GENERAL CONSERVATION PLAN FOR OIL AND GAS ACTIVITIES

Santa Barbara County, California

Prepared by

U.S. Fish and Wildlife Service
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General Conservation Plan Authorization

This General Conservation Plan for Oil and Gas Activities associated with issuance of Endangered Species Act section 10(a)(1)(B) permits for the Santa Barbara County distinct population segment of the California tiger salamander and the California red-legged frog in Santa Barbara County, California is approved and is in effect as of the date below.

Authorization:

_____ _____

Stephen P. Henry
Field Supervisor
Ventura Fish and Wildlife Office

Date

COVER SHEET

TITLE: General Conservation Plan for Oil and Gas Activities in Santa Barbara County (GCP)

PERMIT(S): See individual Applicants / Projects

SPECIES: Santa Barbara County Distinct Population Segment (DPS) of the California tiger salamander (*Ambystoma californiense*), California red-legged frog (*Rana draytonii*), and Lompoc yerba santa (*Eriodictyon capitatum*); collectively Covered Species.

PLANNING AREA: The GCP Planning Area is shown in Figure 1. The area generally encompasses the Santa Maria Valley, San Antonio Creek Watershed, Lompoc Valley, Santa Ynez Valley, and a portion of the Santa Barbara Coastline.

COVERED ACTIVITIES: The GCP covers geophysical exploration (seismic), development, extraction, storage, transport, remediation, and/or distribution of crude oil, natural gas, and/or other petroleum products and construction, maintenance, operation, repair, and decommissioning of oil and gas pipelines and well field infrastructure.

COOPERATORS: U.S. Fish and Wildlife Service, California Department of Fish and Wildlife, and individual oil and gas project proponents engaged in exploration, development, extraction, or transport of crude oil, natural gas, and/or petroleum products.

TAKE/IMPACT: The Service will use the following means to estimate the amount of take that is likely to occur to each of the species covered in the permit:

> California tiger salamander: The Service is using number of acres of California tiger salamander habitat disturbed as a surrogate for the number of individuals in order to estimate the amount of take that is likely to occur (Section 4). Disturbance of California tiger salamander habitat may occur within the Planning Area. These impacts may occur in the form of permanent and temporary habitat impacts resulting from construction of oil and gas facilities. Additionally, habitat may be affected during operations, maintenance, and emergency response (excluding crude oil spills) during the life of the permit. We expect some level of effects to any California tiger salamanders located within the disturbed areas.
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> California red-legged frog: The Service is using number of acres of California red-legged frog habitat disturbed as a surrogate for the number of individuals in order to estimate the amount of take that is likely to occur (Section 4). Disturbance of California red-legged frog habitat may occur within the Planning Area. These impacts may occur in the form of permanent and temporary habitat impacts resulting from construction of oil and gas facilities. Additionally, habitat may be affected during operations, maintenance, and emergency response (excluding crude oil spills) during the life of the permit. We expect some level of effects to any California red-legged frogs located within the disturbed areas.

Lompoc yerba santa: The Service is using number of acres of Lompoc yerba santa habitat disturbed as a surrogate for the number of individual plants in order to estimate the amount of adverse impacts that are likely to occur (Section 4). Disturbance of Lompoc yerba santa habitat may occur within the Planning Area. These impacts may occur in the form of permanent and temporary habitat impacts resulting from construction of oil and gas facilities. Additionally, habitat may be affected during operations, maintenance, and emergency response (excluding crude oil spills) during the life of the permit. We expect some level of effects to any Lompoc yerba santa plants located within the disturbed areas.

FUNDING PLAN: Applicants commit to full implementation of the GCP. Applicants will minimize and mitigate for all unavoidable impacts according to the Mitigation Strategies for the California tiger salamander, California red-legged frog, Lompoc yerba santa, and the anticipated impacts described in their Individual Project Package application (Section 6). Funding assurances will be provided with their Individual Project Package application.

MONITORING PLAN: An annual report is due from each applicant on March 31 each year that the Permit is in effect.

DURATION OF PERMITS ISSUED UNDER THE PLAN: 20 years for construction, operations, maintenance, and decommissioning activities.

Section 1
Introduction

Purpose and Need

Section 9 of the Endangered Species Act of 1973, as amended (Act), and federal regulation pursuant to section 4(d) of the Act prohibit the taking of endangered and certain threatened fish or wildlife species, respectively, without special exemption. Section 10(a)(1)(B) of the Act allows non-federal entities to apply for incidental take permits to take listed fish or wildlife species in the course of otherwise legal activity.

The U.S. Fish and Wildlife Service (Service; Service 2007, 2016) developed the concept of general conservation plans to streamline the process associated with the habitat conservation planning process. This process streamlines the application for a section 10(a)(1)(B) incidental take permit by allowing the Service to develop a single general conservation plan for a local area. The Service then completes all documents required by the Act and National Environmental Policy Act (NEPA). Individual non-federal entities may apply for an incidental take permit, provided they commit to complying with the monitoring, minimization, and mitigation measures in the general conservation plan.

The Service developed this Oil and Gas General Conservation Plan (GCP or Plan) to provide a streamlined mechanism for proponents engaged in oil and gas development, expansion, operations, maintenance, and decommissioning of infrastructure to meet statutory and regulatory requirements while promoting conservation of California tiger salamander (*Ambystoma californiense*), California red-legged frog (*Rana draytonii*), and Lompoc yerba santa (*Eriodictyon capitatum*). The Act, and its implementing regulations, prohibits "take" of wildlife species listed as threatened or endangered. The term "take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" (16 USC § 1532(3)(19)).

This GCP is a conservation plan as required in Section 10(a)(2)(A) of the Act for issuance of an incidental take permit pursuant to section 10(a)(1)(B) (Permit). Participation in the GCP and an application for take authorization is voluntary. To be permitted to take listed wildlife species through this streamlined process, applicants must:

- Meet the issuance criteria found at 50 CFR 13 and 17;
- Document that their projects meet various qualifying criteria (described below);
- Agree to implement the avoidance, minimization, and mitigation actions described in this document and comply with the terms and conditions of any Permit(s) issued under this GCP; and

- Provide documentation that they have met the minimization and mitigation requirements for their project as described in this document.

Following GCP approval, applicants must submit an Individual Project Package for Service approval. If approved, the Service will issue an individual Permit prior to the initiation of impacts occurring in California tiger salamander, California red-legged frog, and Lompoc yerba santa habitats. For covered species that are both federal and California State-listed, the State will decide what type of CEQA document is needed. The requirements for Individual Project Package approval are described in Section 6 of this Plan.

The Service recognizes that actions associated with the exploration, development, extraction, storage, transport, remediation, and/or distribution of crude oil, natural gas, and petroleum products may result in take of the endangered California tiger salamander and the threatened California red-legged frog and remove, displace, disturb and/or destroy Lompoc yerba santa. California tiger salamanders and California red-legged frogs could be taken through crushing or getting struck by equipment or vehicles, and through impacts to habitat for the species. Lompoc yerba santa could be impacted by ground-disturbing activities, crushing, and impacts to its habitat. Section 4 discusses the use of impacts to habitat as a proxy for take for California tiger salamander and California red-legged frog, and impacts to Lompoc yerba santa. This GCP describes a range of projects for which avoidance actions alone are not sufficient to prevent take of covered species, and describes actions that can serve to minimize and mitigate the impacts of such taking to the maximum extent practicable.

This GCP is focused on exploration, development, extraction, storage, transport, remediation and distribution of crude oil, natural gas, and petroleum products within northern Santa Barbara County, California. Project proponents engaged in actions described as “Covered Activities” in this document may participate through the GCP. This document specifies the type of incidental take anticipated to occur over the duration of the GCP, minimization and mitigation requirements, and all other measures necessary to meet permit issuance criteria described in Section 10(a)(2)(B) of the Act. Project proponents that choose to participate in the GCP and meet issuance criteria would subsequently be granted a permit through the GCP.

The Service is required by statute to provide public notice before issuing a Permit under Section 10(a)(1)(B) of the Act. The Service will publish notices of Permit applications (potentially in batches) in the *Federal Register* in accordance with 50 CFR 17.22 and 17.32 b(1)(ii) with a request to the public to submit written data, views, or comments with respect to the application.

We developed this document in cooperation with the local oil and gas project proponents, other interested oil and gas companies, and the California Department of Fish and Wildlife (Department) in an effort to best meet the current and anticipated needs of the industry and the Service’s statutory and regulatory requirements. Despite the best efforts of all stakeholders involved, some projects may result in take that was not foreseen during the development of this GCP, or affect candidate or listed species not covered by the GCP. If Covered Activities may result in take of non-covered, federally listed species, projects should obtain a permit from the Service for the non-covered species. A permit may be suspended or revoked for noncompliance with permit conditions or with any applicable laws or regulations governing the conduct of the

permitted activity (50 CFR 13.27, 13.28); revocation can further disqualify an applicant from receiving or exercising the privileges of a similar permit for a period of five years from date of agency decision on the revocation (50 CFR 13.21(c)(2)).

Planning Area

The Planning Area consists of the Santa Maria Valley, San Antonio Creek, Lompoc Valley, Santa Ynez Valley, and a portion of the Santa Barbara Coastline. The entire Planning Area is 674,220 acres. The figure below shows the Planning Area for this GCP.

Figure 1. GCP Planning Area

Land within the Planning Area includes developed oil and gas fields, undeveloped land, agricultural lands, and rural and urban development. The Planning Area encompasses diverse

habitats, resources, and degrees of development. The Covered Activities would not affect all of the Planning Area.

Throughout this document the terms Planning Area, Project Area and impact area are used. The Planning Area is defined as the total 674,220-acre area covered by this plan. The Project Area refers to the area covered by an individual project seeking an incidental take permit under this plan. The impact area refers to the habitat that could be impacted by project activities within an individual Project Area.

