en la sustancia vehicular, mezclando antes pequeñas cantidades proporcionales. Asegúrese de que la mezcla en tanque específica esté registrada para su aplicación en el área deseada.

Cuando en esta etiqueta se recomienda una mezcla de tanque con un ingrediente activo genérico como 2,4-D, atrazina, dicamba, diuron, o pendimethalin, el usuario asume la responsabilidad de asegurarse de que la aplicación específica que está preparando está incluida en la etiqueta del producto que está utilizando en la mezcla de tanque.

Consulte todas las etiquetas de cada uno de los productos, las etiquetas complementarias y las Fichas Técnicas de todos los productos de la mezcla de tanque, y respete todas las precauciones y limitaciones de la etiqueta, incluidas las restricciones de la época de aplicación, las restricciones de la tierra, el intervalo mínimo para volver a cosechar, y las pautas en cuanto a la rotación. Utilice conforme con las declaraciones preventivas más restrictivas de cada producto en la mezcla de tanque.

Siempre determine con anticipación la compatibilidad de todos los productos de la mezcla de tanque juntos en la sustancia vehicular, mezclando antes pequeñas cantidades proporcionales.

6.3 Mezcla para rociadores de mano

Prepare el volumen deseado de solución de rocío mezclando en agua la cantidad indicada de este producto, como se indica en la siguiente tabla:

Solución de rocío

Cantidad de herbicida Concentrado Roundup PRO

Volumen deseado	0.4%	0.8%	1.2%	1.6%	4.0%	8.0%
1 Gal	0.5 oz	1.0 oz	1.6 oz	2.1 oz	5.2 oz	10.5 oz
25 Gallons	13.0 oz	0.8 qt	1.2 qt	1.6 qt	4.0 qt	8.0 qt
100 Gallons	1.6 qt	0.8 gal	1.2 gal	1.6 gal	4.0 gal	8.0 gal

2 cucharadas soperas = 1 onza líquida

Cuando se usen rociadores tipo mochila, o para bombeo, se recomienda que este producto se mezcle con agua en un recipiente grande. Llene el rociador con la solución ya lista.

6.4 Colorantes o tinturas

Se pueden agregar colorantes o tinturas de señalización a las soluciones de rocío de este producto, sin embargo, el rendimiento del producto puede ser inferior, especialmente a bajas concentraciones del producto o a bajas diluciones. Utilice los colorantes o las tinturas según las recomendaciones del fabricante.

7.0 EQUIPOS Y TÉCNICAS PARA LA APLICACIÓN

No use ningún sistema de irrigación para aplicar este producto.

APLIQUE ESTAS SOLUCIONES DE ROCÍO UTILIZANDO EQUIPOS DEBIDAMENTE MANTENIDOS Y CALIBRADOS QUE SEAN CAPACES DE ROCIAR EL VOLUMEN DESEADO.

7.1 Equipo aéreo

NO APLIQUE ESTE PRODUCTO CON EQUIPOS AÉREOS EXCEPTO BAJO LAS CONDICIONES QUE SE ESPECIFICAN EN ESTA ETIQUETA.

Para aplicaciones áreas por difusión, a menos que se indique otra cosa, use este producto a una dosis de 0.8 a 1.6 cuartos por acre para malezas anuales, 1.6 a 4 cuartos por acre para malezas perennes y 4 a 8 cuartos por acre para matorrales leñosos y árboles. Use las dosis que se indican en la etiqueta de este herbicida en 3 a 25 galones de agua por acre. Cuando se usa de acuerdo con las instrucciones de la etiqueta, este producto brinda control o control parcial de las malezas herbáceas, matorrales leñosos y árboles mencionados en la sección **TIPOS DE MALEZAS CONTROLADAS** de esta etiqueta.

EN CASO DE APLICACIÓN AÉREA EN CALIFORNIA, CONSULTE EN LA ETIQUETA COMPLEMENTARIA FEDERAL LAS INSTRUCCIONES, LAS RESTRICCIONES Y LOS REQUISITOS ESPECÍFICOS PARA APLICACIONES AÉREAS EN ESE ESTADO O CONDADO. Este producto, al ser mezclado en tanques con dicamba, no se puede aplicar por aire en el estado de California.

Al mezclar en tanque este producto con 2,4-D, solo se pueden utilizar formulaciones de 2,4-D amina para la aplicación aérea en California. Las mezclas de tanque con formulaciones de 2,4-D amina se pueden aplicar por aire en California sólo para los sistemas de labranza con barbecho o reducida, y aplicaciones de alfalfa y renovación de pasturas.

No permita que la solución de herbicida pulverice, gotee, se derive o salpique sobre la vegetación deseada, ya que minúsculas cantidades de este producto pueden causar daños graves o destrucción del cultivo, plantas u otras áreas que no se pretendía tratar.

Evite la aplicación directa en masas de agua.

Se pueden utilizar aditivos para el control de la deriva. Cuando utilice un aditivo para el control de la deriva, lea detenidamente y siga al pie de la letra todas las precauciones, limitaciones y el resto de la información de la etiqueta del producto.

Asegúrese de aplicar uniformemente, para evitar la aplicación en surcos, irregular o encimada, utilice dispositivos de señalización apropiados.

EL CONTACTO PROLONGADO DE ESTE PRODUCTO CON PARTES DE ACERO QUE NO ESTA RECUBIERTO CON ALGÚN TIPO DE PROTECCIÓN, PUEDE DAR COMO RESULTADO LA CORROSIÓN Y POSIBLEMENTE QUE LAS PARTES FALLEN. Es posible prevenir la corrosión recubriendo las partes con pintura orgánica, que cumpla con las especificaciones aero-espaciales MIL-C-38413. Al final de cada día de trabajo, para evitar la corrosión de las partes expuestas, lave muy bien el avión a fin de remover los residuos de este producto que se acumulan durante el rocío o por derramamientos. Las partes del tren de aterrizaje son extremadamente susceptibles.

MANEJO DE LA DISPERSIÓN DEL ROCÍO

EVITE LA LA DISPERSIÓN. DEBE USARSE EXTREMO CUIDADO EN LA APLICACIÓN DE ESTE PRODUCTO PARA EVITAR DAÑOS A LA VEGETACIÓN DESEADA Y A LOS CULTIVOS.

No permita que la solución de herbicida pulverice, gotee, se derive o salpique sobre la vegetación deseada, ya que minúsculas cantidades de este producto pueden causar daños graves o destrucción del cultivo, plantas u otras áreas que no se pretendía tratar.

Es la responsabilidad del aplicador evitar la deriva por rocío en el lugar de aplicación. La interacción de varios factores relacionados con el clima y el equipo determina la posibilidad de deriva por rocío. El aplicador y/o el cultivador son responsables de considerar todos estos factores al tomar decisiones.

MANEJO DE LA DISPERSIÓN DEL ROCÍO AÉREO

Deben seguirse los siguientes requerimientos de manejo de la dispersión para evitar el movimiento de ésta fuera de objetivo en aplicaciones aéreas a campos de cultivo agrícola.

1. La distancia de la boquilla más externa en el brazo no debe exceder 3/4 del largo de la envergadura o rotor.
2. Las boquillas deben siempre apuntar hacia atrás, paralelos a la corriente de aire, nunca hacia abajo más de 45 grados. En los estados con reglamentos más estrictos, éstos deben observarse.

Importancia del tamaño de la gotita

La forma más eficaz de reducir la posibilidad de deriva es la aplicación de gotitas grandes. La mejor estrategia de manejo de la deriva es la aplicación de las gotitas más grandes que provean suficiente cobertura y control. La aplicación de gotitas más grandes reduce la posibilidad de deriva, pero no la evitará si las aplicaciones se realizan inadecuadamente o bajo condiciones ambientales desfavorables (vea las secciones de **Viento, Temperatura y humedad**, e **Inversiones de temperatura** en esta etiqueta).

Control del tamaño de la gotita

- **Volumen:** Use boquillas de velocidad de flujo alta para aplicar el mayor volumen de rocío práctico. Las boquillas con mayores velocidades de flujo producen gotitas más grandes.
- **Presión:** Use las presiones de rocío más bajas recomendadas para la boquillar. La presión más alta reduce el tamaño de la gotita y no mejora la penetración del todo. Cuando sean necesarias velocidades de flujo mayores, use boquillas con velocidad de flujo mayor en lugar de aumentar la presión.
- **Número de boquillas:** Use el número mínimo de boquillas que provean cobertura uniforme.
- **Orientaciónla boquilla:** Si orienta las boquillas de modo que liberen el rociado hacia atrás, en sentido paralelo a la circulación del aire, producirán gotas más grandes que si las orienta de otro modo. Cuanto más desviadas estén del plano horizontal, tanto más pequeñas serán las gotas y tanto mayor el potencial de dispersión.
- **Tipo de boquilla:** Use un tipo de boquilla que esté diseñada para la aplicación prevista. Con la mayoría de los tipos de boquillas, los ángulos de rocío más angostos producen gotitas más grandes. Considere el uso de boquillas de poca dispersión. Las boquillas de caudal directo orientadas directamente hacia atrás producen gotas más grandes que otros tipos de boquillas.
- **Longitud del brazo:** Para algunos tesquemas de uso, la reducción de la longitud efectiva del brazo a menos de 3/4 de la envergadura o el largo del rotor puede reducir más la deriva sin reducir el ancho de la hilera.
- **Altura de la aplicación:** Las aplicaciones no deben realizarse a una altura mayor que 10 pies por encima de la copa de las plantas más grandes, a menos que se requiera mayor altura por razones de seguridad del aeroplano. La realización de las aplicaciones a la menor altura que sea segura reduce la exposición de las gotitas a la evaporación y el viento.

Ajuste de la hilera

Cuando las aplicaciones se lleven a cabo con viento lateral, la banda de aspersión se desplazará a favor del viento. Por ello, en los extremos con o contra el viento del campo, el aplicador debe compensar este desplazamiento ajustando la trayectoria del aeroplano contraria al viento. La distancia de ajuste de la hilera debe aumentar, cuando aumenta la posibilidad de deriva (mayor viento, gotitas más pequeñas, etc.).

Viento

La posibilidad de deriva es menor con velocidades del viento entre 2 y 10 mph. Sin embargo, muchos factores, incluyendo el tamaño de las gotitas y el tipo de equipo determinan la posibilidad de deriva a una velocidad determinada. Debe evitarse la aplicación menos de 2 mph debido a la dirección variable del viento y la posibilidad alta de inversión. NOTA: El terreno local puede influir en los patrones de viento. Cada aplicador debe conocer los patrones (vientos) locales y cómo éstos afectan la deriva.

Temperatura y humedad

Cuando se realizan aplicaciones con humedad relativa baja, fije el equipo para que produzca gotitas más grandes para compensar por la evaporación. La evaporación de gotitas es más grave cuando las condiciones son calurosas y secas.

Inversiones de temperatura

No deben realizarse aplicaciones durante una inversión de temperatura debido a que es alta la posibilidad de deriva. Las inversiones de temperatura restringen la mezcla de aire vertical, lo que causa que pequeñas gotitas suspendidas permanezcan en una nube concentrada. Esta nube puede moverse en direcciones no predecibles debido a los vientos variables leves que son comunes durante las inversiones. Las inversiones de temperatura están caracterizadas por temperaturas en aumento con altitud y son comunes en las noches con cobertura de nubes limitada y poco o ningún viento. Comienzan a formarse cuando se mete el sol y a menudo continúan en la mañana. Su presencia puede indicarse por neblina en el suelo; sin embargo, si la neblina no está presente, las inversiones también pueden identificarse por el movimiento del humo desde una fuente del suelo o por el generador de humo de un aeroplano. El humo en capas que se mueve lateralmente en una nube concentrada (bajo condiciones de poco viento) indica una inversión, mientras que el humo que se mueve hacia arriba y se disipa rápidamente indica buena mezcla de aire vertical.

Áreas sensibles

Este producto sólo se debe aplicar cuando la posibilidad de deriva hacia zonas adyacentes susceptibles (como por ejemplo, áreas residenciales, masas de agua, hábitat conocido de especies amenazadas o en peligro de extinción, cultivos que no sean el objetivo) sea mínima, (como por ejemplo, cuando el viento sople lejos de las áreas susceptibles).

7.2 Equipo de difusión terrestre

Para aplicaciones de difusión terrestre, a menos que se indique otra cosa, use este producto a una dosis de 0.8 a 1.6 cuartos por acre para malezas anuales, 1.6 a 4 cuartos por acre para malezas perennes y 4 a 8 cuartos por acre para matorrales leñosos y árboles. Cuando se usa de acuerdo con las instrucciones de la etiqueta, este producto brinda control o control parcial de las malezas herbáceas, matorrales leñosos y árboles mencionados en la sección **TIPOS DE MALEZAS CONTROLADAS** de esta etiqueta.

Use las proporciones recomendadas de este producto con 3 a 40 galones de agua por acre para rocíospor difusión, a menos que se indique de otra manera. A medida que la densidad de las malezas aumenta, el volumen de rocío se debe aumentar también para conseguir una cobertura completa, pero siempre dentro de los límites recomendados. A fin de evitar un rocío muy fino, seleccione la boquilla cuidadosamente. Para obtener mejores resultados con equipo a nivel del terreno, use boquillas tipo abanico plano. Asegúrese de que las gotas del rocío se distribuyan uniformemente.

7.3 Equipos de mano o mochila

Aplique al follaje de la vegetación a ser controlada. En aplicaciones donde se pulveriza hasta mojar, la cobertura del follaje debe ser completa y uniforme. No rocíe hasta el punto de escurrimiento. Use rociadores gruesos solamente.

Para control de malezas mencionadas en la sección **Malezas anuales** de **TIPOS DE MALEZAS CONTROLADAS**, aplicar una solución al 0.4 por ciento de este producto a malezas de menos de 6 pulgadas de altura o largo de los tallos. Para malezas anuales de más de 6 pulgadas de altura, o a menos que se indique otra cosa, use una solución al 0.8 por ciento. Haga la aplicación antes de la formación de semillas en caso de pastos, o la formación de yemas en caso de malezas de hoja ancha.

Para obtener los mejores resultados, utilice una solución al 1.6 por ciento en malezas perennes más difíciles de controlar, como bermudagrass, acedera, field bindweed, hemp dogbane, milkweed y cardo de Canadá (Canada thistle).

Para aplicaciones directas con rocío de bajo volumen, utilice una solución al 4 a 8 por ciento de este producto para control o control parcial de malezas anuales, malezas perennes o matorrales leñosos y árboles. La cobertura del rocío deberá ser uniforme y deberá haber contacto con al menos 50 por ciento del follaje. Es importante lograr la cobertura de la mitad superior de la planta para lograr los mejores resultados. Para asegurar una adecuada cobertura con el rocío, rocíe ambos lados de los matorrales leñosos o árboles grandes o altos, cuando el follaje sea espeso y denso o cuando haya muchos brotes.

7.4 Equipo especializado

Este producto puede ser diluido con agua y aplicado usando rociadores de recirculación, aplicadores con pantalla, rociadores con capucha, aplicadores con enjugador o barras de esponja, sobre las malezas indicadas que crecen en cualquier lugar no cultivado indicado en esta etiqueta.

Los rociadores de recirculación dirigen la solución de rocío hacia los tipos de malezas que crecen sobre vegetación deseable, mientras que la solución de rocío que no ha sido interceptada por las malezas se recoge y se retorna al tanque para volverla a usar.

EVITE EL CONTACTO DEL HERBICIDA CON LA VEGETACIÓN DESEABLE, YA QUE ES PROBABLE QUE OCURRA DAÑO GRAVE O MUERTE DE LA VEGETACIÓN.

El equipo de aplicación que se utilice por encima de la vegetación deseable debe ajustarse de manera que el chorro de rocío o punto de contacto del enjugador esté al menos 2 pulgadas por encima de la vegetación deseable. Es probable que las gotas, niebla, espuma o salpicaduras de la solución de herbicida sobre la vegetación deseable provoquen decoloración, atrofia o destrucción.

Se obtienen mejores resultados cuando una mayor cantidad de la maleza entra en contacto con la solución de herbicida. Las malezas que no entran en contacto con la solución de herbicida no serán afectadas. Esto puede ocurrir en lugares donde las malezas están muy concentradas, cuando la infestación es grave o donde la altura de las malezas es variada, lo que no permite que todas sean tocadas por el herbicida. En estos casos puede ser necesario repetir el tratamiento.

Aplicadores con pantalla y con capucha

Los aplicadores con pantalla o con capucha aplican la solución de herbicida directamente sobre las malezas, al mismo tiempo que protegen la vegetación deseable, para que no sea tocada por el herbicida.

Use boquillas que aseguren un recubrimiento uniforme en toda el área tratada. En los rociadores con pantalla, mantenga las pantallas debidamente colocadas a fin de proteger la vegetación deseada. SE DEBE TENER MUCHO CUIDADO PARA EVITAR EL CONTACTO DEL HERBICIDA CON LA VEGETACIÓN DESEABLE.

Aplicadores con enjugador y barras de esponja

Los aplicadores con enjugador o de esponja aplican la solución de herbicida frotando las malezas con un material absorbente que contenga la solución de herbicida.

El equipo debe ser diseñado, mantenido y operado de manera que la solución de herbicida no haga contacto con la vegetación deseable. Opere este equipo a velocidades inferiores a las 5 millas por hora. En áreas donde la infestación de malezas es grave, se puede mejorar la eficacia reduciendo la velocidad, así se asegura que el enjugador esté siempre adecuadamente saturado. Se obtienen mejores resultados si se aplica 2 veces en direcciones opuestas.

Evite las filtraciones o el goteo en la vegetación deseable. Ajuste la altura de los aplicadores a fin de asegurar un contacto adecuado con las malezas. Mantenga limpias las superficies de enjugado. Tenga en cuenta que, en terreno en declive, la solución de herbicida puede cambiar de lugar, goteando en el extremo inferior y secando las mechas en el extremo superior del aplicador con enjugador.

No use aplicadores con enjugador cuando las malezas estén mojadas.

Mezcle solamente la cantidad de solución que se usará durante el período de un día, debido a que el uso de soluciones de días anteriores puede dar como resultado un efecto menos eficiente. Inmediatamente después de usar este producto, lave bien el aplicador usando bastante agua.

Para aplicadores de cordón o de mecha de esponja: Puede emplearse soluciones que oscilan entre 33 al 75 por ciento de este producto en agua.

Para aplicadores de plástico poroso y sistemas de alimentación por presión: Puede emplearse soluciones que oscilan entre 33 al 100 por ciento de este producto en agua.

Cuando se aplica de acuerdo a las recomendaciones, este producto CONTROLA las siguientes malezas:

Corn, volunteer	Sicklepod
Panicum, Texas	Spanishneedles
Rye, common	Starbur, bristly
Shattercane	

Cuando se aplica de acuerdo a las recomendaciones, este producto SUPRIME las siguientes malezas:

Beggarweed, Florida	Ragweed, common
Bermudagrass	Ragweed, giant
Dogbane, hemp	Smutgrass
Dogfennel	Sunflower
Guineagrass	Thistle, Canada
Johnsongrass	Thistle, musk
Milkweed	Vaseygrass
Nightshade, silverleaf	Velvetleaf
Pigweed, redroot	

7.5 Sistemas por inyección

Este producto puede usarse con sistemas de rocío por inyección, ya sean aéreos o a nivel del terreno. Puede usarse como concentrado líquido o diluido antes de la inyección en el chorro de rocío. No mezcle este producto con concentraciones de otros productos sin diluir cuando use los sistemas por inyección, a menos que se indique de manera específica.

7.6 Equipo de aplicación por goteo controlado

La proporción de este producto aplicado por acre usando el equipo de aplicación por goteo controlado (CDA) no debe ser menor que la cantidad indicada en esta etiqueta cuando se usa equipo convencional para aplicaciones de difusión. Cuando se usa el

equipo aplicador por goteo controlado montado en un vehículo, use de 3 a 15 galones de agua por acre.

El equipo de aplicación por goteo controlado produce un patrón de rocío que no puede verse fácilmente. Se debe tener mucho cuidado para evitar que el rocío o la deriva entren en contacto con el follaje o con cualquier otro tejido de vegetación deseable, ya que es probable que ocurra daño o destrucción.

8.0 INSTRUCCIONES SEGÚN ÁREAS Y USO

Este producto puede usarse en áreas no cultivables como aeropuertos, conjuntos de apartamentos, sitios comerciales, orillas de acequias, caminos de entrada de automóviles, acequias secas, canales secos, filas de vallas, campos de golf, invernaderos, zonas industriales, áreas de paisaje, depósitos de madera, zonas de manufactura, solares municipales, zonas naturales, complejos de oficinas, cultivos ornamentales, parques, áreas de estacionamiento, pasturas, zonas con tanques de petróleo e instalaciones de bombeo, vías de ferrocarril, praderas, áreas recreativas, áreas residenciales, derechos de paso, bordes de carreteras, escuelas, umbráculos, complejos deportivos, áreas de almacenamiento, subestaciones, zonas de césped, zonas de servicios públicos, zonas de almacenes, y zonas en las que se realiza gestión de vida silvestre.

Este producto también puede utilizarse en sitios para cultivos no alimenticios, como plantaciones de árboles de Navidad, viveros, o sitios para la producción de tepes o semilla de césped.

A menos que se indique otra cosa, es posible realizar aplicaciones para controlar cualquier maleza mencionada en la sección TIPO DE MALEZAS CONTROLADAS de esta etiqueta.

8.1 Tocones cortados

El tratamiento de tocones cortados puede hacerse en cualquier área indicada en esta etiqueta. Este producto controla muchas especies de matorrales leñosos y árboles. Aplique este producto usando equipo adecuado para garantizar la cobertura completa del cámbium. Corte los árboles o sus brotes cerca de la superficie del suelo. Aplique una solución de este producto del 50 al 100 por ciento a la superficie recién cortada, **inmediatamente después** del corte. Demorar la aplicación puede reducir la eficacia del producto. Para obtener mejores resultados, la aplicación deberá hacerse durante los períodos de crecimiento activo y expansión completa de las hojas.

NO HAGA LAS APLICACIONES SOBRE TOCONES CORTADOS CUANDO LAS RAÍCES DE LOS MATORRALES LEÑOSOS O ÁRBOLES DESEABLES PUEDEN ESTAR INJERTADAS A LAS RAÍCES DE LOS TOCONES CORTADOS. Algunos brotes, tallos o árboles pueden compartir el mismo sistema radicular. Árboles que están contiguos, que tienen la misma edad, altura y separación pueden indicar raíces compartidas. Cuando se trata a uno o más árboles que tienen raíces en común, tanto si están injertados como si comparten el sistema radicular, es probable que se produzca un daño en los brotes/ árboles no tratados.

8.2 Preparación del lugar para forestación

Este producto puede ser utilizado para controlar o controlar parcialmente malezas leñosas, árboles y malezas herbáceas en forestaciones, y preparar o crear claros para la vida silvestre en estos lugares y para mantener los caminos de las explotaciones forestales.

Este producto puede ser utilizado para preparar el lugar antes de plantar cualquier especie de árbol, como árboles de Navidad, eucaliptos, cultivos de árboles híbridos y viveros dedicados a la silvicultura.

Consulte la sección **TIPOS DE MALEZAS CONTROLADAS** de esta etiqueta para informarse acerca de las proporciones e instrucciones específicas para la aplicación. Use las dosis más altas de este producto dentro del rango especificado para el control o control parcial de matorrales leñosos, árboles y malezas herbáceas perennes difíciles de controlar. Para lograr los mejores resultados, aplique a matorrales leñosos y árboles en activo crecimiento después del desarrollo total de las hojas y antes de que las hojas cambien de color y caigan en el otoño. Aumente las dosis dentro del rango especificado para controlar malezas herbáceas en cualquier momento después de la emergencia y antes de que aparezcan las semillas, flores o bayas.

Use las menores dosis de este producto dentro del rango indicado en la etiqueta para el control anual de las malezas herbáceas anuales y las malezas herbáceas perennes en activo crecimiento después de la aparición de las semillas, flores o bayas. Aplique al follaje de malezas herbáceas anuales en activo crecimiento en cualquier momento después de la emergencia.

Este producto carece de actividad herbicida o residual en la tierra.

A menos que se indique otra cosa, no aplique este producto como rocío por difusión en la parte superior en coníferas para forestación o árboles de madera dura.

MEZCLAS PARA TANQUE: Se pueden emplear mezclas de tanque con este producto para aumentar el espectro de la vegetación controlada. Este producto se puede mezclar en tanque con los siguientes productos, siempre que éstos estén aprobados para el área de uso deseada. Consulte las etiquetas de estos productos para informarse sobre las áreas de uso y las dosis de aplicación aprobadas. Lea y siga cuidadosamente las indicaciones y toda la información en las etiquetas de todos los herbicidas utilizados. Use conforme a las declaraciones preventivas más estrictas indicadas para cada producto en la mezcla.

NOTA: Para la preparación de sitios de forestación, asegúrese de que el producto para mezclar en tanque esté aprobado antes de plantar las especies deseadas. Respete las restricciones del intervalo de plantación.

Todas las proporciones recomendadas de este producto se pueden utilizar en una mezcla de tanque con los siguientes productos para la preparación de sitios de forestación.

Concentrado para aplicadores Arsenal	Garlon 3A
Chopper	Garlon 4
Escort	Oust
Escort XP	Oust XP

Para controlar malezas herbáceas, utilice las proporciones de menor concentración recomendadas para la mezcla de tanque. Para controlar grupos densos o difíciles de arbustos leñosos y árboles, utilice las proporciones de mayor concentración recomendadas en mezcla de tanque.

8.3 Áreas no cultivadas y áreas industriales

Úselo aeropuertos, conjuntos de apartamentos, plantaciones de árboles de Navidad sitios comerciales, Programa de conservación de reservas (CRP), orillas de acequias, caminos de entrada de automóviles, acequias secas, canales secos, filas de vallas, campos de golf, invernaderos, zonas industriales, áreas de paisaje, depósitos de madera, zonas de manufactura, solares municipales, zonas naturales, complejos de oficinas, cultivos ornamentales, parques, áreas de estacionamiento, pasturas, zonas con tanques de petróleo e instalaciones de bombeo, viveros, vías de ferrocarril, praderas, áreas recreativas, áreas residenciales, derechos de paso, bordes de carreteras, escuelas, sitios para la producción de tepes o semilla de césped, complejos deportivos, áreas de almacenamiento, subestaciones, zonas de césped, zonas de servicios públicos, zonas de almacenes, y zonas en la que se realiza gestión de vida silvestre.

Control general de malezas, recortado de bordes y suelo limpio de malezas

Este producto puede utilizarse en áreas generales no cultivadas y de cultivos no alimenticios. Puede aplicarse con cualquiera de los equipos descritos en esta etiqueta. Puede usarse para el recortado de bordes alrededor de objetos en áreas no cultivadas, para tratamiento localizado de vegetación no deseable y para eliminar las malezas no deseables que crecen en lechos de arbustos establecidos y plantaciones ornamentales. Este producto puede usarse antes de plantar un área con plantas ornamentales, flores, césped (tepes o semillas), o antes de colocar asfalto o de comenzar un proyecto de construcción.

Se pueden repetir las aplicaciones de este producto, a medida que emergen las malezas, para mantener el suelo libre de malezas.

MEZCLAS DE TANQUE: Este producto se puede mezclar en un tanque con los siguientes productos, siempre que éstos estén aprobados para el área de uso deseada. Consulte las etiquetas de estos productos para informarse sobre las áreas de uso y las dosis de aplicación aprobadas. Lea y siga cuidadosamente las indicaciones y toda la información en las etiquetas de todos los herbicidas utilizados. Utilice conforme con las declaraciones preventivas más restrictivas de cada producto en la mezcla.

El usuario es responsable de garantizar que en la etiqueta del producto utilizado en la mezcla estén permitidas las aplicaciones específicas cuando se realicen mezclas de tanque con un ingrediente activo genérico de los mencionados a continuación.

2,4-D[1]	Gallery 75 DF	Ronstar 50 WP
Arsenal	Garlon 3A	Sahara DG
atrazine[1]	Garlon 4	Surflan AS
Banvel	Goal 2XL	Surflan WDG
Barricade 65WG	Krovar I DF	simazine[1]
dicamba	Oust	Telar DF
diuron	Oust XP	Transline
Endurance	Outrider	
Escort	pendimethalin[1]	
Escort XP	Plateau	

[1] Se pueden hacer mezclas de tanque con productos que contengan ese ingrediente activo generico siempre que el producto específico esté registrado para ese uso.

Cuando se aplica como mezcla de tanque para mantener el suelo limpio de malezas, este producto brinda control de las malezas anuales emergidas y control o control parcial de las malezas perennes emergidas, matorrales leñosos y árboles.

Para control o control parcial de las siguientes malezas perennes, aplique 0.8 a 1.6 cuartos de este producto más 2 a 4 onzas de Oust XP por acre.

Bahiagrass	Dock, curly	Poorjoe
Bermudagrass	Dogfennel	Quackgrass
Broomsedge	Fescue, tall	Vaseygrass
Dallisgrass	Johnsongrass	Vervain, blue

Segado químico- Perennes

Este producto inhibe los pastos perennes indicados en esta sección para servir como sustituto de la siega. Utilice 6.4 onzas líquidas de este producto por acre para el tratamiento de plantas tall fescue, fine fescue, orchardgrass, quackgrass o reed canarygrass. Utilice 5 onzas líquidas de este producto por acre para el tratamiento de Kentucky bluegrass. Aplique los tratamientos en 10 a 40 galones de solución de rocío por acre.

Emplee sólo en los lugares donde se puede tolerar cierto daño o decoloración temporal en pastos perennes.

Segador químico - Anuales

Para suprimir el crecimiento de algunos pastos anuales, tales como ryegrass, la cebada silvestre y la avena loca anuales que crecen en céspedes agrestes al borde de las carreteras u otras áreas industriales, aplique de 3 a 4 onzas líquidas de este producto en 10 a 40 galones de solución de rocío por acre. Las aplicaciones se deben realizar cuando los pastos anuales crezcan activamente y antes de que las semillas se encuentren en la etapa de “boot” del desarrollo. Los tratamientos pueden perjudicar a los pastos deseados.

Césped latente (durmiente)

Este producto puede usarse para controlar o suprimir muchas malezas anuales de invierno y tall fescue para el alivio eficaz de céspedes de bermudagrass y bahiagrass latentes. Trate solamente cuando el césped esté latente y antes de reverdecer en la primavera.

Aplique de 6.4 a 51 onzas líquidas de este producto por acre. Aplique las dosis recomendadas en 10 a 40 galones de agua por acre. Utilícelo sólo en áreas donde bermudagrass o bahiagrass sean coberturas de terreno convenientes y donde pueda tolerarse algún daño temporal o descoloración.

Los tratamientos en exceso de 13 onzas líquidas por acre, pueden dañar o retrasar el reverdecer en las áreas donde se hace mucho mantenimiento, como campos de golf y jardines. NO aplique mezclas de tanque de este producto más Oust XP en áreas de césped donde se hace mucho mantenimiento. Para otros usos, vea la sección **Bordes de las carreteras** de esta etiqueta, que proporciona dosis para tratamientos de bermudagrass y bahiagrass latentes.