Permittees

Project proponents planning to engage in Covered Activities (as identified in Section 2) within the Planning Area may be eligible for a Permit, if specific conservation measures identified in the GCP are being or will be implemented. Those measures include minimization and mitigation measures for the California tiger salamander, California red-legged frog, and Lompoc yerba santa, (Section 5). Following issuance of a Permit, these project proponents are referred to as Permittees.

GCP and Permit Duration

This GCP will be approved once: (1) a decision is made under NEPA following publication of the *Federal Register* Notice of Availability of the draft NEPA document and draft GCP, (2) public comment period, (3) the Service addresses public comments, and (4) signed by the Service. Permits issued under the GCP will cover only incidental take associated with construction, operations, maintenance, and decommissioning activities for up to 20 years after Permit issuance.

Regulatory Context

Permits issued under this GCP cover only take incidental to, and not the purpose of, the carrying out of an otherwise lawful activity (50 CFR 17.3). Project proponents seeking a Permit under this GCP, therefore, must comply with all applicable Federal, State, and local statutes and regulations to ensure that the action is otherwise lawful.

Permittees under this GCP will work with the Service to assist in fulfilling the requirement of Section 106 of the National Historic Preservation Act, 16 U.S.C. 470f, and its implementing regulations at 36 C.F.R. part 800.

Regulatory Framework

Federal Endangered Species Act

The Service's responsibilities include administering the Act. Section 9 of the Act and federal regulation pursuant to section 4(d) of the Act prohibit the taking of endangered and certain threatened fish or wildlife species, respectively, without special exemption. Take is defined in Section 3(19) of the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The Service regulations at 50 CFR 17.3

further define harm as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns such as breeding, feeding or sheltering." The Act provides for civil and criminal penalties for the unlawful taking of listed species.

Exemptions to the prohibitions against take may be obtained through coordination with the Service in two ways. If a project is to be funded, authorized, or carried out by a Federal agency and may affect a listed species, the Federal agency must consult with the Service pursuant to section 7(a)(2) of the Act. Private individuals and State and local or other entities who propose an action that is likely to result in the take of federally listed fish or wildlife species, and for which no Federal nexus exists, may comply with the Act by applying for, and receiving, an incidental take permit pursuant to section 10(a)(1)(B) of the Act. The application for an incidental take permit must be accompanied by a habitat conservation plan. The criteria for issuance of an incidental take permit pursuant to section 10(a)(1)(B) of the Act require that the effects of permitted incidental take be minimized and mitigated to the maximum extent practicable; that the proposed action also must not appreciably reduce the likelihood of survival and recovery of the species in the wild; and that adequate funding of identified actions to minimize and mitigate impacts must also be ensured [(section 10 (a)(2)(A)]. All of the issuance criteria are described below under *Incidental Take Permit Process*.

Section 7(a)(2) of the Act requires that Federal agencies ensure that their actions, including permit issuance, do not jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Pursuant to 50 CFR 402.2, "Jeopardize the continued existence of…" means to engage in an action that would reasonably 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. Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features. Issuance of an incidental take permit by the Service, pursuant to section 10(a)(1)(B), constitutes a Federal action that is subject to the requirements of section 7(a)(2), and the Service must prepare an internal consultation to address the effects of the permit issuance.

Incidental Take Permit Process

The process for obtaining an incidental take permit has four primary phases: (1) pre-application; (2) development of a habitat conservation plan; (3) processing of the permit; and (4) post-issuance compliance. First, the Service provides the potential applicant guidance in deciding if an incidental take permit is appropriate and if so, what type and scale of habitat conservation plan would fit the applicant's needs. During the second phase, a plan that integrates the proposed project or action with conservation of listed species is prepared. Every conservation plan submitted in support of an incidental take permit application must include the following information: (1) those impacts likely to result from the proposed taking of the species for which permit coverage is requested; (2) 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; (3) alternatives to the proposed action that

would not result in take; and (4) any additional measures Service may require as necessary or appropriate for purposes of the plan.

Development of a conservation plan concludes, and the permit processing phase begins when a complete application package is submitted to the appropriate permit-issuing office. A complete application package for a private citizen consists of: (1) a conservation plan; (2) a permit application; and (3) payment of a $100 fee by the applicant. The Service publishes a Notice of Availability of the package in the Federal Register (FR) to allow for public comment. A Section 10(a)(1)(B) incidental take permit is issued upon a determination by the Service that all requirements for permit issuance have been met. Statutory criteria for issuance of the permit specify that: (1) the taking will be incidental; (2) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; (3) the applicant will ensure that adequate funding for the conservation plan and procedures to deal with unforeseen circumstances will be provided; (4) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and (5) the Service has received assurances, as may be required, that the conservation plan will be implemented. Notification to the public regarding permit issuance is through the publication of a notice in the Federal Register (FR). The Service also prepares an Intra-Service Section 7 Biological Opinion and a Set of Findings, the latter which evaluates the Section 10(a)(1)(B) permit application in the context of permit issuance criteria. Issuance of an incidental take permit is a federal action that requires Section 7 and NEPA compliance.

Throughout this document the terms “applicant” and “permittee” are used. The term “applicant” is used to refer to a party that is applying for an incidental take permit under this plan. The term “permittee” refers to an applicant that has been issued an incidental take permit under this plan.

During the post-issuance phase, the permittee(s) and any other responsible entities are required to implement the conservation plan in accordance with the terms and conditions of the incidental take permit. The Service monitors permittee(s) compliance with the conservation plan as well as its long-term progress and success.

National Environmental Policy Act

The purpose of the NEPA is two-fold: (1) to ensure that Federal agencies examine environmental impacts of their actions (in this case, the federal action is deciding whether to issue an incidental take permit); and (2) to ensure public participation. The NEPA serves as an analytical tool to address direct, indirect, and cumulative impacts of the proposed project alternatives to help the Service decide whether to issue an incidental take permit. Compliance with the NEPA is required of the Service for each HCP as part of the incidental take permit application process. For approval of this Plan as a permitting mechanism for Section 10(a)(1)(B) incidental take permits, NEPA compliance consists of an Environmental Assessment. For each application received under the GCP, the Service would conduct an appropriate level of NEPA-compliant analysis dependent upon impacts to the human and physical environment resulting from the specific project.

National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to take into account the effects of their undertakings on cultural resources that are, or may be, eligible for inclusion on the National Register of Historic Places. An undertaking is a project, activity, or program under the direct or indirect jurisdiction of a Federal agency. Issuance of an incidental take permit are an undertaking and subject to compliance with section 106 of the NHPA.

The Service drives consultation and remains legally responsible for all required findings and determinations associated with the NEPA and NHPA review and compliance process. The Service may use information provided by applicants, consultants, or designees for completing documents associated with NEPA and NHPA.

Other Relevant Laws and Regulations

- *California Endangered Species Act*: The California Endangered Species Act (CESA) generally parallels the main provisions of the Act and provides for the designation of native species or subspecies of plants, fish, and wildlife as endangered or threatened. Section 2080 of the CESA prohibits the take of state-listed endangered or threatened species, but allows for the incidental take of such species as a result of otherwise lawful development projects under section 2081(b) and (c). The California tiger salamander and Lompoc yerba santa are listed under the CESA. Individual permittees who obtain a federal incidental take permit for the California tiger salamander pursuant to section 10(a)(1)(B) could request that the Director of the Department find the federal documents consistent with CESA. Applicants under this GCP would be responsible for submitting individual 2080.1 consistency determination requests for the California tiger salamander to the Department. The Department cannot issue a 2080.1 consistency determination for the Lompoc yerba santa because there are no federal take prohibitions for plants. Therefore, applicants seeking coverage for the Lompoc yerba santa will need to pursue a separate permit with the Department. The Service will notify the Department of any applications submitted for coverage under this GCP.

- *California Environmental Quality Act:* The California Environmental Quality Act (CEQA) is a state statute that is generally analogous to NEPA on the Federal level in requiring the completion of an environmental review for projects that may impact environmental resources. It requires public agencies to review the environmental impacts of proposed projects, prepare and review negative declarations, mitigated negative declarations or environmental impact reports and to consider feasible alternatives and mitigation measures that would substantially reduce significant adverse environmental effects. It applies to a broad range of environmental resources, such as air quality, water, traffic, and including any state and federally listed wildlife and plant species, as well as sensitive natural communities. Impacts to such species and natural communities must be evaluated under the CEQA. The County of Santa Barbara (County) will evaluate a project's consistency with CEQA. Impacts to biological resources represent one aspect of a CEQA review; however, the potential for impacts to other environmental resources is also reviewed as part of the CEQA compliance process.

- *California Geologic Energy Management Division (CalGEM; formerly known as the Division of Oil, Gas, and Geothermal Resources [DOGGR]):* All California oil and gas wells (development and prospect wells), enhanced-recovery wells, water-disposal wells, service wells (i.e. structure, observation, temperature observation wells), core-holes, and gas-storage wells, onshore and offshore (within three nautical miles of the coastline), located on state and private lands, are permitted, drilled, operated, maintained, plugged and abandoned under requirements and procedures administered by the CalGEM.

  The CalGEM has the following Memoranda of Understanding (MOU) and Memoranda of Agreement (MOA) with:

  - **California Air Resources Board and Local Air Districts** - Regarding well stimulation treatments and well stimulation treatment- related activities.

  - **California Coastal Commission** - Regarding well stimulation treatments and well stimulation treatment- related activities.

  - **California Air Resources Board and San Joaquin Valley Air Pollution Control District** - Regarding well stimulation treatments and well stimulation treatment- related activities.