Bermudagrass de crecimiento activo

Este producto puede emplearse para controlar total o parcialmente muchas malezas anuales y perennes a fin de obtener una distribución eficaz de bermudagrass de crecimiento activo. NO aplique más de 13 onzas líquidas de este producto por acre en áreas de céspedes de alto mantenimiento. NO aplique mezclas de tanque de este producto más Oust XP en áreas de céspedes de alto mantenimiento. Para otros usos, vea la sección **Bordes de las carreteras** de esta etiqueta, que proporciona dosis para tratamientos de bermudagrass de crecimiento activo. Utilícelo sólo en áreas donde puede tolerarse algún daño temporal o descoloración.

Renovación del césped, producción de semillas o tepes

Este producto controla la mayoría de la vegetación existente antes de la renovación del césped o de establecer céspedes cultivados para semilla o tepes. Para un control máximo de la vegetación existente, demore la siembra o cobertura de césped a fin de determinar si las partes de la planta que quedaron bajo tierra vuelven a crecer. Cuando sea necesario repetir el tratamiento, permita que las plantas se desarrollen lo suficiente antes de volver a tratar. Para controlar más eficientemente los pastos de estación caliente, como bermudagrass, se debe aplicar este producto en el verano o en el otoño. En lugares donde la vegetación existente esté creciendo y el césped esté bajo un programa de siega, aplique este producto después de omitir por lo menos un corte del césped para permitir un crecimiento suficiente a fin de que el rocío sea interceptado por las plantas.

Pueden plantarse los céspedes convenientes siguiendo los procedimientos anteriormente mencionados.

Puede utilizarse equipo de mano para el tratamiento en sitio de vegetación no deseada que crezca en el césped existente. Puede utilizarse equipo de difusión o de mano para controlar los restos de tepes u otra vegetación no deseada después de cosechar el tepe.

PRECAUCIONES, RESTRICCIONES: No remueva la tierra ni las partes de la planta que estén bajo tierra antes del tratamiento. La labranza o las técnicas de renovación como corte vertical, perforación o rebanado deben esperar 7 días después de la aplicación a fin de permitir la absorción adecuada en las partes de la planta que estén bajo tierra. Si las dosis de aplicación ascienden a 2.4 cuartos de galón por acre o menos, no se requiere un período de espera entre el tratamiento y la alimentación o pastoreo del ganado. Si la dosis es mayor de 2.4 cuartos por acre, retire el ganado doméstico antes de la aplicación y espere 8 semanas después de la aplicación antes de pastorear o cosechar.

No utilice el césped que se cultiva para la producción de semillas o tepes para alimentar animales durante 8 semanas después de la aplicación.

8.4 Manejo de hábitat

Restauración y mantenimiento de hábitats

Este producto puede ser usado para controlar la vegetación exótica y otras plantas indeseables en áreas de manejo de hábitats y en áreas naturales, incluyendo praderas y refugios para la fauna silvestre. Pueden hacerse aplicaciones para permitir la recuperación de las especies de plantas nativas, antes de plantar dichas especies nativas deseables, y para otros requisitos similares de control de la vegetación de amplia efectividad. A fin de eliminar selectivamente ciertas plantas indeseables, se pueden hacer aplicaciones localizadas para controlar y mejorar el hábitat.

Sitios donde se siembran alimentos para la fauna silvestre

Este producto se puede utilizar como tratamiento a fin de preparar el lugar para controlar malezas anuales y perennes antes de sembrar parcelas para alimento de la vida silvestre. Después de aplicar este producto se puede sembrar cualquier especie de alimento para la vida silvestre o bien, se puede permitir la repoblación de la zona con especies nativas. Si debe labrar para preparar un semillero, deje transcurrir 7 días de la aplicación antes de hacerlo a fin de permitir la absorción adecuada en las partes de la planta que estén bajo tierra.

8.5 Inyección en tallo hueco

Este producto puede aplicarse con dispositivos de inyección manuales para administrar las cantidades recomendables de este producto a las plantas con tallo hueco identificadas que crecen en cualquiera de los lugares especificados en esta etiqueta.

Para el control de las siguientes plantas de tallo hueco, utilice según las instrucciones:

Semilla de ricino, *Ricinus communis*

Inyecte 4 ml por planta de este producto en la parte inferior del tallo principal.

Hemlock venenoso, *Conium maculatum*

Inyecte una caña de una hoja por planta 10 a 12 pulgadas por encima de la corona de la raíz con 5 ml de una solución al 5% v/v de este producto.

Hogweed gigante, *Hercleum mantegazzianum*

Inyecte una caña de una hoja por planta 12 pulgadas por encima de la corona de la raíz con 5 ml de una solución al 5% v/v de este producto.

Equiseto o cola de caballo, *Equisetum arvense*

Inyecte un segmento por encima de la corona de la raíz con 0.5 ml de este producto por tallo. Use una jeringa pequeña que pueda medir esa dosis.

Polígono bohemio, *Polygonum bohemicum*

Inject 5 ml per stem of this product between the second and third internode.

Polígono gigante, *Polygonum sachalinense*

Inyecte 5 ml de este producto por tallo entre el segundo y el tercer entrenudo.

Polígono japonés, *Polygonum cuspidatum*

Inyecte 5 ml de este producto por tallo entre el segundo y el tercer entrenudo.

Caña brava, *Arundo donax*

Inyecte 6 m de este producto por tallo entre el segundo y el tercer entrenudo.

Cardo de Canadá, *Circisum arvense*

Use una tijera de podar para cortar un manojo de 8 a 9 de las plantas más altas en la etapa de brotación. Utilice una aguja hueca que se introduce en el centro del tallo y luego se extrae lentamente a medida que inyecta 0.5 ml de este producto en cada tallo.

NOTA: El total de todos los tratamientos no deben superar los 7 cuartos de este producto por acre. A 5 ml por tallos, con 7 cuartos se pueden tratar aproximadamente 1300 tallos por acre.

8.6 Aplicación foliar o de difusión en polígono japonés (*Polygonum cuspidatum*) y Oriental bittersweet (*Celastrus orbiculatus*)

Polígono japonés

Para control de polígono japonés (*Polygonum cuspidatum*), este producto se puede aplicar como solución de rocío para mojar al 2% v/v. Asegúrese de que la cobertura sea a fondo cuando emplee tratamientos de rocío para mojar con equipo de mano.

Para tratamientos de difusión, aplique 3.25 cuartos de este producto en 3 a 40 galones por acre como tratamiento de difusión.

La aplicación al final del verano o en el otoño es ideal, cuando las hojas todavía están verdes y después de la formación de los frutos.

Oriental bittersweet

Para control de Oriental bittersweet (Celastrus orbiculatus), se puede aplicar este producto como solución de rocío para mojar al 2% v/v. Asegúrese de que la cobertura sea a fondo cuando emplee tratamientos de rocío para mojar con equipo de mano.

Para tratamientos de difusión, aplique 2.5 cuartos de este producto en 3 a 40 galones por acre como tratamiento de difusión.

La aplicación al final del verano o en el otoño es ideal, cuando las hojas todavía están verdes y después de la formación de los frutos.

8.7 Inyección y chorro (matorrales leñosos y árboles)

Este producto puede aplicarse por inyección o chorro para el control total o parcial de matorrales leñosos y árboles. Aplique este producto usando equipo adecuado, que debe ser capaz de penetrar en el tejido viviente. Aplique el equivalente a 1 mL de este producto por cada 2 ó 3 pulgadas de diámetro del tronco a la altura del pecho (DBH en inglés). La mejor forma de hacerlo es aplicando una solución a una concentración del 50 al 100 por ciento de este producto, con un chorro continuo alrededor del árbol o en cortes espaciados uniformemente alrededor del árbol y por debajo del nivel de las ramas. A medida que el diámetro del árbol aumenta, se obtienen mejores resultados con el chorro continuo alrededor del árbol o en cortes espaciados muy cerca entre sí alrededor del árbol. Evite las aplicaciones que permiten el escurrimiento de material cuando se chorrea alrededor del árbol o sobre los cortes en árboles que tienen la facilidad de exudar savia de los cortes. En especies de este tipo, haga los cortes de manera oblicua a fin de producir el efecto de copa y use el producto a una concentración del 100 por ciento. Para obtener mejores resultados, la aplicación debe tener lugar durante períodos de crecimiento activo y después de expansión completa de las hojas.

8.8 Plantas ornamentales, viveros y árboles de Navidad

Post-dirigido y recortado de bordes

Este producto puede ser utilizado como un rocío post-dirigido alrededor de especies ornamentales leñosas establecidas, como arborvitae, azalea, boxwood, crabapple, eucalyptus, euonymus, fir, douglas fir, jojoba, hollies, lilac, magnolia, maple, oak, poplar, privet, pine, spruce y yew. Este producto también puede ser utilizado para recortado de bordes alrededor de árboles, edificios, aceras y carreteras, plantas en macetas y otros objetos de viveros.

Las plantas deseables pueden ser protegidas de la solución de rocío usando pantallas o cubriéndolas con cartón o con algún otro material impermeable. ESTE PRODUCTO NO SE RECOMIENDA PARA ROCIARSE DESDE ARRIBA SOBRE PLANTAS ORNAMENTALES Y ÁRBOLES DE NAVIDAD. Se debe tener mucho cuidado para que el rocío, niebla o vapor de este producto no hagan contacto con el follaje o la corteza de las especies ornamentales establecidas.

Preparación del terreno

Este producto puede ser usado antes de plantar cualquier tipo de planta ornamental, de vivero o árboles de Navidad.

Aplicadores con enjugador

Este producto se puede usar mediante aplicadores de mecha de esponja u otro tipo de aplicadores con enjugador adecuados, para controlar total o parcialmente la vegetación indeseable alrededor de eucaliptos o álamos. Consulte la sección **Equipo especializado** de esta etiqueta para obtener mayor información sobre el uso adecuado de los aplicadores con enjugador.

Invernaderos/cobertizos

Este producto puede ser usado para controlar las malezas que estén creciendo en o alrededor de los invernaderos y cobertizos. No debe haber vegetación deseable durante la aplicación y los equipos de ventilación deben estar apagados.

8.9 Parques, áreas recreativas y residenciales

Este producto puede usarse en parques, áreas recreativas y residenciales. Puede aplicarse con cualquiera de los equipos descritos en esta etiqueta. Puede usarse para el recortado de bordes alrededor de árboles, vallas, caminos, alrededor de edificios, aceras y otros objetos en estas áreas. Puede usarse para tratamiento localizado de vegetación no deseable y para eliminar las malezas no deseables que crecen en lechos de arbustos establecidos y plantaciones ornamentales. Este producto puede usarse antes de plantar un área con plantas ornamentales, flores, césped (tepes o semillas), o antes de colocar asfalto o de comenzar un proyecto de construcción.

Todas las instrucciones de la sección **Áreas no cultivadas y áreas industriales** son válidas para los parques y áreas recreativas.

8.10 Vías de ferrocarril

Las instrucciones en la sección **Áreas no cultivadas y áreas industriales** se pueden usar en vías de ferrocarril.

Suelo vacío, balastos y bordes, cruces y tratamiento localizado

Este producto puede ser usado para mantener el suelo limpio de malezas en balastos y bordes de las vías de ferrocarril. Pueden hacerse aplicaciones repetidas de este producto, a medida que emergen las malezas, para mantener el suelo limpio de malezas. Este producto puede usarse para controlar las malezas altas y mejorar la línea visual en los cruces de ferrocarril y reducir la necesidad de segar a lo largo de las servidumbres de vía. Para aplicaciones en los cruces, pueden usarse hasta 80 galones de solución de rocío por acre.

MEZCLAS DE TANQUES: Este producto se puede mezclar en un tanque con los siguientes productos para tratamientos en balasto, bordes, tratamiento cruzado y suelo vacío, siempre que éstos estén aprobados para el área de uso deseada. Consulte las etiquetas de estos productos para informarse sobre los lugares de uso no cultivados y las dosis de aplicación aprobadas. Lea y siga cuidadosamente las indicaciones y toda la información en las etiquetas de todos los herbicidas utilizados. Utilice conforme con las declaraciones preventivas más restrictivas de cada producto en la mezcla.

El usuario es responsable de garantizar que en la etiqueta del producto utilizado en la mezcla estén permitidas las aplicaciones específicas cuando se realicen mezclas de tanque con un ingrediente activo genérico de los mencionados a continuación.

Arsenal	Hyvar X	simazine[1]
atrazine[1]	Hyvar X-L	Spike 80DF
dicamba[1]	Krovar I DF	Telar DF
Escort	Oust	Transline
Escort XP	Oust XP	Velpar DF
Garlon 3A	Outrider	Velpar L
Garlon 4	Sahara DG	2,4-D[1]

[1]Se pueden hacer mezclas de tanque con productos que contengan ese ingrediente activo generico siempre que el producto específico esté registrado para este uso.

Control de matorrales

Este producto puede ser usado para controlar matorrales leñosos y árboles en las servidumbres de vía. Aplique de 3 a 8 cuartos de galón de este producto por acre para aplicaciones diseminadas, usando boquillas tipo brazo o sin brazo. Pueden usarse hasta 80 galones de solución de rocío por acre. Aplique una solución de 0.8 a 1.6 por ciento de este producto cuando haga aplicaciones de rocío para mojar a gran escala. Aplique una solución de 4 a 8 por ciento de este producto cuando haga aplicaciones de rocío dirigido a pequeña escala para tratamientos localizados. Este producto puede ser mezclado con los siguientes productos para un mejor control de los matorrales leñosos y árboles:

Arsenal	Telar DF	Vanquish
Escort	Krenite	Velpar DF
Escort XP	Tordon K	Velpar L
Garlon 3A	Tordon 22K	
Garlon 4	Transline	

Mantenimiento del Bermudagrass

Este producto puede ser usado para controlar o controlar parcialmente muchas malezas anuales y perennes para el mantenimiento eficaz de bermudagrass que esté creciendo activamente. Aplique de 13 a 38 onzas líquidas de este producto en un máximo de 80 galones de solución de rocío por acre. Para tratar malezas anuales que tengan menos de 6 pulgadas de altura (o el largo de los tallos), use las proporciones más bajas. Use la proporción más alta a medida que las malezas aumenten de tamaño o cuando estén cerca de la floración o de la formación de semillas. Estas proporciones también controlan parcialmente las siguientes especies perennes:

Bahiagrass	Johnsongrass
Bluestem, silver	Trumpetcreeper
Fescue, tall	Vaseygrass

Aplique 6.4 a 51 onzas líquidas de este producto en una mezcla de tanque con 0.75 a 1.33 onzas del herbicida Outrider por acre. Lea y siga todas las indicaciones de la etiqueta para el herbicida Outrider.

Este producto puede ser mezclado con Oust XP. Si se mezcla en tanques, no use más de 13 a 38 onzas líquidas de este producto con 1 a 2 onzas de Oust XP por acre. Para tratar malezas anuales listadas en esta etiqueta y en la etiqueta de Oust XP, que tengan menos de 6 pulgadas de altura (o el largo de los tallos), use las proporciones más bajas de cada producto. Use la proporción más alta a medida que las malezas anuales aumenten de tamaño o cuando estén cerca de la floración o de la formación de semillas. Estas proporciones también controlan parcialmente las siguientes malezas perennes:

Bahiagrass	Fescue, tall
Blackberry	Johnsongrass
Bluestem, silver	Poorjoe
Broomsedge	Raspberry
Dallisgrass	Trumpetcreeper
Dewberry	Vaseygrass
Dock, curly	Vervain, blue
Dogfennel	

Úselo solamente en bermudagrass que esté bien establecido. Como resultado del tratamiento, el bermudagrass puede sufrir deterioro, pero volverá a crecer si se riega. No se recomienda repetir el tratamiento en la misma estación, ya que esto puede ocasionar daños graves al bermudagrass.

8.11 Bordes de las carreteras

Todas las instrucciones de la sección **Áreas no cultivadas y Áreas Industriales** son válidas para bordes de las carreteras.

Tratamiento de bordes

Este producto puede ser usado en los bordes de las carreteras. Puede aplicarse con rociadores de brazos, rociadores con brazos y pantalla, boquillas descentradas de gran volumen, equipo de mano y equipos similares.

Barandas y otros obstáculos para la siega

Este producto puede ser usado para controlar las malezas que crecen debajo de las barandas y alrededor de la señalización y otros objetos en los bordes de las carreteras.

Tratamiento localizado

Este producto puede ser usado como tratamiento localizado para controlar la vegetación no deseada que crece a lo largo de los bordes de las carreteras.

MEZCLAS DE TANQUE: Este producto puede mezclarse en tanque con los siguientes productos para tratamientos de bordes, barandas, localizados y de suelo vacío siempre y cuando dichos productos estén aprobados para su uso en dichos sitios. Consulte las etiquetas de estos productos para informarse sobre los lugares de uso no cultivados y las dosis de aplicación aprobadas. Lea y siga cuidadosamente las indicaciones y toda la información en las etiquetas de todos los herbicidas utilizados. Utilice conforme con las declaraciones preventivas más restrictivas de cada producto en la mezcla.

El usuario es responsable de garantizar que en la etiqueta del producto utilizado en la mezcla estén permitidas las aplicaciones específicas cuando se realicen mezclas de tanque con un ingrediente activo genérico de los mencionados a continuación.

atrazine[1]	Landmark II MP	Sahara DG
Crossbow L	Landmark XP	simazine[1]
dicamba	Oust	Surflan AS
diuron	Oust XP	Surflan WDG
Escort	Outrider	Telar DF
Escort XP	pendimethalin[1]	Velpar DF
Endurance	Plateau	Velpar L
Gallery 75 DF	Plateau DG	2,4-D[1]
Krovar I DF	Poast	
Landmark MP	Ronstar 50 WSP	

[1]Se pueden hacer mezclas de tanque con productos que contengan ese ingrediente activo siempre que el producto específico esté registrado para este uso.

Mantenimiento del Bermudagrass y Bahiagrass

Aplicaciones cuando estén latentes (durmientes)

Este producto puede usarse para controlar o controlar parcialmente muchas malezas anuales de invierno y tall fescue para el alivio eficaz de bermudagrass y bahiagrass latentes. Trate solamente cuando el césped esté latente y antes de su reverdecer primaveral.

Este producto puede mezclarse en tanque con el herbicida Outrider o Oust XP para el control residual. Las mezclas de tanque de este producto con Oust XP pueden retrasar el reverdecer.

Para obtener mejores resultados con malezas anuales de invierno, haga el tratamiento cuando las plantas estén en una etapa temprana de su crecimiento (menos de 6 pulgadas de altura) después de que la mayoría haya germinado. Para obtener mejores resultados con tall fescue, haga el tratamiento cuando el fescue esté en o después de su etapa de 4 a 6 hojas.

Aplique de 6.4 a 51 onzas líquidas de este producto en una mezcla de tanque con 0.75 a 1.33 de onza de herbicida Outrider por acre. Lea y siga todas las instrucciones de la etiqueta del herbicida Outrider.

Aplique de 6.4 a 51 onzas líquidas de este producto por acre, solo o en mezcla de tanque con 0.25 a 1 onza de Oust XP por acre. Aplique las proporciones recomendadas en 10 a 40 galones de agua por acre. Úselo solamente en áreas donde el bermudagrass o bahiagrass son deseables y en las que puede tolerarse un poco de daño o decoloración. Para evitar que el reverdecer se retarde y para minimizar el daño, no agregue más de 1 onza de Oust XP por acre sobre bermudagrass y no más de 0.5 onzas de Oust XP por acre sobre bahiagrass, y evite el tratamiento cuando estos pastos se encuentren en estado semilatente.

Bermudagrass que esté creciendo activamente

Este producto puede ser usado para controlar total o parcialmente muchas malezas anuales y perennes para el mantenimiento eficaz de bermudagrass que esté creciendo activamente. Aplique de 13 a 38 onzas líquidas de este producto en 10 a 40 galones de solución de rocío por acre. Para tratar malezas anuales que tengan menos de 6 pulgadas de altura (o el largo de los tallos), use las proporciones más bajas. Use la proporción más alta a medida que las malezas aumenten de tamaño o cuando estén cerca de la floración o de la formación de semillas. Estas proporciones también controlan parcialmente las siguientes especies perennes:

Bahiagrass	Johnsongrass
Bluestem, silver	Trumpetcreeper
Fescue, tall	Vaseygrass

Este producto puede ser mezclado en tanque con el Outrider para el control o el control parcial de Sorghum halepense (Johnsongrass) y otras malezas indicadas en la etiqueta del Outrider. Use de 6.4 a 26 onzas líquidas de este producto con 0.75 a 1.33 onzas de Outrider. Utilice las proporciones más altas de ambos productos para el control de malezas perennes o anuales que tengan una altura superior a 6 pulgadas.
Este producto puede ser mezclado con Oust XP. Si se mezcla en tanques, no use más de 13 a 26 onzas líquidas de este producto con 1 a 2 onzas de Oust XP por acre. Para tratar malezas anuales listadas en este etiqueta y en las etiqueta de Oust XP, que tengan menos de 6 pulgadas de altura (o el largo de los tallos), use las proporciones más bajas de cada producto. Use la proporción más alta a medida que las malezas anuales aumenten de tamaño o cuando estén cerca de la floración o de la formación de semillas. Estas proporciones también controlan parcialmente las siguientes malezas perennes:

Bahiagrass	Fescue, tall
Bluestem, silver	Johnsongrass
Broomsedge	Poorjoe
Dallisgrass	Trumpetcreeper
Dock, curly	Vaseygrass
Dogfennel	Vervain, blue

Úselo solamente en bermudagrass que esté bien establecido. Como resultado del tratamiento, el bermudagrass puede sufrir deterioro, pero volverá a crecer si se riega. No se recomienda repetir el tratamiento con la mezcla de tanque en la misma estación, ya que esto puede ocasionar daños graves al bermudagrass.

Bahiagrass que esté creciendo activamente

Para la supresión del crecimiento vegetativo y la inhibición de la formación de semillas de bahiagrass durante aproximadamente 45 días, aplique 5 onzas líquidas de este producto en 10 a 40 galones de agua por acre. Aplique de 1 a 2 semanas después de reverdecer completo o después de cortar a una altura uniforme de 3 a 4 pulgadas. Esta aplicación debe ser hecha antes de la emergencia de las semillas.

Para la supresión durante un máximo de 120 días, aplique 3 onzas líquidas de este producto por acre, y a continuación una aplicación de 1.5 a 3 onzas líquidas por acre unos 45 días más tarde. No haga más de 2 aplicaciones al año.

Este producto se puede utilizar para el control o el control parcial de Sorghum halepense (Johnsongrass) y otras malezas indicadas en la etiqueta de Outrider, en bahiagrass en crecimiento activo. Aplique de 5 onzas de este producto con 0.75 a 2 onzas de Outrider por acre. Utilice sólo en bahiagrass bien establecido.

Se puede utilizar la mezcla de tanque de este producto con Oust XP. Aplique 5 onzas líquidas de este producto con 0.5 a 1 onzas de Oust XP por acre, 1 a 2 semanas después de la primera siega de la primavera. Haga solamente una aplicación al año.

8.12 Especie *Bromus* y Medusahead en pasturas y praderas

***Especies* Brimus:**

Este producto puede ser utilizado para tratar downy brome *(Bromus tectorum)*, Japanese brome *(Bromus japonicus)*, soft chess *(Bromus mollis)* y cheatgrass *(Bromus secalinus)* que se encuentran en lugares industriales, pasturas y praderas. Aplique por difusión, 6.5 a 13 onzas líquidas de este producto por acre.

Para obtener mejores resultados, el tratamiento debe coincidir con la emergencia temprana del epicótilo de las plantas más maduras. Demorar la aplicación hasta esta etapa del desarrollo maximizará la emergencia de otros brotes de malezas de pastos. Las aplicaciones se deben hacer todos los años sobre el mismo lugar hasta que se agoten los bancos de semilla y se puedan restablecer en el lugar los pastos perennes deseados.

Medusahead:

Para tratar medusahead, aplique 13 onzas líquidas de este producto por acre, tan pronto como las plantas se encuentren en desarrollo activo y antes de la etapa de 4 hojas. Las aplicaciones se pueden hacer en el otoño o en la primavera.

Las aplicaciones sobre brome y sobre medusahead se pueden hacer utilizando equipo terrestre o aéreo. Las aplicaciones aéreas para estos usos se pueden hacer utilizando equipos para aeronaves de ala fija o para helicóptero. Para aplicaciones aéreas, diluya en 2 a 10 galones de agua por acre. Para aplicaciones utilizando equipo terrestre, diluya en 10 a 20 galones de agua por acre. Cuando se aplica de acuerdo a las instrucciones de esta etiqueta, no hay restricciones al pastoreo.

8.13 Sitos de servicios públicos

Este producto puede ser utilizado junto a derechos de paso para alimentación eléctrica, conductos y teléfonos y en otros lugares asociados con estos derechos de paso, como subestaciones, bordes de carreteras, vías de ferrocarril o derechos de paso similares para servicios públicos.

Este producto puede ser utilizado en áreas de servicios públicos y subestaciones para el mantenimiento del suelo limpio de malezas, el recortado de bordes y el tratamiento localizado de vegetación no deseable, así como para eliminar las malezas no deseables que crecen en lechos de arbustos establecidos o plantaciones ornamentales. Este producto puede ser utilizado antes de plantar un área de servicios públicos con plantas ornamentales, flores y césped (panes de césped o semillas) o antes de comenzar un proyecto de construcción.

Pueden hacerse aplicaciones repetidas de este producto, a medida que emergen las malezas, para mantener el suelo limpio de malezas.

Este producto también puede ser utilizado para preparar o establecer zonas de reserva de vida silvestre dentro de estos sitios, manteniendo los caminos de acceso y para el recorte lateral a lo largo de los derechos de paso.

MEZCLAS DE TANQUE: Se pueden emplear mezclas de tanque con este producto para aumentar el espectro de control de malezas herbáceas, arbustos leñosos y árboles Este producto se puede mezclar en tanque con los siguientes productos, siempre que éstos estén aprobados para el área de uso deseada. Consulte las etiquetas de estos productos para informarse sobre las áreas de uso y las dosis de aplicación aprobadas. Lea y siga cuidadosamente las indicaciones y toda la información en las etiquetas de todos los herbicidas utilizados. Use conforme a las declaraciones preventivas más estrictas indicadas para cada producto en la mezcla.

El usuario es responsable de garantizar que en la etiqueta del producto utilizado en la mezcla estén permitidas las aplicaciones específicas cuando se realicen mezclas de tanque con un ingrediente activo genérico de los mencionados a continuación.

Arsenal	Krenite	Surflan AS
atrazine[1]	Krovar I DF	Surflan WDG
dicamba[1]	Oust	Telar DF
diuron[1]	Oust XP	Transline
Endurance	Outrider	Vanquish
Escort	pendimethalin[1]	Velpar DF
Escort XP	Plateau	Velpar L
Garlon 3A	Sahara DG	2,4-D[1]
Garlon 4[2]	simazine[1]	

[1] Pueden realizarse mezclas en tanque con productos que contienen este ingrediente activo genérico siempre y cuando dichos productos estén aprobados para su aplicación.

[2] Para tratamientos de recorte lateral, este producto puede ser utilizado solo o en una mezcla en tanque con Garlon 4.

8.14 Programa de conservación de reservas (CRP)

Este producto se puede utilizar para preparar tierras del programa CRP para la producción de cultivos. Consulte en las guías de uso Federales, estatales o locales las recomendaciones de renovación del programa CRP. Los cultivos no clasificados en esta etiqueta se pueden sembrar 30 días después de la aplicación.

Renovación (rotación de salida de programa CRP), preparación del sitio, control post-emergencia de malezas en pastos CRP latentes, aplicaciones con enjugador por encima

Se puede usar este producto para inhibir el crecimiento competitivo y la producción de semillas de vegetación no atractiva en tierras CRP. Las aplicaciones se pueden realizar utilizando aplicaciones de enjugado o como tratamiento de difusión o localizado en pastos CRP latentes. Para aplicaciones selectivas con equipo rociador de difusión, aplique 10 a 13 onzas líquidas de este producto por acre al comenzar la primavera antes de que los pastos CRP deseados, como crested y tall wheatgrass, comiencen la actividad e inicien el crecimiento vegetativo. Se pueden efectuar aplicaciones al finalizar el otoño después de que los pastos perennes llegaron al período de inactividad.

Se producirá cierta atrofia de los pastos CRP perennes si las aplicaciones de difusión se realizan cuando las plantas no están inactivas. No se necesita período de espera entre la aplicación y el pastoreo o para cosechar como alimento. No aplique más de 2.25 cuartos de este producto por acre, por año en tierras CRP.

8.15 Producción de semillas de pasto o tepes

Antes de sembrar, preemergencia, al momento de sembrar, renovación, eliminación de grupos de plantas establecidos, preparación del lugar

Este producto controla la mayoría de la vegetación existente antes de la renovación del césped o de establecer céspedes cultivados para semilla o tepes. Se puede utilizar para destruir restos de vegetación no deseada cuando los campos de producción se convierten para especies o cultivos alternativos. Realice las aplicaciones antes, durante o después de sembrar o para renovación. Para lograr máximo control de la vegetación existente, demore la siembra para determinar si se produce algún crecimiento de partes de plantas subterráneas que no fueron alcanzadas por el tratamiento. En lugares donde la vegetación existente esté creciendo y el césped esté bajo un programa de siega, aplique este producto después de omitir por lo menos un corte del césped para permitir un crecimiento suficiente a fin de que el rocío sea interceptado por las plantas. Para pastos de estación cálida, como bermudagrass, las aplicaciones en verano u otoño brindan el mejor control. Se pueden utilizar equipos de difusión para controlar restos de tepes o de otra vegetación no deseada después de cosechar los tepes. Se pueden aplicar proporciones de hasta 4 cuartos de este producto por acre para eliminar totalmente grupos de plantas establecidos de especies de pastos difíciles de eliminar.

No remueva la tierra ni las partes de la planta que estén bajo tierra antes del tratamiento. La labranza o las técnicas de renovación como corte vertical, perforación o rebanado deben esperar 7 días después de la aplicación a fin de permitir la absorción adecuada en las partes de la planta que estén bajo tierra. Si las proporciones de aplicación equivalen a 2.25 cuartos o menos por acre, no se requiere período de espera entre el tratamiento y la utilización como alimento o pastoreo del ganado Si la proporción es mayor a 2.25 cuartos de galón por acre, retire el ganado doméstico antes de aplicar y espere 8 semanas después de haber efectuado la aplicación para utilizar para pastoreo o para cosechar. Para todos los cultivos no indicados en esta etiqueta, las aplicaciones se deben realizar al menos 30 días antes de sembrar. Las aplicaciones deben efectuarse antes de la emergencia del cultivo para evitar daños.

Rociadores con pantalla

Aplique 26 onzas líquidas a 2.4 cuartos de este producto en 10 a 20 galones de agua por acre para controlar las malezas entre las hileras de semilla para pasto. La siembra uniforme en hileras rectas facilita las aplicaciones con rociador con pantalla. Se obtienen los mejores resultados cuando el cultivo de semilla de pasto es suficientemente pequeño como para pasar con facilidad por las pantallas protectoras.

Cualquier tipo de contacto de este producto con vegetación que no se desea incluir en el tratamiento podría causar daño. Este daño es responsabilidad exclusiva de la persona encargada de la aplicación del producto.