  - **California Department of Resources Recycling and Recovery** - Regarding well stimulation treatments and well stimulation treatment- related activities.

  - **California Department of Toxic Substances Control** - Regarding well stimulation treatments and well stimulation treatment- related activities.

  - **State Water Resources Control Board and Regional Water Quality Control Boards** - Regarding well stimulation treatments and well stimulation treatment-related activities.

  - **Bureau of Land Management (BLM)** - The purpose of this MOU is to delineate procedures for regulating oilfield operations where both the BLM and the Division have jurisdictional authority, to streamline operations, and minimize duplication.

  - **Minerals Management Service, Pacific Outer Continental Shelf Region, U.S. Department of the Interior; Western Region, Office of Pipeline Safety, Research and Special Program Administration, U.S. Department of Transportation; The California State Lands Commission; The California State Fire Marshal** - The purpose of this MOA is to implement the Offshore California Pipeline Inspection Survey (OCPIS) Plan process and procedures. The OCPIS Plan will provide a coordinated analytical framework for assessing the present condition and inspection needs of offshore pipelines.

- **California Public Utilities Commission (CPUC)** - The purpose of this MOA clarifies the regulatory responsibilities under which the Division and the CPUC will manage the gas-storage pipelines that fall under joint jurisdiction.

- **Department of Forestry and Fire Protection, State Fire Marshal's Office of Pipeline Safety (SFM)** - This MOA clarifies the jurisdictional boundary between the Division and the SFM, and eliminates any potential gaps in jurisdiction between the two agencies.

- **Department of Fish and Game (DFG)** - The purpose of this MOA is to establish procedures by which the DFG and the Division will participate in Coastal Sage Scrub Natural Community Conservation Planning.

- **Department of Fish and Game, State Water and Resources Control Board** - The purpose of this MOA is to outline the procedures for modifying notification requirements for onshore drilling and production oil spills.

- **Joint Coordination Committee** - The purpose of this MOU is to establish a Joint Coordination Committee for Natural Resources Damage Assessment, California Environmental Quality Act and other studies related to the assessment of environmental impacts of Guadalupe Oil Field diluent releases.

- **Department of Fish and Game (DFG), Office of Oil Spill Prevention and Response (OSPR)** -The purpose of this MOA is to establish procedures between the DFG, OSPR and the Division whereby, the Division will participate in monthly marine aircraft patrol flights to monitor offshore oil and gas operations and provide reports of such activities to OSPR.

- **Office of Oil Spill Prevention and Response, State Lands Commission, California Coastal Commission, State Water Resources Control Board** - The purpose of this MOA is to establish the Review Subcommittee, which is responsible for reviewing regulations, guidelines, and amendments to the state oil spill contingency plan.

- **Santa Barbara County** - The purpose of this MOU is to establish procedures between the Division and Santa Barbara County for delineating administrative field boundaries for new oil and gas fields and altering the administrative field boundaries of existing oil and gas fields within Santa Barbara County.

- **U.S. Environmental Protection Agency (USEPA) for Geothermal Wells** - The purpose of this MOA is to establish the responsibilities of and procedures to be used by the USEPA and the Division in the administration of the Underground Injection Control program for geothermal energy Class V injection wells.

- **U.S. Fish and Wildlife Service, Bureau of Land Management, Department of Fish and Game, California Energy Commission, County of Kern** - The

purpose of this MOU is to define relationships among agencies with permit or regulatory authority over Species of Concern and to develop a cooperative program called the Kern County Endangered Species Program, which will ensure that the activities of private parties will comply with applicable laws and regulations concerning the Species of Concern in Kern County, and which will provide long-term protection of such species.

- **California State Water Resources Control Board** - The purpose of this MOA is to outline the procedures for reporting proposed oil, gas, and geothermal field discharges and for prescribing permit requirements.

- **South Coast Air Quality Management District** - The purpose of this MOU is to outline the areas of responsibility between the South Coast Air Quality Management District (SCAQMD) and the Division for the inspection of oilfield valves and flanges that fall under the provisions of SCAQMD Rule 466.1.

- **Minerals Management Service (MMS)** - The purpose of this MOU is to establish that MMS and the Division will notify each other and exchange information as soon as offshore, non-routine well-control problems occur in waters adjacent to California that are under the jurisdiction of each respective agency.

- **Addendum to the Primacy Memoranda Agreement** - As of March 30,2017

- **Primacy Memoranda of Agreement** -Two competing versions of the September 29, 1982 Memorandum of Agreement between the Division of Oil, Gas and Geothermal Resources and the United States Environmental Protection Agency. California's primacy delegation was made based on one or both of versions of this document. Some related documentation is also included.

- **U.S. Geological Survey (USGS)** - This MOU establishes that the USGS has the responsibility to permit and inspect all exploration, development, production, and utilization operations where the lessee or his operator is conducting the activity to recover Federal geothermal resources.

Covered Species

The California tiger salamander, California red-legged frog, and Lompoc yerba santa are the only species covered under this GCP, and therefore it only addresses impacts to and conservation of these species. The California tiger salamander, California red-legged frog, and Lompoc yerba santa are described further in Section 3 of this GCP.

The Service evaluated the potential for other federally listed species, candidate species, species proposed for Federal listing, eagles, and migratory birds with the GCP Planning Area that could be affected by the Covered Activities (Section 2). Project proponents must avoid or receive separate take authorization for other federally protected species that occur within their respective

project area(s) to meet issuance criteria for participation in the GCP. Failure to provide for compliance with the Act for other regulated species may constitute a violation of Section 9, and may result in suspension or revocation of Permits issued under the GCP.

Alternatives to the Taking

Section 10(a)(2(A)(iii) of the Act requires that the applicant describe "what alternative actions to the taking the applicant considered, and the reasons why such alternatives are not being utilized." The only alternative to the proposed incidental taking we considered is for project proponents to avoid any actions that could result in take of federally listed species. This is synonymous with a no-action alternative, in which the project proponent would modify their project to avoid take of listed species altogether. Under this alternative, exploration, storage, remediation, development, and transportation of crude oil, natural gas, and petroleum products would be curtailed within the range of these federally listed species (to avoid take of the species) and therefore would not meet the needs of project proponents. Complete avoidance of federally listed species and their associated habitats is not practical or feasible for most oil and gas industry activities within the Planning Area.

Section 2
Covered Activities

Only actions listed and described here as "Covered Activities" are eligible to receive incidental take authorization through this GCP. Industry standards, disturbance area estimates, and averages were obtained primarily from representatives of the oil and gas industry and were used when estimating the overall oil and gas development that may occur within the Planning Area over the term of the GCP.

All Covered Activities associated with each project must be fully contained within the Planning Area to be eligible to participate through the GCP. Therefore, pipelines or other infrastructure that extend beyond the GCP Planning Area are not eligible to participate in this GCP and project proponents should seek incidental take authorization independent of the GCP, if needed.

For the purposes of this GCP, Covered Activities are categorized and defined as "Upstream Activities" and "Midstream Activities," which are commonly used terms in the crude oil, natural gas, and petroleum products industries. Some overlap between the two categories may occur, and different Federal agencies may define "upstream" and "midstream" differently than the definitions in this GCP. The following descriptions provide an overview of the activities analyzed and for which incidental take coverage will be available through this GCP.

Given the potential significant effects that are likely to result from the establishment of new oil fields, construction of well pads is generally limited to existing oil field facilities and must meet the scope of this GCP and associated NEPA document. As described in Section 6 *Permit Processing and Implementation*, the Service will review each application for take coverage received under this GCP to ensure the proposed project fits within the scope of this Plan and associated NEPA document.

Upstream Activities

Upstream activities, as defined by this GCP, includes activities associated with oil, natural gas, and other petroleum products and development of the infrastructure required to extract those resources. Upstream activities include the following:

1. Geophysical exploration (seismic exploration)

2. Well field development (construction, operation, and maintenance of new and existing well field infrastructure and decommissioning of obsolete facilities) including:
    a) Well pads
    b) Drilling and completion activities

c) Pipelines located within the oil field, including gathering lines, header systems and production tanks
d) Wells
e) Gas flaring
f) Work and access roads
g) Electrical distribution lines (voltage must be 34.5 kilovolts (kV) or less)
h) Equipment and multiphase booster pads
i) Communication towers
j) Tank batteries

3. Renewable energy production facilities and infrastructure

The following sections provide a description of the upstream activities listed above.

Geophysical Exploration

Geophysical exploration is the process of locating oil and gas deposits beneath the earth's surface. This involves generating seismic waves and measuring their reflectance through differing geologic structures. These seismic waves may be initiated by detonating explosives or through a process known as "land vibroseis." Reflected seismic waves are recorded and interpreted to characterize subterranean landforms. Seismic companies often design sound generation points to avoid identified sensitive habitats and hazards and still collect meaningful data. Ground disturbance associated with geophysical exploration may include clearing vegetation or construction of roads. In some instances, hand crews are used to place source and receiver lines and drill shot holes, avoiding the necessity of road building. Hand crews and their equipment can be brought in to remote or environmentally sensitive sites by helicopter, known as heliportable drilling. In other cases, small off-road vehicles can be used for equipment and personnel. Vehicles used in the course of geophysical exploration activities sometimes include the use of wide track or rubber tires and smooth treads on vibroseis trucks to minimize disturbance and soil compaction. Road building or clearing may result in a maximum ground disturbance of 2 acres per square mile (0.8 hectares per 2.6 square kilometers).