Aplicaciones con enjugador por la parte superior

Los aplicadores se deben ajustar de manera que el punto de contacto del enjugador esté al menos 2 pulgadas por encima de la vegetación deseable. Las malezas deben estar por lo menos 6 pulgadas por encima de la vegetación deseable. Se obtienen mejores resultados cuando una mayor cantidad de la maleza está expuesta a la solución de herbicida. Las malezas que no entren en contacto con la solución de herbicida no serán afectadas. Esto puede ocurrir en lugares donde las malezas están muy concentradas, cuando la infestación es grave o donde la altura de las malezas es variada, lo que no permite que todas entren en contacto con el herbicida. En esos casos, puede ser necesario repetir el tratamiento. El contacto de la solución de herbicida con vegetación deseable puede provocar daño o destrucción.

Tratamiento localizado

Aplique una solución del 1.0 al 1.6 por ciento. Aplique este producto antes del despunte de los pastos cultivados para semilla. Los cultivos que reciban el rocío en el área tratada morirán. Intente evitar el escurrimiento o rocío fuera del área que no sea el objetivo por la misma razón. También se pueden utilizar equipos de mano para controlar restos de tepes o de otra vegetación no deseada después de cosechar los tepes.

Creación de hileras en ryegrass anual

Utilice 13 a 26 onzas líquidas de este producto por acre. Use proporciones superiores cuando el ryegrass tiene una altura de más de 6 pulgadas. Se obtienen los mejores resultados cuando las aplicaciones se realizan antes de que las plantas de ryegrass alcancen 6 pulgadas de alto.

Configure las alturas de las boquillas de modo de permitir el espacio entre hileras deseado y al mismo tiempo evitar que gotas, nieblas o deriva del rocío entre en contacto con las plantas de ryegrass no tratado. Se recomienda utilizar boquillas de baja presión o boquillas de goteo diseñadas para concentrar la aplicación en una franja estrecha.

El cultivador asume toda la responsabilidad por la pérdida de cultivos a causa de la aplicación indebida de este producto.

8.16 Pasturas

CULTIVOS CLASIFICADOS: Todos los pastos (familia de las gramíneas), incluidos bahiagrass, Bermudagrass, Bluegrass, Brome, Fescue, Guineagrass, Kikuyugrass, Orchardgrass, Pangola grass, Ryegrass, Timothy, Wheatgrasses

TIPOS DE APLICACIONES: Tratamiento localizado, aplicaciones con enjuagador por encima, antes de la siembra, preemergencia, renovación de pasturas, de difusión postemergente.

Antes de sembrar, preemergencia, renovación de pasturas

Este producto se puede aplicar para controlar malezas antes de sembrar o de que emerjan pastos forrajeros, incluidos Bahiagrass, Bermudagrass, Bluegrass, Bromus, Fescue, Guineagrass, Kikuyugrass, Orchardgrass, Pangola grass, Ryegrass, Timothy, Wheatgrass.

Además, este producto se puede utilizar para controlar especies de pasturas perennes indicadas en esta etiqueta antes de resembrar.

Si las proporciones de aplicación totales equivalen a 2.25 cuartos de este producto o menos por acre, no se requiere período de espera entre el tratamiento y la utilización como alimento opastoreo del ganado. Si la proporción es mayor a 2.25 cuartos de galón por acre, retire el ganado doméstico antes de aplicar y espere 8 semanas después de haber efectuado la aplicación para utilizarpara pastoreo.

Tratamiento localizado, aplicaciones de enjugado por encima

Se puede aplicar este producto como tratamiento localizado o con aplicadores con enjugador en pasturas. Se pueden hacer aplicaciones en la misma área con intervalos de 30 días.

Para tratamientos localizados o métodos de aplicación de enjugado en los que se utilicen dosis de 2.25 cuartos por acre o menos, se puede tratar todo el campo o una parte. Cuando se realicen tratamientos localizados o con aplicadores con enjugador utilizando dosis superiores a los 2.25 cuartos por acre, no se podrá tratar más de 10 por ciento del total de la pastura por vez. Para lograr el mejor desempeño, retire los animales domésticos antes de la aplicación y espere 7 días después de la aplicación antes de permitir el pastoreo del ganado o cosechar.

Control de malezas postemergentes (tratamiento de difusión)

Este producto se puede aplicar a para inhibir el crecimiento competitivo y la producción de semillas de malezas anuales y vegetación no deseable. Para aplicaciones selectivas con equipo rociador de difusión, aplique 10 a 13 onzas líquidas de este producto por acre al comenzar la primavera antes de que los pastos perennes deseables comiencen la actividad e inicien el crecimiento vegetativo. Se pueden efectuar aplicaciones al finalizar el otoño después de que los pastos perennes llegaron al período de inactividad.

Se producirá cierta atrofia de los pastos perennes si las aplicaciones de difusión se realizan cuando las plantas están activas. No se necesita período de espera entre la aplicación y el pastoreo o para cosechar como alimento. No aplique más de 2.25 cuartos por acre por año en pastos de pastura, excepto en el caso de las renovaciones detalladas antes en esta sección. Si debe resembrar debido a una severa reducción en el grupo de plantas, espere 30 días después de la aplicación para sembrar cualquier cultivo que no esté indicado en esta etiqueta.

9.0 TIPOS DE MALEZAS CONTROLADAS

Use siempre la proporción más alta de este producto por acre, dentro de las proporciones recomendadas, cuando las malezas son densas o cuando crecen en un área no tocada (no cultivada).

Puede haber una disminución de los resultados cuando se traten malezas cubiertas con mucho polvo. Para las malezas que han sido segadas, pastadas o cortadas, permita que vuelvan a crecer antes del tratamiento.

Vea las secciones siguientes para las proporciones recomendadas para el control de malezas, matorrales leñosos y árboles anuales y perennes. Para las malezas, matorrales leñosos y árboles difíciles de controlar, donde las plantas crecen en condiciones de estrés, o donde la infestación es densa, pueden usarse 4 a 8 cuartos de galón por acre de este producto para obtener mejores resultados.

9.1 Malezas anuales

Use 26 onzas fluidas por acre si las malezas tienen menos de 6 pulgadas de altura o largo de los tallos y 1.2 a 3.2 cuartos de galón por acre si las malezas tienen más de 6 pulgadas de altura o largo de los tallos o cuando las malezas crecen en condiciones de estrés. Use la dosis más alta para las especies más difíciles de controlar, sin importar el tamaño de la maleza en el momento de la aplicación. Trate las malezas difíciles de controlar temprano, cuando son relativamente pequeñas. Este producto puede usarse en mezclas de tanque siempre que el producto específico de la mezcla de tanque esté registrado para uso en el lugar. Consulte las etiquetas de estos productos para informarse sobre las áreas de uso y las dosis de aplicación aprobadas. Lea y siga cuidadosamente las indicaciones y toda la información en las etiquetas de todos los herbicidas utilizados. Utilice conforme con las declaraciones preventivas más restrictivas de cada producto en la mezcla.

Para aplicaciones de rocío para mojar, aplique una solución de 0.4 por ciento de este producto a las malezas que tengan menos de 6 pulgadas de altura o largo de los tallos. Haga la aplicación antes de la formación de semillas para el pasto, o la formación de yemas para las malezas de hoja ancha. Para las malezas anuales que tienen más de 6 pulgadas de altura o las malezas más pequeñas que crecen en condiciones de estrés, use una solución del 0.8 al 1.6 por ciento. Use la dosis más alta para las especies difíciles de controlar o las malezas de más de 24 pulgadas de altura.

Especies de malezas	
Anoda, spurred	Carolina geranium
Barley*	Castor bean
Barnyardgrass*	Cheatgrass*
Bittercress*	Cheeseweed (*Malva parviflora*)
Black nightshade*	Chervil*
Bluegrass, annual*	Chickweed*
Bluegrass, bulbous*	Cocklebur*
Bassia, fivehook	Copperleaf, hophornbeam
Brome, downy*	Corn*
Brome, Japanese*	Corn speedwell*
Browntop panicum*	Crabgrass*
Buttercup*	Dwarfdandelion*
Carolina foxtail*	Eastern mannagrass*

Eclipta*
Fall panicum*
Falsedandelion*
Falseflax, smallseed*
Fiddleneck
Field pennycress*
Filaree
Fleabane, annual*
Fleabane, hairy (*Conyza bonariensis*)*
Fleabane, rough*
Florida pusley
Foxtail*
Goatgrass, jointed*
Goosegrass
Grain sorghum (milo)*
Groundsel, common*
Hemp sesbania
Henbit
Horseweed/Marestail (*Conyza canadensis*)
Itchgrass*
Johnsongrass, seedling
Junglerice
Knotweed
Kochia
Lamb's-quarters*
Little barley*
London rocket*
Mayweed
Medusahead*
Morningglory (*Ipomoea spp.*)
Mustard, blue*
Mustard, tansy*
Mustard, tumble*
Mustard, wild*
Oats
Pigweed*
Plains/Tickseed coreopsis*
Prickly lettuce*
Puncturevine
Purslane, common
Ragweed, common*
Ragweed, giant
Red rice
Russian thistle
Rye*
Ryegrass*
Sandbur, field*
Shattercane*
Shepherd's-purse*
Sicklepod
Signalgrass, broadleaf*
Smartweed, ladysthumb*
Smartweed, Pennsylvania*
Sowthistle, annual
Spanishneedles
Speedwell, purslane*
Sprangletop*
Spurge, annual
Spurge, prostrate*
Spurge, spotted*
Spurry, umbrella*
Starthistle, yellow
Stinkgrass*
Sunflower*
Teaweed/Prickly sida
Texas panicum*
Velvetleaf
Virginia copperleaf
Virginia pepperweed*
Wheat*
Wild oats*
Witchgrass*
Woolly cupgrass*
Yellow rocket

*Cuando use equipos de aplicación diseminada a nivel del terreno (aplicaciones aéreas o rociadores con brazos con boquillas tipo abanico plano), estas especies serán controladas o controladas parcialmente usando 13 onzas líquidas de este producto por acre. Las aplicaciones deben hacerse usando de 3 a 10 galones de volumen de la sustancia vehicular por acre. Use boquillas que garanticen una cobertura completa del follaje y haga el tratamiento cuando las malezas estén en su etapa temprana de crecimiento.

9.2 Malezas perennes

Los mejores resultados se obtienen cuando las malezas perennes son tratadas una vez que han alcanzado la etapa reproductiva de su crecimiento (inicio de las semillas para pastos y formación de yemas para malezas de hoja ancha). Para las plantas sin flores, los mejores resultados se obtienen cuando las plantas alcanzan el estado de madurez. En muchos casos, se requiere el tratamiento antes de estas etapas del crecimiento. En estos casos, use la proporción más alta dentro de las proporciones recomendadas.

Asegúrese de que la cobertura sea a fondo cuando emplee tratamientos de rocío para mojar con equipo de mano. Cuando se utilice equipo manual para tratamientos puntuales localizados de bajo volumen, aplique una solución de 4 al 8 por ciento de este producto.

Espere 7 días o más después de la aplicación antes de labrar.

Especies de malezas	Proporción (cuartos por acre)	% de solución de mano
Alfalfa*	0.8	1.6
Alligatorweed*	3.2	1.2
Anise (fennel)	1.6 - 3.2	0.8 - 1.6
Bahiagrass	2.4 - 4	1.6
Beachgrass, European (*Ammophila arenaria*)	–	4
Bentgrass*	1.2	1.6
Bermudagrass	4	1.6
Bermudagrass, water (knotgrass)	1.2	1.6
Bindweed, field	3.2 - 4	1.6
Bluegrass, Kentucky	1.6	1.6
Blueweed, Texas	3.2 - 4	1.6
Brackenfern	2.4 - 3.2	0.8 - 1.2
Bromegrass, smooth	1.6	1.6
Bursage, woolly-leaf	–	1.6
Canarygrass, reed	1.6 - 2.4	1.6
Cattail	2.4 - 4	1.6
Clover; red, white	2.4 - 4	1.6
Cogongrass	2.4 - 4	1.6
Dallisgrass	2.4 - 4	1.6
Dandelion	2.4 - 4	1.6
Dock, curly	2.4 - 4	1.6
Dogbane, hemp	3.2	1.6
Fescue (except tall)	2.4 - 4	1.6
Fescue, tall	0.8 - 2.4	1.6
German ivy	1.6 - 3.2	0.8 - 1.6
Guineagrass	2.4	0.8
Horsenettle	2.4 - 4	1.6
Horseradish	3.2	1.6
Iceplant	1.6	1.2 - 1.6
Jerusalem artichoke	2.4 - 4	1.6
Johnsongrass	1.6 - 2.4	0.8
Kikuyugrass	1.6 - 2.4	1.6
Knapweed	3.2	1.6
Lantana	–	0.8 - 1
Lespedeza	2.4 - 4	1.6
Milkweed, common	2.4	1.6
Muhly, wirestem	1.6	1.6
Mullein, common	2.4 - 4	1.6
Napiergrass	2.4 - 4	1.6
Nightshade, silverleaf	1.6	1.6
Nutsedge; purple, yellow	2.4	0.8 - 1.6
Orchardgrass	1.6	1.6
Pampasgrass	2.4 - 4	1.2 - 1.6
Paragrass	2.4 - 4	1.6
Pepperweed, perennial	3.2	1.6
Phragmites*	2.4 - 4	0.8 - 1.6
Poison hemlock	1.6 - 3.2	0.8 - 1.6
Quackgrass	1.6 - 2.4	1.6
Redvine*	1.6	1.6
Reed, giant	3.2 - 4	1.6
Ryegrass, perennial	1.6 - 2.4	0.8
Smartweed, swamp	2.4 - 4	1.6
Spurge, leafy*	–	1.6
Sweet potato, wild*	–	1.6
Thistle, artichoke	1.6 - 2.4	0.8 - 1.6
Thistle, Canada	1.6 - 2.4	1.6
Timothy	1.6 - 2.4	1.6
Torpedograss*	3.2 - 4	1.6
Trumpetcreeper*	1.6 - 2.4	1.6
Vaseygrass	2.4 - 4	1.6
Velvetgrass	2.4 - 4	1.6
Wheatgrass, western	1.6 - 2.4	1.6

*Control parcial

9.3 Matorrales leñosos y árboles

Aplique este producto después de la expansión completa de las hojas, a menos que se indique lo contrario. Utilice una proporción mayor para plantas más grandes y/o zonas de crecimiento más densas. En enredaderas, utilice la proporción máxima para plantas que han alcanzado la etapa de crecimiento leñoso. Se obtienen los mejores resultados cuando la aplicación se realiza entre el final del verano y el otoño, después de la formación de frutos.

En zonas áridas, se obtienen los mejores resultados cuando las aplicaciones se realizan entre primavera y comienzos de verano, cuando las especies de malezas tienen gran contenido de humedad y están en floración.

Cuando haga tratamientos de rocío para mojar con equipos de mano, asegúrese de que la cobertura sea total. Cuando use equipos de mano para tratamientos localizados con rociado dirigido de poco volumen, aplique una solución del 4 al 8 por ciento de este producto.

Es posible que los síntomas no aparezcan antes de las heladas o del envejecimiento con tratamientos de otoño.

Para labrar, segar o eliminar, deje transcurrir un lapso de 7 o más días después de haber aplicado el producto. Tal vez sea necesario repetir el tratamiento para controlar plantas que se regeneran de partes subterráneas o semillas. Se aceptan algunos colores otoñales en especies de hoja caduca no atractivas siempre y cuando no se haya producido una importante caída de las hojas. El rendimiento será inferior si se realizan tratamientos en otoño, después de una helada.