Well Field Development

Well Pad Construction

Areas determined to have recoverable crude oil or natural gas deposits must be developed as well fields to initiate extraction of these resources. Well fields include facilities and infrastructure that support oil and gas production. Well pads include all structures and equipment necessary for recovering crude oil and/or natural gas (production wells). Well pads may also be necessary for obtaining water for oil and gas recovery (water wells) or disposal of fluids used in the oil and gas recovery following production (disposal wells). This includes the primary facilities including the pad, drilling rig, pump or well head, and baker tanks for the containment of drilling muds and cuttings. The well pad may also include facilities such as storage tanks for extracted water and crude oil, fuel tanks, water tanks, mist pumps, mud pumps, flow lines, pipelines, and associated electrical equipment. The pad also houses structures such as the cellar (where the well's main

borehole is drilled), drilling pipe storage areas (referred to as the rat and mouse holes), and various trenches and sumps, which collect liquids.

Typical well pad construction requires vegetation clearing; grading to level the site; construction of stormwater and erosion control structures; laying shale, gravel, and/or rock over the well pad; and constructing reserve/cutting pits, trenches, sumps, a cellar, and the rat and mouse holes. Land clearing, grading, and construction are typically performed with a bulldozer or other heavy equipment. Soil is typically excavated to a depth of approximately 6 inches during routine well pad installation.

Topsoil removed from the construction area is typically stored for use during site restoration. Vegetation debris piles are stored along the edges of the construction site and are typically buried in the reserve pit or left in place after drilling operations are completed.

Additional shale, gravel, and/or rock may be delivered to the construction site via dump trucks to aid in leveling the site and raise the pad above grade. Once completed, additional gravel or rock is hauled in to cover the vehicular traffic areas and trailer areas associated with drilling operations. Once constructed, the majority of the pad site is a long-term installation (30-40 years or more for a productive well). Once a well is ready for production, reserve pits and slopes used for drilling purposes are restored with topsoil and revegetated. Standard erosion control measures are incorporated into each well pad site.

Pipeline Construction

Oil and gas pipeline construction involves land clearing activity where right-of-ways (ROWs) are cleared and graded. Pipeline construction ROWs are typically divided into four areas of activity: trenching, spoil piles (excavated materials consisting of topsoil or sub-soils that have been removed and temporarily stored during the construction activity), pipeline assembly, and vehicle traffic areas. Clearing and installation of the pipeline typically requires the use of heavy equipment. The types of equipment used during construction may include track-hoes, bulldozers, side booms, bending machines, ditching machines, boring machines, and in some cases hydraulic directional drilling rigs. Pipe hauling and welding trucks as well as miscellaneous smaller vehicles are also used on most projects.

Pipeline ROW widths are determined by the pipeline diameter and material, as well as terrain and site-specific conditions. Trench widths are determined by the pipeline diameters (e.g., typically the diameter of the pipe plus 6 to 12 inches clearance between the pipe and the trench wall) and pipeline burial depths (e.g., deeper trenches usually dictate greater trench widths to address sidewall instability and worker safety). Pipeline construction ROWs also vary based on the type of pipeline. Gathering pipeline ROWs (the smaller interconnected pipeline networks which bring crude oil and/or natural gas from wells to treatment plants or processing facilities) average 50 feet in width. Transmission pipeline (longer pipes with larger diameters that move oil and gas longer distances) typically have construction ROWs of 75 feet to 150 feet depending on pipe sizes. Distribution pipelines (pipelines used to take products to the final consumer, including feeder lines) typically consist of small diameter, pipelines with construction ROWs of 10 to 50 feet.

Typical pipeline construction proceeds along the ROW in one continuous operation. Prior to initiating ground-disturbing activities, existing underground utilities (i.e., cables, conduits, and pipelines) must be located, identified, and flagged to prevent accidental damage during pipeline construction. Project areas are cleared of vegetation and large obstacles, such as trees, rocks, brush, and logs. Timber is only removed where necessary for construction purposes. Timber and other debris are burned or disposed of in accordance with applicable regulations.

Following clearing, the construction workspace is graded where necessary to allow safe passage of equipment. Temporary erosion and sediment controls are installed after initial disturbance of the soils, in accordance with local, state, and Federal regulations. Also, during grading, topsoil may be stripped from the area overlying the pipeline trench and spoil piled in the ROW. The topsoil is stockpiled separately from the subsoil. The segregated topsoil is typically restored to its original location immediately following installation of the pipe and backfill of the trench to reduce erosion and preserve native seed stock.

In some instances, pipelines may be constructed above ground and placed on double “tee” stands to minimize impacts to habitat edges and rare plants. In steep or other constrained areas, concrete anchors can be used to support the tee stands.

Trenching may be accomplished with back-hoes, track-hoes, or similar other ditching equipment. Excavated soil is placed to one side of the trench in a spoil pile. After a trench is excavated and pipeline assembled, the pipe is laid in the open trench using a side boom. The excavated trench is backfilled with the previously removed soil.

Depending on pipeline size and type, hydrostatic tests may be conducted by filling the pipeline with water and pressurizing it to ensure integrity at operating pressures. After backfilling the trench, work areas are graded and restored as closely as possible to preconstruction contours, and previously segregated topsoil is spread across the construction right-of-way. Surplus construction material and debris is removed, and typically vegetation is reestablished (usually through seeding). To minimize future settling, the trench may be compacted with tracked construction equipment or left crowned. Permanent erosion controls are installed within the right-of-way as needed during the restoration phase.

Pipe installation by conventional or directional boring, also known as horizontal direction drilling, may be utilized at roads, railroad crossings, water crossings, or in other sensitive areas. Conventional road boring requires excavation of a pit on either side of the feature, the placement of boring equipment in the pit, and boring under the feature. Horizontal directional drilling is a trenchless crossing method that is typically carried out in three stages: (1) directional drilling of a small diameter pilot hole; (2) enlarging the pilot hole to a sufficient diameter to accommodate the pipeline; and (3) pulling the prefabricated pipeline into the enlarged bore hole.

Contractor yards and pipe storage areas are generally located in existing commercial/industrial sites or other previously disturbed areas, but may require land clearing in areas with native vegetation. Extra workspace, such as areas needed for equipment storage and trenching, is

sometimes required at stream, wetland, railroad, road, and other pipeline crossings due to extra safety and environmental precautions often taken in these areas.

Road Construction

Development of well fields relies on existing roadways or may require construction of new roads. Newly constructed roads are first cleared of vegetation with a bulldozer and leveled with a road grader. Shale/rock/gravel and/or asphalt is used to stabilize the length of the road. Approximately 80 percent of newly constructed roads remain in permanent use, and 20 percent are temporary (existing for less than five years) and are restored to natural conditions. Road length can vary significantly, however the average road length per well pad is 300 feet. Rights-of-way (ROW) for access roads average 25 feet in total width for permanent roads and 15 feet for temporary roads. Roads require periodic maintenance to correct washouts or other deterioration. Where necessary, culverts and ditches may be installed to facilitate drainage away from the road. Culverts that require a waterway crossing would trigger the need for project proponents to apply for a permit with the Army Corps of Engineers.

Electrical Distribution Lines

Each well pad has its own electrical distribution line (voltage must be 34.5 kV or less to be covered under this GCP), unless power is provided by a generator. Vegetation clearing and grading along the electric transmission ROW are typically necessary prior to installation. The length of electric distribution line necessary at each facility is determined by the location and distance to the nearest existing active line and is, on average, 300 feet in length. ROWs average 30 feet in width. Distribution lines are typically suspended 30 feet above grade and are typically constructed above-ground, with 18-inch diameter poles approximately every 75 – 80 feet. Electrical distribution lines and poles are needed throughout the life of the well.

Less often, electrical distribution lines may be buried to meet the needs of the project design. If distribution lines are buried below-ground, trenching is accomplished with back-hoes, trackhoes, or similar other ditching equipment. Excavated soil is placed to one side of the trench in a spoil pile. After the trench is excavated, the electric line is then strung in the open trench. The excavated trench is backfilled with the previously removed soil. If a high voltage (12k or above) electric line is used, the trench may be cemented to prevent accidental uncovering or impact.

Drilling, Completion, and Production

Following construction of access roads and well pads, drilling rigs and associated equipment are transported to the well pad and installed. Drilling rigs are approximately 140 to 180 feet in height. All drilling activities occur within the previously disturbed (cleared and graded) well pad. After drilling is completed, the rig is removed. All activities associated with drilling and well completion occurs on previously disturbed areas or newly constructed pads. Drilling rigs typically include multiple sources of light to allow for 24-hour drilling activity.

Gas Flaring

Some operations may produce natural gas as a byproduct of other operations at rates that are not economically feasible to collect for sale. In some locations, no pipeline infrastructure is available to transport natural gas offsite. If no other use for the gas is found, such gas may be flared (burned in the air) for disposal over a 3 to 6-day initial period during drilling and production. This gas passes through a vent away from the well and is burned in the presence of a pilot flame. Additionally, smaller flares may be associated with tanks at production sites. These smaller flares may be burning constantly throughout the production process. Gas flaring must be in compliance with the Santa Barbara County Air Pollution Control District and California Air Resources Board.

Communication Towers

Communication towers may be required at some facilities, are usually constructed within the permanent footprint of the well pad, and typically range from 10 – 200 feet in height. Under the GCP, communication towers must be less than 200 feet in height, shall not use any guy wires, and not use lighting, unless required by the Federal Aviation Administration. Communication towers that exceed 200 feet in height or require guy wires are not eligible for inclusion under this GCP. Project proponents with these towers should seek consultation with the Ventura Fish and Wildlife Office to address potential impacts to listed species through a separate permitting process. Towers exceeding 200 feet in height typically have Federal oversight through the Federal Aviation Administration or Federal Communications Commission.

Tank Batteries

One or more tank batteries may be required at some facilities. Tank batteries are connected to receive and store crude oil production from a well or a producing lease. A Tank Battery is typically made up of two or more storage tanks which have crude oil storage capacities up to 4 days production. Tank Batteries are equipped with all the measuring equipment and fireproof equipment.

Operation, Maintenance, and Decommissioning of Wells, Roads, and Electrical Distribution Lines

Covered Activities for the purposes of this GCP include operation and maintenance of newly built and existing crude oil, natural gas, and petroleum facilities and decommissioning of obsolete facilities. Operation and maintenance activities may be routine (e.g.., planned upgrades to equipment) or emergency (i.e., unplanned repairs).

Well operation and maintenance activities typically occur within the existing well pad. Erosion affecting adjoining property may require disturbance outside of the existing well pad to repair and install additional erosion control features. Decommissioning of wells may involve removing or capping the permanent structures and restoring the area of the well pad to its original condition.

Operation and maintenance of permanent access roads includes adding additional surface material (e.g., asphalt, gravel, dirt) to the road and maintaining bar ditches. Roads would require

periodic maintenance to correct washouts or deterioration. To minimize dust, water may be applied to roads. All additional disturbances would occur within previously disturbed areas or newly constructed pads.

If a road is no longer needed, surface material would be removed and native vegetation is typically restored by seeding. Temporary roads may be restored with native vegetation following construction and would not require any operation and maintenance activities.

Operation and maintenance of electric distribution lines may include pole replacement and repairing above-ground lines. Most repairs require less than 1 acre of disturbance, typically about 50 square feet. Electric distribution line ROWs are kept clear of trees and brush to provide for line maintenance. Vegetation is typically maintained with mowing equipment (tractor, brush hog, etc.) or herbicide application (by applicators on foot or all-terrain vehicles) once every one to three years. Decommissioning of above ground electric distribution lines may involve removal of poles and distribution lines for above-ground lines. Buried electric lines would likely be left in place once disconnected from power sources.

Renewable Energy Production Facilities and Infrastructure

Some applicants may construct renewable energy sources in the form of PV solar panels and/or small wind projects to provide energy for oil and gas production activities. Solar facilities would generally include photovoltaic energy panels, an interconnecting power line (gen-tie line) to a substation, access roads, electrical switch station, and other necessary infrastructure. Wind projects would generally include wind turbines, an interconnecting power line (gen-tie line) to a substation, access roads, electrical switch station, and other necessary infrastructure. Wind turbines would range from 50 kilowatts (kW) to 300kW. Their blades typically range from 4 feet to 12 feet. Project proponents with wind turbines should seek consultation with the Ventura Fish and Wildlife Office to address potential impacts to listed species through a separate permitting process. Turbines exceeding 200 feet in height typically have Federal oversight through the Federal Aviation Administration or Federal Communications Commission.

The method used to construct the gen-tie lines and access roads would occur in a manner similar to what is described in this section for transmission lines and access road, respectively. Operations and maintenance of renewable energy projects would occur in a manner similar to what is described throughout this section for operations and maintenance of other infrastructure.

Midstream Activities

Midstream activities, as defined in this GCP, includes gathering, processing and treatment, transmission, and distribution of crude oil, natural gas, or other petroleum products. Petroleum products may include unprocessed natural gas liquid or condensate streams (including methane, ethane, propane, butane, and pentane). Refined oil products including gasoline, diesel, and kerosene may also be transported via pipeline. Midstream activities include the following:

1. Pipeline construction (gathering, transmission, and distribution pipelines)

2. Construction of associated surface facilities, including:
    a) Access roads and bridges
    b) Booster, compressor, and pump stations
    c) Meter stations, mainline valves, pig launchers and receivers, regulator facilities, and other required facilities
    d) Natural gas processing and treatment facilities
    e) Communication towers
    f) Electric distribution lines (voltage must 34.5 kV or less)
    g) Electric substations

3. Oil seep management

4. Operation and maintenance of pipeline and associated surface facilities

5. Decommissioning and reclamation of pipeline and associated surface facilities

6. Onsite mitigation areas and/or mitigation banks

7. Habitat restoration activities

The following sections provide a description of the midstream activities listed above.

Pipeline Construction

Oil and gas pipeline construction involves land clearing activity where ROWs are cleared and graded. Pipeline construction ROWs are typically divided into four areas of activity: trenching, spoil piles (excavated materials consisting of topsoil or sub-soils that have been removed and temporarily stored during the construction activity), pipeline assembly, and vehicle traffic areas. Clearing and installation of the pipeline typically requires the use of heavy equipment. The types of equipment used during construction may include track-hoes, bulldozers, side booms, bending machines, ditching machines, boring machines, and in some cases hydraulic directional drilling rigs. Pipe hauling and welding trucks as well as miscellaneous smaller vehicles are also used on most projects.

Pipeline ROW widths are determined by the pipeline diameter and material, as well as terrain and site-specific conditions. Trench widths are determined by the pipeline diameters (e.g., typically the diameter of the pipe plus 6 to 12 inches clearance between the pipe and the trench wall) and pipeline burial depths (e.g., deeper trenches usually dictate greater trench widths to address sidewall instability and worker safety). Pipeline construction ROWs also vary based on the type of pipeline. Gathering pipeline ROWs (the smaller interconnected pipeline networks which bring crude oil and/or natural gas from wells to treatment plants or processing facilities) average 50 feet in width. Transmission pipeline (longer pipes with larger diameters that move oil and gas longer distances) typically have construction ROWs of 75 feet to 150 feet depending on pipe sizes. Distribution pipelines (pipelines used to take products to the final consumer, including feeder lines) typically consist of small diameter, pipelines with construction ROWs of 10 to 50 feet.

Typical pipeline construction proceeds along the ROW in one continuous operation. Prior to initiating ground-disturbing activities, existing underground utilities (i.e., cables, conduits, and pipelines) must be located, identified, and flagged to prevent accidental damage during pipeline construction. Project areas are cleared of vegetation and large obstacles, such as trees, rocks, brush, and logs. Timber is only removed where necessary for construction purposes. Timber and other debris are burned or disposed of in accordance with applicable regulations.

Following clearing, the construction workspace is graded where necessary to allow safe passage of equipment. Temporary erosion and sediment controls are installed after initial disturbance of the soils, in accordance with local, state, and Federal regulations. Also, during grading, topsoil may be stripped from the area overlying the pipeline trench and spoil piled in the ROW. The topsoil is stockpiled separately from the subsoil. The segregated topsoil is typically restored to its original location immediately following installation of the pipe and backfill of the trench to reduce erosion and preserve native seed stock.

In some instances, pipelines may be constructed above ground and placed on double “tee” stands to minimize impacts to habitat edges and rare plants. In steep or other constrained areas, concrete anchors can be used to support the tee stands.

Trenching may be accomplished with back-hoes, track-hoes, or similar other ditching equipment. Excavated soil is placed to one side of the trench in a spoil pile. After a trench is excavated and pipeline assembled, the pipe is laid in the open trench using a side boom. The excavated trench is backfilled with the previously removed soil.

Depending on pipeline size and type, hydrostatic tests may be conducted by filling the pipeline with water and pressurizing it to ensure integrity at operating pressures. After backfilling the trench, work areas are graded and restored as closely as possible to preconstruction contours, and previously segregated topsoil is spread across the construction right-of-way. Surplus construction material and debris is removed, and typically vegetation is reestablished (usually through seeding). To minimize future settling, the trench may be compacted with tracked construction equipment or left crowned. Permanent erosion controls are installed within the right-of-way as needed during the restoration phase.

Pipe installation by conventional or directional boring, also known as horizontal direction drilling, may be utilized at roads, railroad crossings, water crossings, or in other sensitive areas. Conventional road boring requires excavation of a pit on either side of the feature, the placement of boring equipment in the pit, and boring under the feature. Horizontal directional drilling is a trenchless crossing method that is typically carried out in three stages: (1) directional drilling of a small diameter pilot hole; (2) enlarging the pilot hole to a sufficient diameter to accommodate the pipeline; and (3) pulling the prefabricated pipeline into the enlarged bore hole.

Contractor yards and pipe storage areas are generally located in existing commercial/industrial sites or other previously disturbed areas, but may require land clearing in areas with native vegetation. Extra workspace, such as areas needed for equipment storage and trenching, is

sometimes required at stream, wetland, railroad, road, and other pipeline crossings due to extra safety and environmental precautions often taken in these areas.

Construction of Associated Surface Facilities

Surface facilities associated with crude oil, natural gas, and petroleum product pipelines may include access roads, booster stations, pump stations, compressor stations, generators, valve sites, meter stations, pig (a device used to clean and/or inspect pipelines) launchers and receivers (locations where pigs are inserted into or removed from a pipeline), processing/treatment plants, communication towers, electric distribution lines and other utilities, electric substations, equipment yards, field offices and other infrastructure within the oil field. The number, type, and size of facilities required for each pipeline varies depending on the size of the pipeline, product being transported, topography of the area, existing infrastructure in the area, and needs of the project proponents.

Construction of access roads may be necessary to reach oil wells, pipelines and/or associated facilities if existing roads are not available. Some of these access roads may be reclaimed following construction; however others remain for operation and maintenance of the pipeline and associated facilities. Roads typically range in widths from 15 to 30 feet, with an average length of 0.25 miles, depending on the location and necessary use. Roads are expected to require periodic maintenance to correct washouts or other deterioration. Where necessary, culverts and ditches may be installed to facilitate drainage away from the road. Additionally, the construction of bridges may be necessary if a creek crossing or drainage is located within a project area.