Especie de maleza	Proporción por difusión (cuarto de galón por acre)	% de solución de mano de rocío para mojar
Alder	2.4 - 3.2	0.8 - 1.2
Ash*	1.6 - 4	0.8 - 1.6
Aspen, quaking	1.6 - 2.4	0.8 - 1.2
Bearclover (Bearmat)*	1.6 - 4	0.8 - 1.6
Beech*	1.6 - 4	0.8 - 1.6
Birch	1.6	0.8
Blackberry	2.4 - 3.2	0.8 - 1.2
Blackgum	1.6 - 4	0.8 - 1.6
Bracken	1.6 - 4	0.8 - 1.6
Broom; French, Scotch	1.6 - 4	1.2 - 1.6
Buckwheat, California*	1.6 - 3.2	0.8 - 1.6
Cascara*	1.6 - 4	0.8 - 1.6

Especie de maleza	Proporción por difusión (cuarto de galón por acre)	% de solución de mano de rocío para mojar
Catsclaw*	–	0.8 - 1.2
Ceanothus*	1.6 - 4	0.8 - 1.6
Chamise*	1.6 - 4	0.8
Cherry; bitter, black, pin	1.6 - 2.4	0.8 - 1.2
Coyote brush	2.4 - 3.2	1.2 - 1.6
Deerweed	1.6 - 4	0.8
Dogwood*	1.6 - 4	0.8 - 1.6
Elderberry	1.6	0.8
Elm*	1.6 - 4	0.8 - 1.6
Eucalyptus	–	1.6
Gorse*	1.6 - 4	0.8 - 1.6
Hasardia*	1.6 - 3.2	0.8 - 1.6
Hawthorn	1.6 - 2.4	0.8 - 1.2
Hazel	1.6	0.8
Hickory*	1.6 - 4	0.8 - 1.6
Honeysuckle	2.4 - 3.2	0.8 - 1.2
Hornbeam, American*	1.6 - 4	0.8 - 1.6
Kudzu (Pueraria lobata)	3.2	1.6
Locust, black*	1.6 - 3.2	0.8 - 1.6
Madrone resprouts* (rebrotes)	–	1.6
Manzanita*	1.6 - 4	0.8 - 1.6
Maple, red (Arce, rojo)	1.6 - 3.2	0.8 - 1.2
Maple, sugar (Acer saccharum)	–	0.8 - 1.2
Monkey flower*	1.6 - 3.2	0.8 - 1.6
Oak; black, white*	1.6 - 3.2	0.8 - 1.6
Oak, post	2.4 - 3.2	0.8 - 1.2
Oak; northern, pin	1.6 - 3.2	0.8 - 1.2
Oak, scrub*	1.6 - 3.2	0.8 - 1.2
Oak; southern red	1.6 - 2.4	0.8 - 1.2
Peppertree, Brazilian (Florida holly)*	1.6 - 4	0.8 - 1.6
Persimmon*	1.6 - 4	0.8 - 1.6
Pine	1.6 - 4	0.8 - 1.6
Poison ivy	3.2 - 4	1.6
Poison oak	3.2 - 4	1.6
Poplar, yellow*	1.6 - 4	0.8 - 1.6
Redbud, eastern	1.6 - 4	0.8 - 1.6
Rose, multiflora	1.6	0.8
Russian olive*	1.6 - 4	0.8 - 1.6
Sage, black	1.6 - 3.2	0.8
Sage, white*	1.6 - 3.2	0.8 - 1.6
Sage brush, California	1.6 - 3.2	0.8
Salmonberry	1.6	0.8
Saltcedar*	1.6 - 4	0.8 - 1.6
Sassafras*	1.6 - 4	0.8 - 1.6
Sourwood*	1.6 - 4	0.8 - 1.6
Sumac; laurel, poison, smooth, sugarbush, winged*	1.6 - 3.2	0.8 - 1.6
Sweetgum	1.6 - 2.4	0.8 - 1.2
Swordfern*	1.6 - 4	0.8 - 1.6
Tallowtree, Chinese	–	0.8
Tan oak resprouts*	–	1.6
Thimbleberry	1.6	0.8
Tobacco, tree*	1.6 - 3.2	0.8 - 1.6
Toyon*	–	1.6
Trumpetcreeper	1.6 - 2.4	0.8 - 1.2
Vine maple*	1.6 - 4	0.8 - 1.6
Virginia creeper	1.6 - 4	0.8 - 1.6
Waxmyrtle, southern*	1.6 - 4	0.8 - 1.6
Willow	2.4	0.8
Yerba Santa*	–	1.6

*Control parcial

10.0 LIMITES EN LA GARANTÍA Y EN LA RESPONSABILIDAD

Monsanto Compañía garantiza que este producto concuerda con la descripción química de la etiqueta y es razonablemente adecuado para los propósitos descritos en el libreto titulado Instrucciones Completas para el Uso ("Instrucciones") cuando se usa de acuerdo con dichas Instrucciones y las condiciones que allí se detallan. NO SE HACE NINGUNA OTRA GARANTÍA EXPRESA O IMPLÍCITA ACERCA DE LA IDONEIDAD PARA UN USO PARTICULAR O COMERCIABILIDAD. Esta garantía está sujeta también a las condiciones y limitaciones que aquí se indican.

El comprador y todos los usuarios deberán reportar con prontitud a esta Compañía acerca de cualquier reclamo que se base en un contrato, negligencia, estricta responsabilidad, o otros actos ilícitos.

Hasta el grado máximo permitido por la ley, el comprador y todos los usuarios son responsables por todas las pérdidas o daños que resultasen por el uso o manipulación en condiciones que estén más allá del control de esta Compañía, incluyendo pero no limitándose a: incompatibilidad con productos que no sean los señalados en las Instrucciones, aplicación o contacto con vegetación que no se quiera destruir, condiciones climáticas inusuales, condiciones de clima que estén fuera de los límites que se consideran normales en el lugar de la aplicación y para el período de tiempo en el cual se aplica, así como condiciones de clima que estén fuera de los límites indicados en las Instrucciones, aplicaciones que no estén explícitamente aconsejadas en las Instrucciones, condiciones de humedad que estén fuera de los límites establecidos en las Instrucciones, o la presencia de productos en la tierra o sobre ella, en las plantas o en la vegetación que se está tratando, diferentes a los indicados en las Instrucciones.

Esta Compañía no garantiza ninguno de los productos reformulados o reempacados de este producto, excepto de acuerdo a los requisitos de la administración de esta Compañía y con el permiso escrito expreso de esta Compañía.

SEGÚN LO ESTABLECIDO EN LA LEY VIGENTE, LA ÚNICA Y EXCLUSIVA COMPENSACIÓN AL USUARIO O COMPRADOR Y EL LIMITE DE RESPONSABILIDAD DE ESTA COMPAÑÍA O DE CUALQUIER OTRO VENDEDOR POR CUALQUIER PERDIDA O POR TODAS LAS PERDIDAS, PERJUICIOS O DAÑOS QUE RESULTASEN DEL USO O MANEJO DE ESTE PRODUCTO (INCLUYENDO RECLAMOS QUE SE BASEN EN UN CONTRATO, NEGLIGENCIA, ESTRICTA RESPONSABILIDAD Y OTROS ACTOS ILÍCITOS) SERÁ EL PRECIO PAGADO POR EL USUARIO O EL COMPRADOR POR LA CANTIDAD INVOLUCRADA DE ESTE PRODUCTO, O A ELECCIÓN DE ESTA COMPAÑÍA O DE OTRO VENDEDOR, EL REEMPLAZO DE DICHA CANTIDAD, O SI NO SE OBTUVO MEDIANTE COMPRA SE REEMPLAZARA DICHA CANTIDAD DEL PRODUCTO. EN NINGÚN CASO ESTA COMPAÑÍA U OTRO VENDEDOR SERÁN RESPONSABLES POR DAÑOS INCIDENTALES, CONSECUENTES O ESPECIALES.

En el momento de abrir y usar el producto, se asume que el comprador y todos los usuarios han aceptado las condiciones de los LIMITES EN LA GARANTÍA Y EN LA RESPONSABILIDAD que no pueden variar por medio de ningún acuerdo verbal o escrito. Si las condiciones son inaceptables, devuelva el producto inmediatamente sin abrir el recipiente.

Outrider, PROformance, Roundup PRO, y Monsanto y el símbolo de la enredadera es una marca comercial de la empresa Monsanto Technology LLC.

Todas las otras marcas registradas son la propiedad de sus dueños respectivos.

Este producto está protegido por la patente de los Estados Unidos Nos 4,405,531. No se han otorgado licencias bajo ninguna patente que no sea de los Estados Unidos.

EPA Reg. No. 524-529

En caso de que se presente una emergencia relacionada con este producto, llame por cobrar a cualquier hora del día o de la noche, al teléfono (314) 694-4000.

MONSANTO®

Empacado Para:
MONSANTO COMPANY
800 N. LINDBERGH BLVD.
ST. LOUIS, MISSOURI, 63167 U.S.A.
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070109

SAFETY DATA SHEET

Section 1: Identification

Product identifier: **FirstStrike® Soft Bait**
Other identifier(s): EPA Registration Number 7173-258
Uses or restrictions: Rodenticide with difethialone

Manufacturer: Liphatech, Inc.
3600 W. Elm Street, Milwaukee, WI 53209
Emergency phone: 800-351-1476 Monday - Friday 8:00 am - 4:30 pm (US Central time zone)
After hours: Call CHEMTREC at 1-800-424-9300

Section 2: Hazard Identification

Hazard class: Specific Target Organ Toxicity (Single exposure), Category 2; Specific Target Organ Toxicity (Repeated exposure), Category 2

Warning: May cause damage to blood and reduce the clotting ability of blood if swallowed, inhaled or absorbed through skin. Do not breathe dust. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. If exposed or if you feel unwell, call a poison control center or doctor. Dispose of container and contents according to instructions on product label. Store locked up.

Section 3: Composition / Information on Ingredients

Hazardous ingredients:
Difethialone (CAS registry no. 104653-34-1) 0.0025%

Section 4: First Aid Measures

Emergency overview: This material may reduce the clotting ability of the blood and cause bleeding. Symptoms of toxicity include lethargy, loss of appetite, reduced clotting ability of blood, and bleeding. Have the product label with you when obtaining treatment advice.

If swallowed: Call a poison control center or doctor. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor.

If inhaled: Move person to fresh air. If person is not breathing, call an ambulance, then give artificial respiration and call poison control or doctor.

If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor.

If on skin or clothing: Take off contaminated clothing. Rinse skin with plenty of cool water for 15-20 minutes. Call a poison control center or doctor.

Note to Physician or Veterinarian: Contains anticoagulant ingredient. For humans or animals ingesting bait and/or showing obvious poisoning symptoms (bleeding or prolonged prothrombin times), give Vitamin K_1 intramuscularly or orally. In severe cases, blood transfusions may be needed.

Section 5: Fire-fighting Measures

Extinguishing media: Use media suitable for the surrounding fire
Specific fire or explosion hazards: None known
Special cautions for firefighters: Wear self-contained breathing apparatus (full facepiece) & full protective clothing. Contain runoff to prevent pollution.

Section 6: Accidental Release Measures

Precautions, PPE and Procedures: Wearing PPE as specified in Section 8, isolate and contain spill. Limit access to spill area to necessary personnel. Do not allow spilled material to enter sewers, streams or other waters.
Methods and materials: Scoop up spilled material and place in a closed, labeled container for use according to label instructions or disposal.

Section 7: Handling and Storage

Precautions for safe handling: Read the entire product label before using this rodenticide. **Conditions for safe storage:** Store in original container in a cool, dry area out of reach of children, pets and domestic animals. Do not contaminate water, food or feed. Keep container tightly closed. Do not remove or destroy the product label.

Section 8: Exposure Controls / Personal Protection

Established exposure limits: Not applicable
Appropriate engineering controls: Special ventilation is not required for the normal handling and use of this product when following label instructions.
Individual protection measures: Wear long pants, shoes, socks and waterproof gloves when handling this product. Follow manufacturer's instructions for cleaning/maintaining PPE, or else wash with detergent and hot water. Keep and wash PPE separately from other laundry. Remove PPE immediately after handling this product. Wash the outside of gloves before removing. Wash hands thoroughly after applying bait and before eating, drinking, chewing gum, using tobacco or using the toilet, and change into clean clothing.

Section 9: Physical and Chemical Properties

Appearance: Soft paste, blue color, raw grain odor. Odor threshold not determined.

Water solubility: Negligible	**pH:** Not applicable
Relative density: 1.11 g/cc	**Viscosity:** Not applicable
% Volatile (volume): Not applicable	**Evaporation rate:** Not applicable
Vapor density: Not applicable	**Vapor pressure:** Not applicable
Boiling point: Not determined	**Freezing point:** Not applicable
Flash point (ASTM D92): >150 °C	**Autoignition temp.:** Not determined
Flammability: Not a flammable solid	**Decomposition temp.:** Not determined

Explosive limits - Lower limit: Not applicable; Upper limit: Not applicable
Partition coefficient (n-octanol/water): Not applicable

Section 10: Stability and Reactivity

Reactivity: Not reactive, not sensitive to shock or static discharge

Chemical stability: Stable	**Hazardous reactions:** None
Incompatible materials: None	**Conditions to avoid:** None

Hazardous decomposition products: Oxides of carbon

Section 11: Toxicological Information

Likely routes of exposure: Ingestion, skin absorption.
Symptoms of toxicity: Lethargy, loss of appetite, reduced clotting ability of blood, and bleeding.

Eye effects/eye irritation:	Mild, transient irritant
Acute oral effects:	LD_{50} (oral-rat): >5000 mg/kg
Acute inhalation effects:	LC_{50} (rat, 4 hour): 200 mg/L (extrapolated)
Acute dermal effects:	LD_{50} (dermal-rabbit): >2000 mg/kg
Skin irritation:	Non-irritating
Skin sensitization:	Not a skin sensitizer
Carcinogenicity:	No ingredient listed by NTP, IARC or OSHA

Section 12: Ecological Information

This product is extremely toxic to birds and mammals. Do not apply this product directly to water, where surface water is present or to intertidal areas below the mean high water mark. Carefully follow label cautions and directions to reduce hazards to children, pets and non-target wildlife.

Section 13: Disposal Considerations

Disposal: Wastes resulting from the use of this product according to the label instructions must be disposed of as specified on the product label.
RCRA waste status: This product is not regulated as a hazardous waste under Federal law. State and local regulation may affect the disposal of this product. Consult your state or local environmental agency for disposal of waste generated other than by use according to label instructions.

Section 14: Transport Information

Transportation data (49 CFR): This product is not regulated as a hazardous material for all modes of transportation within the U.S.
Hazard Class, Packing Group and UN ID No.: Not applicable

Section 15: Regulatory Information

TSCA: All components of this product are listed on the TSCA inventory.
SARA section 313: Contains no reportable components.
CA Proposition 65: Contains no substances subject to Prop 65 requirements.
FIFRA: This product is registered as a pesticide with the U.S. Environmental Protection Agency. The label requirements under Federal pesticide law differ from the classification criteria and hazard information required by OSHA on this Safety Data Sheet. Read and follow all cautions, directions and use restrictions on the product label on the container.

Section 16: Other Information

Prepared by: T. Schmit **Date:** 1 July 2016

This Safety Data Sheet is believed to be accurate at time of publication. No warranty, expressed or implied, is made with regard to this information. This information may not be adequate for every application, and the user must determine the suitability of this information due to the manner or conditions of use or storage, or local regulation.