Booster, compressor and/or pump stations are generally required at intervals between 25 and 100 miles along a pipeline to maintain or increase internal pressures and keep the flow of oil or gas moving through the pipeline at an appropriate rate. The location of these stations is typically determined by topography, the type of product being transported, and system hydraulic requirements. Compressor, booster, and pump stations are usually built within or adjacent to the pipeline right-of-way. Additional clearing and grading may be required at these facilities during construction. Office, control, utility, storage, and maintenance buildings and parking areas may be associated with these facilities. These associated facilities range in size from approximately 0.1 acres to over 5 acres. Compressor and pump station facilities generally incorporate gravel or other hardened surfaces, lighting, and perimeter fencing.

Associated surface facilities that occur within pipeline ROWs may include meter stations, mainline valves, pig launchers/receivers, regulator facilities, lease automatic custody transfer (LACT) units and other required facilities. Connections between large transmission pipelines and smaller pipelines require meter/regulator stations to control the metering and flow control. Mainline valves are installed along transmission pipelines to enable portions of the pipeline to be shut down or isolated, if necessary. Pig launcher/receiver facilities are usually installed at locations of other aboveground facilities such as compressor stations or meter stations, but these facilities may also be required at points of pipeline diameter change or to accommodate the maximum practical distance that can be recorded by a pig during internal inspections. Regulators, which control the pressure of sections of pipeline, are associated surface facilities for natural gas distribution pipelines. Gas flaring may be associated with tanks at surface facilities.

Each meter station, mainline valve site, pig/launcher/receiver, and regulator facility may be surrounded by security fencing.

Other accessories include miscellaneous facilities such as filter/separators, miscellaneous valves, sumps, tanks, yard piping, pipeline markers, cathodic protection system (a method of protection for iron and steel against electrochemical corrosion) components, generators, offices, storage buildings, equipment yards, and sheds. These are often associated with other surface facilities like compressor stations, but some, such as pipeline markers, may be located independently on pipeline ROWs.

Additional processing or treatment facilities may be required to process natural gas before it can be transported. Relatively few natural gas processing facilities are necessary, as gathering systems may interconnect more than 100 wells to a processing facility. These facilities generally range in size from approximately 5 to 30 acres. Processing facilities generally include hardened surfaces, lighting, and perimeter fencing.

Communication towers may be required at some of the associated surface facilities, are usually constructed within the permanent footprint of the facility, and typically range from 10 to 200 feet in height. Under the GCP, communication towers must be less than 200 feet in height, would not use any guy wires, and not use lighting, unless required by the Federal Aviation Administration. Communication towers that exceed 200 feet in height or require guy wires are not eligible for inclusion under this GCP. Towers exceeding 200 feet in height typically have Federal oversight through the Federal Aviation Administration or Federal Communications Commission.

Electric distribution lines (voltage of 34.5 kV or less) and other utilities are often constructed to serve facilities that need a source of electricity, such as compressor and pump stations, valve sites, and processing plants. Vegetation clearing and potentially grading along the electric distribution right-of-way are typically necessary prior to installation. The length of electric distribution line necessary is determined by the location and distance to the nearest substation. Distribution lines are usually between 0.5 miles and 5 miles in length. If distribution lines are buried below-ground, trenching is accomplished with back-hoes, trackhoes, or similar other ditching equipment. Excavated soil is placed to one side of the trench in a spoil pile. After the trench is excavated, the electric line is then strung in the open trench. The excavated trench is backfilled with the previously removed soil. If above-ground, distribution lines are approximately 18 to 40 feet high, depending on the voltage required. Poles are usually constructed every 75 to 80 feet. The typical permanent ROW is approximately 20 feet wide. Electrical distribution lines and poles are needed throughout the life of the well pad and are considered permanent structures; however, ROWs associated with these lines may be maintained as native vegetation.

Electric substations may be associated with electric distribution lines. These substations generally require approximately 2 to 5 acres of disturbance. Electric substations are usually located off a county road but occasionally require an access road to be built to the site. Electric substations are typically surrounded by fencing. When constructed in association with an associated facility, the substation may be constructed on the same facility site within an easement granted to the electric service provider.

Oil Seep Management

Oil seeps are releases of crude oil from the ground surface that occur naturally from the shallow, Careaga Formation but may increase in frequency of occurrence and volume with the addition of steam. State and local regulations require control and containment of oil seep flow on the ground and removal and disposal of discharged material. Seep oil that is collected is removed from seep can receptacles via pump or vacuum truck and sent to existing facilities for processing and shipping.

A seep can is a temporary receptacle consisting of a perforated galvanized culvert placed vertically in the ground to collect and contain seep oil. In some cases, an electric pump is attached to the seep can. A seep can's depth is approximately 15 to 20 feet, with a diameter of approximately 24 to 48 inches. Seep cans are removed when seep oil ceases to flow. Installation, management and removal of seep cans can result in habitat disturbance.

Operation and Maintenance of Pipelines and Associated Surface Facilities

Covered Activities include operation and maintenance of existing and newly built facilities and decommissioning of obsolete facilities as described above. Operation and maintenance activities may be routine (i.e., planned upgrades to equipment) or emergency (i.e., unplanned repairs).

During the operation and maintenance phase of midstream activities, visual inspections are performed in accordance with California Department of Transportation regulations and pipeline operator procedures. Such inspections may be carried out by personnel on foot, in all-terrain vehicles, or aerially. Pipeline integrity is checked throughout the pipeline's lifespan, sometimes requiring soil disturbance. Digging to, exposing, and in some instances replacing pipeline, may be necessary based on inspection results. Annual pipeline maintenance generates from 0.005 to 0.015 acres of soil disturbance per mile of pipeline. The Service therefore estimates an average annual total of 0.01 acres per mile of pipeline may be disturbed due to maintenance activities.

The permanent ROWs of larger transmission pipeline, pipeline spans, some gathering lines, and the electric distribution lines are kept permanently clear of trees and brush to allow future maintenance and inspections. Vegetation maintenance is typically done by large mowing equipment (tractor, brush hog, etc.) or herbicide application, by foot or all-terrain vehicles, once every 1 to 3 years.

Gas flaring may be used at associated surface facilities and pipelines. Smaller gas flares may be burning constantly throughout the life of the project, while others may be short-term (20 to 30-minute intervals) that are used as control of pressure for emergency releases.
Operation and maintenance of permanent access roads includes adding additional surface material (i.e., gravel, dirt) to the road and maintaining bar ditches. Disturbances are expected to occur within previously disturbed areas. Roads would require periodic maintenance to correct washouts or deterioration. To minimize dust, water may be applied to roads.

Operation and maintenance of electric distribution lines may include pole replacement for aboveground lines. Repair of buried lines may require soil disturbance to locate problems. These repairs typically rely on existing roads. Most repairs require less than 1 acre of disturbance, typically about 50 square feet.

Decommissioning and Reclamation

Decommissioning a pipeline and associated facilities occurs when the pipeline or facility is no longer functional or necessary. Such facilities are typically removed and the area may be restored to native vegetation conditions. Decommissioned pipelines are either dismantled and removed or left in place. Pipelines left in place are capped and grouted at locations of road/railroad crossings, which requires minor soil disturbance at the locations of the capping. Removing pipelines involves excavating to expose the pipeline, cutting and removing the pipe, and backfilling and reclaiming the area.

If an access road is no longer needed, surface material would be removed and native vegetation is typically restored by seeding. Decommissioning of above ground electric distribution lines involves removal of poles and distribution lines. Buried electric lines would likely be left in place following disconnection from power sources.

Onsite Mitigation Areas and/or Offsite Mitigation Banks

As part of this GCP, compensation lands may be permanently conserved to mitigate project impacts to Covered Species. These lands may be immediately adjacent, or in proximity to, project sites on land owned by applicants, or may consist of offsite compensation lands that are adjacent to or in close proximity to existing blocks of conserved lands that support the Covered Species. All compensation lands should meet the criteria in the Covered Species Recovery Plans and other supporting documents (i.e., conservation strategy, strategic conservation plan, etc.). Section 5 of this GCP further describes these criteria and supporting documents.

Habitat Restoration and Maintenance Activities

Applicants may propose to restore lands that are temporary impacted by Covered Activities to minimize impacts to Covered Species. These lands would be restored and stabilized to reflect pre-existing contours and gradients to the extent practicable. Erosion and sediment controls (e.g., silt fences, fiber rolls, sandbags) would be installed, where necessary, utilizing weed-free materials in areas with a predominance of native plants. Applicants proposing to restore habitat would prepare a Habitat Restoration Plan. The applicant would monitor restoration sites for a minimum of 5 years, or until the Service determines that the Project's long-term performance standards to be satisfied. If habitat restoration is proposed as part of the applicant's mitigation for unavoidable impacts to Covered Species and their habitat, the Service would have the option to require that the applicant provide permanent protection of habitat as suitable mitigation.

The Habitat Restoration Plan would include detailed specifications for restoring all temporarily disturbed areas, such as seed mixes and application methods. The Plan would also indicate the best time of year for seeding to occur. Restored areas would be maintained and monitored,

including weed removal (focused on noxious weeds and excluding non-native annual grasses), to reach a goal of a self-regenerating grassland. All planting and seeding would occur the first year after construction is complete, after the first significant rain event of the year (i.e., more than 0.25 inches of precipitation). The Plan would also include success criteria for all habitat restoration that is based on suitability for the Covered Species.

Applicants may also propose to implement habitat maintenance activities within livestock ponds or other aquatic features that serve as suitable breeding habitat for Covered Species. Many livestock ponds have a lifespan of 30 to 50 years and require spillway/berm repair and sediment or vegetation removal during this time span. Other aquatic features such as modified ponds may also require regular sediment or vegetation removal.

Section 3
Environmental Setting and Covered Species

Climate

The regional climate is mild and typifies a Mediterranean coastal climate throughout the year that is characterized by long, dry summers and short, wet winters. Fog is common during the late spring and summer months and moderate summer temperatures. Temperatures range from 50 degrees Fahrenheit to 74 degrees Fahrenheit during the summer, with an average of 62 degrees Fahrenheit, and from 40 degrees Fahrenheit to 64 degrees Fahrenheit during the winter months, with an average temperature of 52 degrees Fahrenheit. On average the warmest month is September and the coolest month is January. Precipitation within the planning area varies greatly from season to season and with each location. The average annual precipitation in the northern and southern portions of the planning area is 13.31 inches and 16.7 inches, respectively (County of Santa Barbara, 2017). Most of the precipitation occurs from November to April and highest rainfall occurring in February (Western Regional Climate Center [WRCC], 2016). Climate studies have determined that drought periods occur regularly and may last as long as a decade or more. Prior to the current, the most recent drought lasted from 1986 to 1991, during which water storage in the county's major reservoirs was nearly depleted. With a mean annual rainfall of 18.55 inches, only 6.41 inches of rain were recorded in Santa Barbara in 2007; this was the driest year of record.

Topography/Geology

In general, the planning area is characterized by low elevation (generally under 1,500 feet) grassland, oak savannah, and coastal scrub plant communities of the Santa Maria, Los Alamos, and Santa Rita Valleys in the northwestern area of Santa Barbara County. The underlying soils generally consist of unique soil formations, including dune fields (e.g., Orcutt Terrace Dune Sheet), folded and faulted ridges (e.g., Casmalia, Purisima, and Santa Rita Hills), and adjacent valleys (e.g., Los Alamos and Santa Rita Valleys) (Hunt 1993, Ferren and Hecht 2003).

Hydrology/Streams, Rivers, Drainages

The planning area is located within the Central California Coastal Hydrologic Unit and crosses the Santa Maria, Los Alamos, Lompoc, Santa Ynez Valleys, and covers a portion of the Santa Barbara Coastline.

The Santa Maria Valley is bound by the Santa Maria River to the north and the Casmalia and Solomon Hills to the south, which creates a valley that opens toward the Pacific Ocean. The

Santa Maria River watershed includes all areas tributary to the Cuyama River, Sisquoc River, and Santa Maria River. At 1.2 million acres, the Santa Maria River watershed is one of the larger coastal drainage basins of California. The Santa Maria River is formed by the confluence of the Cuyama and Sisquoc approximately seven miles southwest of Santa Maria.

The Los Alamos Valley is largely characterized by high quality pastoral, agricultural, and natural landscapes along San Antonio Creek, which is situated before the Solomon and Purisima Hills. The watershed is drained westerly by the San Antonio Creek and discharges into the San Antonio Lagoon at the Pacific Ocean.

The Lompoc Valley encompasses the City of Lompoc and the unincorporated areas of Vandenberg Village and Mission Hills. The Lompoc Valley is located along the Santa Ynez River watershed. Other surface water features in the Lompoc Valley include the San Miguelito Creek, which joins the Santa Ynez River just west of Lompoc.

The Santa Ynez Valley is broad and flat, with marine terraces, as well as some rolling hills and rugged mountains. Major waterways in the Santa Ynez Valley include the Santa Ynez River, Alamo Pintado Creek, Zaca Creek, and Zanja de Cota Creek. The Santa Ynez River is 75 miles long and drains the north slope of the Santa Ynez Mountains and the south slope of the San Rafael Mountains. It also drains much of the southern half of Santa Barbara County.

The Santa Ynez Mountains drop steeply to the Santa Barbara coast, and the many small watersheds deliver high sediment yields directly to the shoreline. The Santa Barbara Coastline is a south-facing section of coastline characterized by rapid geologic uplift, as evidenced by the coastal bluffs and narrow beaches that are present along most of the coastline. Coastal sand dunes are scattered along the coastline that are affected by wave action, tides, and wind. Plants found on coastal sand dunes are mostly prostrate herbs with creeping stems and long fleshy taproots.

The planning area contains numerous seasonal ponds, such as vernal pools (seasonal, shallow wetlands that alternate between dry and wet periods) and sag ponds (ponds located in depressions formed at a strike-slip fault). These pools range in size from small pools to shallow lakes. There are also numerous man-made ponds or modified natural ponds that create various types of artificial aquatic habitat. These features are often ponds that are created for the purposes of providing water for cattle when a berm is created in a natural drainage corridor, forming a pond behind it. Along the Santa Barbara coast, many small watersheds drain from Santa Ynez Mountains to the ocean.

Existing and Surrounding Land Uses

Land use within the planning area includes agriculture, residential, recreation, open lands, and urban areas. Highway 101 runs north to south through the eastern portion of the planning area. Due to the size and heavy traffic, Highway 101 is mostly an impermeable barrier to the dispersal of species across the landscape. Many other paved and unpaved roads, which are much smaller in size and traffic, traverse the planning area.

Covered Species

The California tiger salamander, California red-legged frog and Lompoc yerba santa are addressed in this plan. This section provides a concise review of pertinent information on the California tiger salamander, California red-legged frog, and Lompoc yerba santa, including a species description, review of the species' life history, status and distribution, reasons for the species decline, as well as the threats and survival and recovery needs of these species.

California Tiger Salamander Species Information

Description of the California Tiger Salamander

The California tiger salamander is an amphibian in the family Ambystomatidae. The California tiger salamander is a large, stocky salamander, with a broad, rounded snout. It has small eyes, with black irises that protrude from its head.

Adult males are about 8 inches long. Females are about 7 inches long. Adult California tiger salamanders are black or dark grey, with oval to bar-shaped spots ranging in color from white to yellow. The belly varies from almost uniform white or yellow to a variegated pattern of white or pale yellow and black. Males can be distinguished from females, especially during the breeding season, by their swollen cloacae, a common chamber into which the intestinal, urinary, and reproductive canals discharge. They also have more developed tail fins.

Juveniles are dark olive green in color and do not generally have any lighter markings. Larval tiger salamanders have external gills and are olive green in color, generally with very fine dark markings. Eggs are laid underwater singularly or in small groups, on subsurface portions of emergent vegetation or other debris. Each egg is approximately 0.5 to 0.75 of an inch in diameter, including a thick gelatinous layer.

Life History of the California Tiger Salamander

Like other members of family Ambystomatidae, California tiger salamanders spend the majority of their lives underground in small mammal burrows. California tiger salamanders may also use landscape features such as leaf litter or desiccation cracks in the soil for upland refugia. Such refugia provide protection from the sun and wind associated with a dry California climate, which can otherwise desiccate and kill amphibians in upland terrain.

Little is known about the fossorial behavior of California tiger salamanders as they are difficult to observe while underground; most evidence suggests that California tiger salamanders remain active. Because California tiger salamanders arrive at breeding ponds in good condition and are heavier when entering a pond than when leaving, researchers infer that California tiger salamanders are feeding while underground. Trenham (2001) recorded underground movements within burrow systems, and other researchers have used fiber optic or infrared scopes to observe active California tiger salamanders while underground (Semonsen 1998).

Winter rain events trigger California tiger salamanders to emerge from refugia and seek breeding ponds (Storer 1925). After mating, females attach their eggs to submerged twigs, grass stems, vegetation, or debris (Storer 1925; Twitty 1941). California tiger salamander eggs hatch into larvae within 10 to 28 days, (Petranka 1998; Hansen and Tremper 1993), with observed differences likely related to water temperatures. Requiring a relatively short period to complete development of the aquatic larvae as compared to other salamanders, California tiger

salamanders may breed successfully in pools or ponds that are inundated with water for little more than 2 months. The developmental period can be prolonged in colder weather, commonly in excess of 4 months, after which they emerge as terrestrial metamorphic salamanders, between approximately May and August (Trenham et al. 2000).

Lifetime reproductive success of California tiger salamanders is typically low because they require an extended amount of time before they reach sexual maturity (4 to 5 years) (Trenham et al. 2000). Less than 50 percent of first-time breeding California tiger salamanders typically survive to breed more than once (Trenham et al. 2000). Metamorphs also have low survivorship. In some populations, less than 5 percent survive to breed (Trenham 1998). Thus, isolated metapopulations can decline substantially from unusual, randomly occurring, natural events (e.g., disease, drought) as well as from human-caused factors that reduce breeding success and individual survival.

Migration is defined as movements, primarily by resident adults, toward and away from aquatic breeding sites (Semlitsch 2008). For the adult residents using a breeding pond, migrations are reoccurring events (often, but not always annually), round-trip, and intrapopulational (within populations). Dispersal is defined as unidirectional movements that are interpopulational (between different populations) in scale, are ultimately greater in distance than for migrating adults, and may occur only once in a lifetime (Semlitsch 2008). For dispersing juveniles, movement occurs from natal sites to future breeding sites that are not the pond of birth and not part of the local population. For dispersing adults, movement occurs out of the local population and/or between metapopulations. A local population can be either one pond or clusters of ponds in close proximity occupied by one breeding group.

California tiger salamanders can undertake long-distance migrations, and can disperse long distances as well. They have been recorded traveling the second-longest distance among salamanders, which is also the longest of any salamander in the family Ambystomatidae (reviewed in Searcy et al. 2013). California tiger salamanders move more readily among breeding ponds than other members of the family, a characteristic found consistently among different study sites (Trenham et al. 2001, Wang et al. 2011).