Appendix F
BIOLOGIST QUALIFICATIONS FOR COVERED SPECIES

In order to implement the avoidance, minimization, and mitigation measures outlined in this MSHCP, biologists in the role of Project Biologist or biological monitor may be required to conduct protocol and preconstruction surveys, construction monitoring, handling, and/or relocation activities for the 41 Covered Species (see Chapter 6.0, *Conservation Program*). SoCalGas shall request USFWS approval of biologists wishing to conduct these activities pursuant to this MSHCP. Such requests shall be in writing, and the Ventura Fish and Wildlife Office must receive the request at least 15 days prior to any such activities, with the exception of emergency activities that may require expedited notification. USFWS approval is contingent upon the biologists meeting minimum qualification requirements for different activities with each Covered Species, such as a certain level of experience and possession of the applicable state or federal permit.[567] For the purposes of this MSHCP, biologists that meet these requirements include the following:

- **Project Biologist**—A biologist appointed by the MSHCP Administrator, subject to the approval of USFWS, to oversee and ensure compliance for a specific Covered Activity. A Project Biologist is responsible for supervising and training biological monitors; ensuring the implementation of SoCalGas SOPs and all general, habitat, and species-specific AMMs outlined in this chapter that are applicable to the Covered Activity; and fulfilling all reporting requirements for the Covered Activity. A Project Biologist has sufficient educational background, training, and experience working with a specific Covered Species that is approved by USFWS to survey, monitor, handle, and/or relocate the species out of harm's way as needed. The requirements to be approved as a Project Biologist vary per the Covered Species, as well as the activities a Project Biologist may conduct.

- **Permitted Biologist**—A biologist that possesses a recovery permit pursuant to Section 10(a)(1)(B) of the ESA and/or a State Memorandum of Understanding (MOU) or Plant Voucher Collecting Permit that authorizes activities such as surveying, monitoring, handling, and/or relocation of specific Covered Species. These permits are issued by USFWS and/or CDFW, depending on the species. Because minimum qualifications are required for an individual to obtain a species-specific recovery permit,[568] a permitted biologist is anticipated to also fulfill the requirements of a qualified biologist for a particular species. A permitted biologist may supervise activities conducted by a qualified biologist.

- **Biological Monitor**—A biologist trained to identify all Covered Species with the potential to occur in the vicinity of a Covered Activity, and to follow all general, habitat, and species-specific AMMs outlined in this chapter, as well as SoCalGas SOPs. Species specific AMMs may require an approved Project Biologist, in which they cannot be carried out by a

[567] U.S. Fish and Wildlife Service, Pacific Southwest Region. Updated 2018 January 9. Minimum Qualifications, Acquiring Experience, Practical Exams and Protocols. Available at: https://www.fws.gov/cno/es/minqual.html

[568] U.S. Fish and Wildlife Service, Pacific Southwest Region. Updated 2018 January 9. Minimum Qualifications, Acquiring Experience, Practical Exams and Protocols. Available at: https://www.fws.gov/cno/es/minqual.html

biological monitor alone. Biological monitors shall implement all applicable AMMs and SOPs for the Covered Activity, and report to the Project Biologist.

- **Qualified Biologist**—A biologist with sufficient educational background, training, and field experience working with a specific Covered Species including avian species protected by the MBTA in order to be approved by USFWS and/or CDFW to survey, monitor, handle, establish avoidance buffers, and/or relocate the species out of harm's way. The requirements to be approved as a qualified biologist vary per Covered Species, as well as the activities a qualified biologist may conduct. Certain activities for specific Covered Species may only be conducted by a permitted biologist (see below). Qualified biologists may conduct some activities under the supervision of a permitted biologist (see below).

The type of biologist required to conduct surveying, monitoring, handling, and/or relocating activities with each Covered Species are listed in Table F-1, *Biologist Qualifications for Covered Species*. The terms adopted for this MSHCP, Project Biologist and Biological Monitor, are identified in Table F-1 as Permitted and Qualified, respectively. In the Conservation Program, Species-Specific Measures were developed for 32 of the 41 Covered Species (see Chapter 6.0). Specific qualifications and/or permits are required to conduct biological activities for these species. General qualifications and/or permits are required to conduct surveys for the remaining 14 species.

Before conducting surveys for Covered Species whose protocols have not yet been developed, a qualified biologist shall contact USFWS and/or CDFW regarding the appropriate survey methods. Regardless of whether or not protocols have been developed for them, all species listed as endangered or threatened pursuant to the ESA require a recovery permit to handle or relocate.[569] Species listed as rare, threatened, endangered, or candidate pursuant to the CESA, as well as SSCs, require an MOU to handle or relocate.[570] For species that are both federally and state listed, this MSHCP defers to the federal requirements; however, coordination with CDFW should take place regarding biologist approval prior to conducting surveying, monitoring, handling, and/or relocation activities. Fully Protected species are not included as Covered Species in this MSHCP (see Chapter 3.0, *Covered Species*). For some Covered Species, with the implementation of avoidance measures outlined in the Conservation Program, the need for handling and/or relocation is not anticipated during Covered Activities (i.e., mobile avian species).

For most Covered Species, pre-construction clearance surveys and construction monitoring may be conducted by a qualified biologist that is able to identify the Covered Species potentially present. Observations of Covered Species during these activities would be incidental, and not considered protocol surveys. However, should an individual of a Covered Species be discovered in harm's way, if a permit is required to handle the Covered Species, a permitted biologist must be available to relocate the individual. Therefore, if protocol surveys are positive for the presence of a Covered Species that requires a permit to handle, a permitted biologist shall be present during pre-construction clearance surveys and available on-call during construction monitoring. If suitable habitat for a Covered Species is present, but protocol surveys have not been conducted, a permitted biologist shall be available on-call during pre-construction clearance surveys and construction monitoring in the event that the Covered Species is discovered.

[569] U.S. Fish and Wildlife Service. Updated 19 December 2017. Recovery "10(a)(1)(A)" Permits Program. Available at: https://www.fws.gov/endangered/permits/recovery_permits.html

[570] California Department of Fish and Wildlife. N.d. When a Memorandum of Understanding is Needed. Accessed 22 March 2018. Available at: http://www.dfg.ca.gov/wildlife/nongame/research_permit/mou.html

TABLE F-1
BIOLOGIST QUALIFICATIONS FOR COVERED SPECIES

Common Name	Scientific Name	Protocol Surveys	Pre-Construction Clearance Surveys*	Construction Monitoring*	Handling and Relocation
Invertebrates (3)					
DSFF	*Rhaphiomidas terminatus abdominalis*	Permitted – RP[1,2,3,4,5]	Qualified	Qualified	Permitted** – RP
ESBB	*Euphilotes battoides allyni*	Qualified***	Qualified	Qualified	Permitted** – RP[6]
MSS	*Helminthoglypta walkeriana*	Permitted – RP[7]	Qualified	Qualified	Permitted – RP
Fish (1)					
SAS	*Catostomus santaanae*	Qualified***	Qualified	Qualified	Permitted** – RP
Amphibians (4)					
Arroyo toad	*Anaxyrus californicus*	Qualified[8,9]	Qualified[9]	Qualified[9]	Qualified[9]
CRLF	*Rana draytonii*	Qualified[10,11]	Qualified	Qualified	Permitted – RP[12]
CTS	*Ambystoma californiense*	Permitted – RP[13]	Qualified	Qualified	Permitted – RP
MYLF	*Rana muscosa*	Qualified***	Qualified	Qualified	Permitted – RP
Reptiles (2)					
SRB	*Charina bottae umbratica*	Qualified***	Qualified	Qualified	Permitted** – MOU
SWPT	*Actinemys pallida marmorata*	Qualified***	Qualified	Qualified	Permitted** – MOU
Birds (6)					
BSS	*Passerculus sandwichensis beldingi*	Qualified***	Qualified	Qualified	Permitted** – MOU
Burrowing owl	*Athene cunicularia*	Qualified[14]	Qualified	Qualified	Qualified**
CAGN	*Polioptila californica californica*	Permitted – RP[15,16]	Qualified	Qualified	Permitted** – RP
LBV	*Vireo bellii pusillus*	Qualified[17, 18]	Qualified[19]	Qualified[19]	Permitted** – RP
SWF	*Empidonax traillii extimus*	Permitted – RP[20, 21]	Qualified	Qualified	Permitted** – RP
WYBC	*Coccyzus americanus occidentalis*	Permitted – RP[22,23]	Qualified	Qualified	Permitted** – RP
Mammals (3)					
SBKR	*Dipodomys merriami parvus*	Permitted – RP[24,25]	Qualified	Qualified	Permitted – RP

TABLE F-1
BIOLOGIST QUALIFICATIONS FOR COVERED SPECIES

Common Name	Scientific Name	Protocol Surveys	Pre-Construction Clearance Surveys*	Construction Monitoring*	Handling and Relocation
SJKF	*Vulpes macrotis mutica*	Qualified[26]	Qualified	Qualified	Qualified[27]
SKR	*Dipodomys stephensi*	Permitted – RP[24,28]	Qualified	Qualified	Permitted – RP
Covered Plants (26)					
	See Chapter 3, Covered Species	Qualified[29,30,31]	Qualified	Qualified	Permitted – CDFW Plant Voucher Collecting Permit[32]

NOTE: RP = Recovery Permit pursuant to Section 10(a)(1)(A) of the ESA; MOU = Memorandum of Understanding issued by CDFW.
*Pre-construction surveys and/or construction monitoring may be conducted by a qualified biologist for many species; however, should an individual of a Covered Species be encountered in harm's way during the monitoring or pre-construction clearance survey, if a permit is required to handle or relocate the species, a permitted biologist must be available to move the individual out of harm's way.
**Handling and/or relocation activities are not anticipated to be required for this species under the Covered Activities.
***Currently, no protocol surveys have been developed by the agencies for this species. Survey methods shall be modeled after protocol survey methods for similar species, in consultation with USFWS and/or CDFW.
SOURCE:

1. U.S. Fish and Wildlife Service. N.d. Delhi Sands Flower-loving Fly Minimum Qualifications. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/insects/delhi_sands_flower_loving_fly/1-DelhiSandsFlower-LovingFly_MinQuals_NotDated.pdf
2. U.S. Fish and Wildlife Service. December 1996. Interim General Survey Guidelines for the Delhi Sands Flower-loving Fly. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/insects/delhi_sands_flower_loving_fly/2-DelhiSandsFlower-lovingFly_SurveyGuidelines_19961230.pdf
3. U.S. Fish and Wildlife Service. 30 April 2004. Changes to the Delhi Sands Flower-Loving Fly Recommended Survey Guidelines. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/insects/delhi_sands_flower_loving_fly/3-DelhiSandsFlower-LovingFly_GuidelineRevisionLtr_20040430.pdf
4. U.S. Fish and Wildlife Service. 30 June 2004. Guidelines for Conducting Presence/Absence Surveys for the Delhi Sands Flower-Loving Fly. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/insects/delhi_sands_flower_loving_fly/4-DelhiSandsFlower-LovingFly_GuidelineRevisionLtr_20040630.pdf
5. In order to become permitted for DSFF, a biologist is required to take a practical examination. See the Suggested Study Guide for the Carlsbad Fish and Wildlife Service Office Delhi Sands Flower Loving Fly Practical Exam at the USFWS Pacific Southwest Region Minimum Qualifications, Acquiring Experience, Practical Exams and Protocols website, available at: https://www.fws.gov/cno/es/minqual.html.
6. In order to become permitted for ESBB, a biologist is required to take a practical examination. See the Study Guide for the USFWS El Segundo Blue and Palos Verdes Blue Practical Exam at the USFWS Pacific Southwest Region Minimum Qualifications, Acquiring Experience, Practical Exams and Protocols website, available at: https://www.fws.gov/cno/es/minqual.html.
7. U.S. Fish and Wildlife Service. June 2003. Protocol Survey Guidelines for the Morro Shoulderband Snail (*Helminthoglypta walkeriana*). Ventura, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/snail/morro_bay_shoulderband/MorroShoulderbandSnail_ProtocolSurveyGuidelines_200306.pdf
8. U.S. Fish and Wildlife Service. 19 May 1999. Survey Protocol for the Arroyo Toad. Ventura, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/amphibians/arroyo_toad/ArroyoToad_Protocol_19990519.pdf
9. The capture, translocation, and monitoring of arroyo toads in conjuction with construction projects is authorized by USFWS through HCP authorities under Section 10(a)(1)(B) of the ESA, and a recovery permit is not

necessary. See: U.S. Fish and Wildlife Service, Pacific Southwest Region. N.d. Arroyo toad Minimum Qualifications. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/amphibians/arroyo_toad/ArroyoToad_MinQuals_NotDated.pdf

10. U.S. Fish and Wildlife Service. August 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog. Ventura, CA. Available at: https://www.fws.gov/cno/es/pdf%20files/Permit_Minimum_Qualifications/CA_Red-legged_Frog/CRLFMinQuals7-2017.pdf
11. A recovery permit is not required to conduct visual encounter surveys under the survey protocol for CRLF. However, should more intensive surveys be necessary, a permitted biologist would be required to conduct the survey.
12. U.S. Fish and Wildlife Service. 11 July 2017. Minimium Qualifications for Obtaining a Section 10(a)(1)(A) Recovery Permit for Conducting Intensive Surveys for the California red-legged frog. Available at: https://www.fws.gov/cno/es/pdf%20files/Permit_Minimum_Qualifications/CA_Red-legged_Frog/CRLFMinQuals7-2017.pdf
13. U.S. Fish and Wildlife Service. October 2003. Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander. Sacramento, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/amphibians/california_tiger_salamander/CaliforniaTigerSalamander_Protocol_2003.pdf
14. California Department of Fish and Wildlife. 7 March 2012. Staff Report on Burrowing Owl Mitigation. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843&inline
15. U.S. Fish and Wildlife Service. 28 July 1997. Coastal California Gnatcatcher (*Polioptila californica californica*) Presence/Absence Survey Protocol. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/coastal_calif_gnatcatcher/CoastalCaliforniaGnatcatcher_SurveyGuidelines_19970728.pdf
16. U.S. Fish and Wildlife Service. N.d. Coastal California Gnatcatcher Minimum Qualifications. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/coastal_calif_gnatcatcher/CoastalCaliforniaGnatcatcher_MinQuals_199707.pdf
17. U.S. Fish and Wildlife Service. 19 January 2001. Least Bell's Vireo Survey Guidelines. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/least_bells_vireo/LeastBellsVireo_SurveyGuidelines_20010119.pdf
18. A permit is not required to conduct protocol presence/absence surveys for LBV as long as taped vocalizations are not used. See: U.S. Fish and Wildlife Service. N.d. Least Bell's Vireo Minimum Qualifications. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/least_bells_vireo/LeastBellsVireo_MinQuals_20010119.pdf
19. A qualified biologist may conduct pre-construction clearance surveys and construction monitoring for LBV; however, if a nest is detected, then a permitted biologist must conduct the nest monitoring.
20. Sogge, M., D. Ahlers, and S. J. Sferra. 2010. A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher: U.S. Geological Survey Techniques and Methods 2A-10. Prepared in cooperation with the Bureau of Reclamation and the U.S. Fish and Wildlife Service. U.S. Geological Survey, Reston, Virginia. Available at: https://pubs.usgs.gov/tm/tm2a10/pdf/tm2a10.pdf
21. U.S. Fish and Wildlife Service. N.d. Southwestern Willow Flycatcher Minimum Qualifications. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/southwest_willow_flycatcher/SouthwesternWillowFlycatcher_MinQuals_NotDated.pdf
22. Halterman, M.D., M.J. Johnson, JA Holmes, and SA Laymon. 15 April 2015. A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-billed Cuckoo: US Fish and Wildlife Techniques and Methods. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/yellow_billed_cuckoo/Yellow-billedCuckoo_SurveyProtocol_FinalDraft_20150422.pdf
23. U.S. Fish and Wildlife Service. N.d. Minimum Qualification Guidelines Western Distinct Population Segment of the Yellow-billed Cuckoo. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/birds/yellow_billed_cuckoo/Yellow-billedCuckoo_MinQuals_20150512.pdf
24. U.S. Fish and Wildlife Service. N.d. Stephens' Kangaroo Rat, San Bernardino Kangaroo Rat, and Pacific Pocket Mouse Minimum Qualifications. Carlsbad, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/mammals/san_bernardino_kangaroo_rat/SanBernardinoKRat_MinimumQuals_201207.pdf
25. Currently, no survey protocol exists for SBKR. However, because survey protocols for kangaroo rats involve live trapping, a recovery permit is required. Survey protocol in this MSHCP is based on the protocol for a similar species, San Joaquin kangaroo rat. See: U.S. Fish and Wildlife Service. March 2013. Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats. Sacramento, CA. Available at:

https://www.fws.gov/cno/es/Recovery_Permitting/mammals/tipton-fresno_kanagroo_rats/TiptonKRat&FresnoKRat_Trapping%20Protocol_201303.pdf
26. U.S. Fish and Wildlife. June 1999. U.S. Fish and Wildlife Service San Joaquin Kit Fox Survey Protocol for the Northern Range. Sacramento, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/mammals/san_joaquin_kit_fox/SanJoaquinKitFox_SurveyProtocol_199906.pdf
27. Direct relocation of SJKF is not anticipated; however, any den excavation activities shall be conducted by a qualified biologist, as authorized by USFWS through HCP authorities. See: U.S. Fish and Wildlife. January 2011. U.S. Fish and Wildlife Service Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance. Sacramento, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/mammals/san_joaquin_kit_fox/SanJoaquinKitFox_GroundDisturbanceProtection_201101.pdf
28. Currently, no survey protocol exists for SKR. However, because survey protocols for kangaroo rats involve live trapping, a recovery permit is required. Survey protocol in this MSHCP is based on the protocol for a similar species, San Joaquin kangaroo rat. See: U.S. Fish and Wildlife Service. March 2013. Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats. Sacramento, CA. Available at: https://www.fws.gov/cno/es/Recovery_Permitting/mammals/tipton-fresno_kanagroo_rats/TiptonKRat&FresnoKRat_Trapping%20Protocol_201303.pdf
29. California Department of Fish and Wildlife. 20 March 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities. Sacramento, CA. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959&inline
30. Protocol surveys for covered plants may be conducted by a qualified biologist that meets the minimum qualifications in the survey protocol. However, should a special status plant be discovered and a voucher collection required for identification, the voucher must be collected by a biologist that possesses a CDFW Plant Voucher Collecting Permit.
31. U.S. Fish and Wildlife Service. 23 September 1996. Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants. Available at: https://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines/Documents/Listed_plant_survey_guidelines.PDF
32. California Department of Fish and Wildlife. N.d. Permits for Threatened and Endangered Plant Species. Accessed 22 March 2018. Sacramento, CA. Available at: https://www.wildlife.ca.gov/Conservation/Plants/Permits

MITIGATION BANKS SUMMARY TABLE

These mitigation and conservation banks were evaluated at the time of preparation of the MSHCP as a means of assessing feasibility of utilizing in-lieu fee as a conservation strategy. However, other conservation banks determined to be acceptable by the USFWS may be utilized on a case-by-case basis.

Common Name	Species Name	Habitat Type	Area Suggested for Mitigation	Acres Needed	Current Cost per Acre ($)	Temporary Impacts (acres)	Permanent Impacts (acres)	Projected Cost ($)	Projected Temporary Cost ($)	Projected Permanent Cost ($)
Invertebrates										
DSFF	*Rhaphiomidas terminatus abdominalis*	Delhi sands	Colton Dunes Conservation Bank	2.00	275,000	1.304414452	0.249032812	550,000.00	357,500.00	192,500.00
ESBB	*Euphilotes battoides allyni*	Coastal sand dunes	La Purisima Conservation Bank	3.815420095	40,000	2.518363182	0.432352304	152,616.80	755,508.95	389,117.07
MSS	*Helminthoglypta walkeriana*	Coastal dune/scrub; chaparral/grasslands	93402	1.015397083	398,067	0.325397083	0.23	404,196.07	129,529.84	274,666.23
Fish										
SAS	*Catostomus santaanae*	Riverine	Riverside-Corona Resource Conservation District	1.315930992	80,000	0.625930992	0.23	105,274.48	50,074.48	55,200.00
Amphibians										
Arroyo toad	*Anaxyrus californicus*	Riparian	Santa Paula Creek Mitigation Bank	13.25431571	80,000	9.49357561	1.253580032	1,060,345.26	759,486.05	300,859.21
CRLF	*Rana draytonii*	Riparian/ponds/marsh	Santa Paula Creek Mitigation Bank	350.5111657	80,000	76.60183858	91.30310905	28,040,893.26	6,128,147.09	21,912,746.17
CTS	*Ambystoma californiense*	Grasslands	La Purisima Conservation Bank	61.44525006	32,000	44.01095765	5.811430801	1,966,248.00	1,408,350.64	557,897.36
MYLF	*Rana muscosa*	Riparian	Santa Paula Creek Mitigation Bank	5.771181521	80,000	3.97641903	0.598254164	461,694.52	318,113.52	143,581.00
Reptiles										
SRB	*Charina bottae umbratica*	Woodlands	Soquel Canyon Mitigation Bank	15.50467036	100,000	11.10542133	1.466416343	1,550,467.04	1,110,542.13	439,924.90
SWPT	*Emys marmorata*	Riparian/ponds/wetland/reservoirs	Santa Paula Creek Mitigation Bank	67.00351912	80,000	47.99213999	6.337126375	5,360,281.53	3,839,371.20	1,520,910.33
Birds										
BSS	*Passerculus sandwichensis beldingi*	Marsh	90265	1.11571342	14,662	0.42571342	0.23	16,358.59	6,241.81	10,116.78
Burrowing owl	*Athene cunicularia*	Desert/grassland	Palo Prieto Conservation Bank	282.8695543	2,500	202.6089887	26.75352186	707,173.89	506,522.47	200,651.41
CAGN	*Polioptila californica californica*	Sage scrub/chaparral/grassland	Santa Paula Creek Mitigation Bank	249.8668709	80,000	178.9703885	23.6321608	19,989,349.67	14,317,631.08	5,671,718.59
LBV	*Vireo bellii pusillus*	Riparian scrub/woodlands	Santa Paula Creek Mitigation Bank, Santa Clara River (Hedrick/Levy) Conservation Bank	15.93536296	80,000	11.4139105	1.507150822	1,274,829.04	913,112.84	361,716.20
SWF	*Empidonax traillii extimus*	Riparian	Santa Paula Creek Mitigation Bank, Santa Clara River (Hedrick/Levy) Conservation Bank	7.17309743	80,000	5.137824111	0.67842444	573,847.79	411,025.93	162,821.87
WYBC	*Coccyzus americanus occidentalis*	Riparian woodlands	Santa Clara River (Hedrick/Levy) Conservation Bank	0.92	$20,000–$200,000	0.23	0.23	92,000.00	23,000.00	69,000.00

Common Name	Species Name	Habitat Type	Area Suggested for Mitigation	Acres Needed	Current Cost per Acre ($)	Temporary Impacts (acres)	Permanent Impacts (acres)	Projected Cost ($)	Projected Temporary Cost ($)	Projected Permanent Cost ($)
					(depending on the type of land purchased)*					
Mammals										
SBKR	*Dipodomys merriami parvus*	Sage scrub/chaparral	Cajon Creek Conservation Bank	17.73324271	300,000	12.70166519	1.677192506	5,319,972.81	3,810,499.56	1,509,473.25
SJKF	*Vulpes macrotis mutica*	Shrublands/grasslands	Palo Prieto Conservation Bank	21.28273011	3,500	15.2440316	2.012899503	74,489.56	53,354.11	21,135.44
SKR	*Dipodomys stephensi*	Grasslands/coastal sagebrush	Soquel Canyon Mitigation Bank	2.085841261	100,000	1.395841261	0.23	208,584.13	139,584.13	69,000.00
Plants										
BMV	*Astragalus brauntonii*	Chaparral/ coastal sage scrub	Santa Monica Mountains Conservancy OR Mountains Recreation and Conservation Authority	17.96376454	$20,000–$200,000 (depending on the type of land purchased)*	12.86677945	1.698995031	1,796,376.45	1,286,677.94	509,698.51
California seablite	*Suaeda californica*	Estuarine/wetland	93402	0.92	398,067	0.23	0.23	366,221.64	91,555.41	274,666.23
CCBT	*Cirsium fontinale var. obispoense*	Chaparral/coastal scrub/grasslands	93430	0.92	9,777	0.23	0.23	8,994.84	2,248.71	6,746.13
Conejo dudleya	*Dudleya abramsii* spp. *parva*	Coastal sage scrub	90265	2.503339199	14,662	1.647025123	0.285438026	36,703.96	24,148.68	12,555.28
GWC	*Nasturtium gambelii*	Marsh/Lakes	93437	0.92	6,335	0.23	0.23	5,828.20	1,457.05	4,371.15
Gaviota tarplant	*Deinandra increscens* ssp. *villosa*	Grasslands/coastal sage scrub	93437	15.52301039	6,335	11.11855762	1.468150925	98,338.27	70,436.06	27,902.21
IKM	*Eriodictyon altissimum*	Woodland/chaparral	93402	0.92	398,067	0.23	0.23	366,221.64	91,555.41	274,666.23
LYS	*Eriodictyon capitatum*	Chaparral/coastal sage scrub	93455**	22.90077421	40,000	16.40297668	2.165932509	916,030.97	656,119.07	259,911.90
Lyon's pentachaeta	*Pentachaeta lyonii*	Grassland/coastal sage scrub/ chaparral	Santa Monica Mountains Conservancy OR Mountains Recreation and Conservation Authority	7.242074055	$20,000–$200,000 (depending on the type of land purchased)*	5.187229513	0.684948181	724,207.41	518,722.95	205,484.45
Marcescent dudleya	*Dudleya cymosa* ssp. *marcescens*	Chaparral/ Live oak woodland	90265	0.92	14,662	0.23	0.23	13,489.04	3,372.26	10,116.78
Morro manzanita	*Arctostaphylos morroensis*	Coastal dune scrub/ chaparral/ woodland	93402	1.527006666	398,067	0.837006666	0.23	607,850.96	333,184.73	274,666.23
Nevin's barberry	*Berberis nevinii*	Chaparral/coastal sage scrub/ oak woodland/ riparian	Santa Monica Mountains Conservancy OR Mountains Recreation and Conservation Authority	1.725848741	$20,000–$200,000 (depending on the type of land purchased)*	1.035848741	0.23	172,584.87	103,584.87	69,000.00
NML	*Lupinus nipomensis*	Coastal dune scrub	93420	1.247198141	9,755	0.557198141	0.23	12,166.42	5,435.47	6,730.95
Pismo clarkia	*Clarkia speciosa* ssp. *immaculata*	Chaparral/ woodland	93420	22.34297813	9,755	16.003448	2.113176709	217,955.75	156,113.64	61,842.12
SFVS	*Chorizanthe parryi* var. *fernandina*	Grassland/coastal sage scrub/ chaparral	Santa Monica Mountains Conservancy OR Mountains Recreation and Conservation Authority	2.106513473	$20,000–$200,000 (depending on the type of land purchased)*	1.347439066	0.253024802	210,651.35	134,743.91	75,907.44
SARW	*Eriastrum densifolium ssp. sanctorum*		Cajon Creek Conservation Bank	3.021420276	300,000	2.164131478	0.285762933	906,426.08	649,239.44	257,186.64
SMMD	*Dudleya cymosa* ssp. *ovatifolia*	Coastal sage scrub/ Chaparral	90265	1.254642537	14,662	0.564642537	0.23	18,395.57	8,278.79	10,116.78

Common Name	Species Name	Habitat Type	Area Suggested for Mitigation	Acres Needed	Current Cost per Acre ($)	Temporary Impacts (acres)	Permanent Impacts (acres)	Projected Cost ($)	Projected Temporary Cost ($)	Projected Permanent Cost ($)
SBB	*Cordylanthus rigidus* ssp. *Littoralis*	Coniferous forest/ chaparral/ woodlands/ coastal sage scrub	93437	3.630705769	6,335	2.782761345	0.282648141	23,000.52	17,628.79	5,371.73
SHS	*Dodecahema leptoceras*	Chaparral/woodlands/coastal scrub	Cajon Creek Conservation Bank	1.873120235	300,000	1.14690714	0.242071032	561,936.07	344,072.14	217,863.93
Vandenberg Monkeyflower	*Diplacus vendenbergensis*	Chaparral/ coastal dunes	93437	6.827580617	6,335	5.091514939	0.578688559	43,252.72	32,254.75	10,997.98
VMMV	*Astragalus pycnostachyus* var. *lanosissimus*	Marsh	93001	33.21308227	22,764	23.78930114	3.141260376	756,062.60	541,539.65	214,522.95
Verity's dudleya	*Dudleya verityi*	Chaparral/ woodland/ coastal sage scrub	90265	1.097904018	14,662	0.407904018	0.23	16,097.47	5,980.69	10,116.78

NOTE:

* Lotts, Brandon, Sapphos Environmental, Inc. November 30, 2019. Email to Debbie Sharpton, Coldwell Banker Residential Brokerage. Subject: Mitigation Banking.

** The zip code 93455 is approximately 10 miles north of the La Purisima Conservation Bank, which has a range of $32,000 - $40,000 per acre, depending on habitat type. Based on searches through Zillow.com the cost per acre can vary from $1,000 to $300,000 per acre depending on land type and use. The proximity to the La Purisima Conservation Bank and being within the Zillow range makes this a reasonable cost per acre estimate. Retrieved from Zillow. 2019. Search. https://www.zillow.com/santa-maria-ca/land/?searchQueryState=%7b%22pagination%22:%7b%7d,%22mapBounds%22:%7b%22west%22:-120.81901155296282,%22east%22:-119.70389924827532,%22south%22:34.368403758314564,%22north%22:35.182813784440256%7d,%22regionSelection%22:%5b%7b%22regionId%22:47570,%22regionType%22:6%7d%5d,%22isMapVisible%22:true,%22filterState%22:%7b%22isMakeMeMove%22:%7b%22value%22:false%7d,%22isSingleFamily%22:%7b%22value%22:false%7d,%22isCondo%22:%7b%22value%22:false%7d,%22isMultiFamily%22:%7b%22value%22:false%7d,%22isManufactured%22:%7b%22value%22:false%7d,%22isTownhouse%22:%7b%22value%22:false%7d,%22isApartment%22:%7b%22value%22:false%7d,%22sortSelection%22:%7b%22value%22:%22pricea%22%7d%7d,%22isListVisible%22:true%7d. Accessed December 9, 2019.

Appendix H
CUMULATIVE PERMANENT DISTURBANCE IMPACT TRACKING TEMPLATE

Cumulative Permanent Disturbance Impact Tracking Template

Year	Covered Activities Completed	Acres Permanently Disturbed										
		Habitat 1	Habitat 2	Habitat 3	Habitat 4	Habitat 5	Habitat 6	Habitat 7	Habitat 8	Habitat 9	Habitat 10	Total
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												

Cumulative Permanent Disturbance Impact Tracking Template

Year	Covered Activities Completed	Acres Permanently Disturbed										
		Habitat 1	Habitat 2	Habitat 3	Habitat 4	Habitat 5	Habitat 6	Habitat 7	Habitat 8	Habitat 9	Habitat 10	Total
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
TOTAL												

NOTE:
Year: The year the activities were completed (ex. 2020)
Activities completed: the numerical amount of Covered Activities completed that year
Habitat: The habitat type that was permanently disturbed in acres (ex. Coastal sage scrub)
Total column: total permanently disturbed acreage per year
Total row: total permanently disturbed acreage per habitat