Many studies have recorded migration and dispersal distances by adult and juvenile California tiger salamanders, both through radio-tracking (Loredo et al. 1996, Trenham 2001) and upland drift fence capture (Trenham and Shaffer 2005, Orloff 2007, Orloff 2011). None of these studies were conducted within the range of the Santa Barbara County distinct population segment (DPS) of the California tiger salamander, but are considered to be the best available scientific information on the species. Movement of California tiger salamanders is reviewed in Service (2009) and Searcy et al. (2013). In general, adults may migrate up to 1.2 miles from upland habitats to aquatic breeding sites (Service 2000a). Trenham et al. (2001) observed a substantial number of California tiger salamanders moving between ponds separated by up to 2,200 feet. Trenham and Shaffer (2005) used capture data and models to calculate that 95 percent of migrating salamanders remain within 2,034 feet of a breeding pond. Orloff (2011) found that a considerable number of adult and juvenile California tiger salamanders moved more than 2,625 feet from their breeding pond, and some more than 1.4. Based on the numbers captured, Orloff (2011) hypothesized that substantially more than 5 percent of the pond's population must be migrating beyond 2,200 feet from their breeding pond. Based on studies at Jepson Prairie (Central DPS), researchers estimated that California tiger salamanders use a much greater area

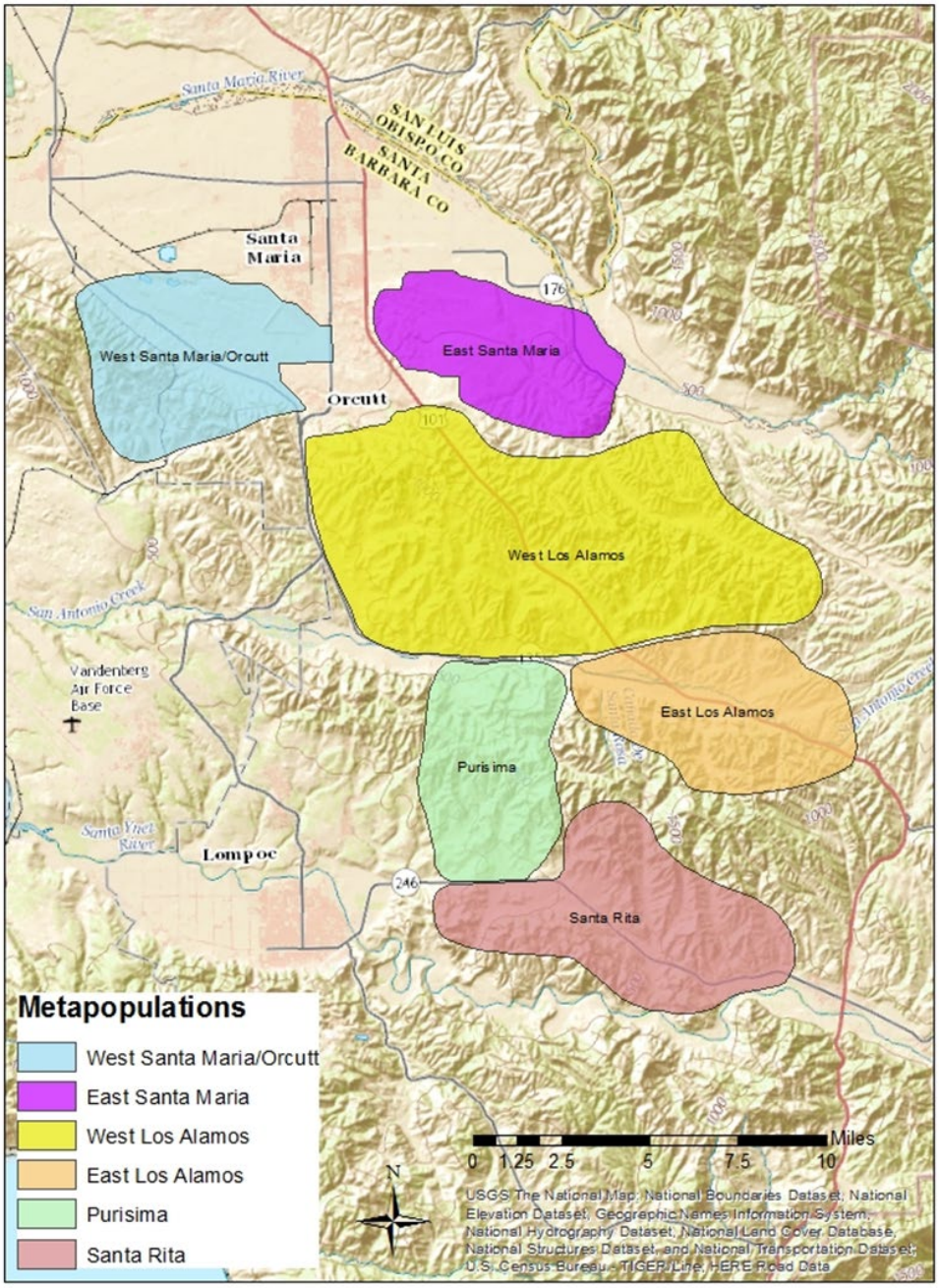
around the pond, as compared to Trenham and Shaffer's (2005) original 2,200-foot estimate, with 95 percent of salamanders found within 1.1 miles of a breeding pond from the most outlying pool edge (Searcy and Shaffer 2008, 2011, Searcy et al. 2013, C. Searcy in litt, 2014).

California tiger salamander larvae typically feed on invertebrate prey. This includes zooplankton, small crustaceans, and aquatic insects until the salamanders grow large enough to switch to larger prey (Anderson 1968, Fisher and Shaffer 1996). Larger larvae consume aquatic invertebrates, as well as the tadpoles of other amphibians such as Pacific chorus frogs (*Pseudacris regilla*), western spadefoot toads (*Spea hammondii*), California red-legged frogs (*Rana draytonii*), bullfrogs (*Lithobates catesbeianus*), and even juvenile mice (Anderson 1968; Trenham et al. 2000, Bobzien and DiDonato 2007). Less is known about the dietary habits of subterranean life stages. Stomach contents of several California tiger salamander sub-adults from the Santa Barbara County DPS included spiders, earthworms, and aquatic insects (Hansen and Tremper 1993). Van Hattem (2004) anecdotally reported a Central DPS California tiger salamander eating a moth while being observed underground.

Status of the California Tiger Salamander

The Santa Barbara County DPS of the California tiger salamander was listed as endangered throughout its entire range in 2000 under the Act. The DPS is endemic to the northern portion of Santa Barbara County, California, and currently consists of six distinct metapopulations (see map below). The recovery priority number for the Santa Barbara County California tiger salamander is 3C, indicating a high potential for recovery and a high degree of threat in conflict with development.

Figure 2. Santa Barbara County Distinct Population Segment of the California Tiger Salamander



A study of genetic effective population sizes (effective number of breeders, as measured by the molecular co-ancestry method) across 30 unique breeding ponds measured effective populations sizes ranging from 0.9 (CI: 0.9 -1.1) to 141.2 (CI: 23.4-362.4). The median effective population size was 12.10, and 22 of 33 ponds exhibited Ne of less than 20 (Toffelmier 2021). Effective population size measurements can be used to estimate the size of the population and trends over time. Recent research on the Central DPS of the California tiger salamander shows Ne is positively related to the area of individual vernal pools; however, no relationship was found with stock ponds (Wang et al. 2011, Shaffer et al. 2013). This suggests that larger vernal pools are

more valuable for the conservation of the species than smaller ones. Although small mammal burrows provide important habitat for California tiger salamander during the terrestrial part of their life cycle, the density of adults in a population has been observed to decrease as burrow densities increase, suggesting that the species is sensitive to other factors than burrow density (Searcy et al. 2013).

California tiger salamander breeding populations can fluctuate substantially due to random, natural processes. At one study site monitored for seven years in Monterey County (Central DPS of the California tiger salamander), the number of breeding adults visiting a site ranged from 57 to 244 individuals (Trenham et al. 2000). Similar work also conducted in Monterey County showed a comparable pattern of variation, suggesting that such fluctuations are typical (Loredo and Van Vuren 1996). Further complicating estimating population size is that salamanders move between ponds (Trenham et al. 2001), or even forego breeding for 2 to 8 years, resulting in negative aquatic surveys despite the presence of the species in adjacent uplands (Trenham et al. 2000, Alvarez et al. 2013)

All occurrences of California tiger salamanders in Santa Barbara County are within the Santa Maria Basin Geomorphic Province, which occurs between the interface of the westernmost extent of the east-west trending Transverse Ranges (i.e., the Santa Ynez Mountains) and the southernmost extent of the north-south trending Coast Ranges (i.e., the San Luis Range and San Rafael Mountains). The Santa Barbara County DPS of the California tiger salamander is restricted to Santa Barbara County in southern California. This population constitutes the southernmost range of the species and is the only one west of the outer Coast Ranges (Service 2000b). At the time of publication of the emergency listing rule in January 2000, the Santa Barbara County DPS of the California tiger salamander was known from 14 ponds in Santa Barbara County. The emergency and final listing rules acknowledged that other potential breeding ponds or pond complexes may exist, but could not be surveyed at that time because of restricted access.

The California tiger salamander has a metapopulation structure. A metapopulation is a set of local populations or breeding sites within an area, where typically dispersal from one local population or breeding site to other areas containing suitable habitat is possible, but not routine. California tiger salamanders appear to have high site-fidelity, returning to their natal pond as adults and commonly returning to the same terrestrial habitat areas after breeding (Orloff 2007, 2011; Trenham 2001). Wang et al. (2009) studied genetic distinctness across 16 Central DPS California tiger salamander breeding sites (Fort Ord, Monterey County), and confirmed genetic differences at almost every site. More work is needed to determine the genetic distinctness across metapopulations in the Santa Barbara County DPS of the California tiger salamander; however, the metapopulation structure of the DPS suggests that there would be similar genetic differences.

The Santa Barbara County California tiger salamander is 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 (Service 2009). For the purposes of this document, a "metapopulation" is defined as a set of local populations or breeding sites within an area, where typically, dispersal from one local population or breeding site to other areas containing suitable habitat is possible, but not routine. The "metapopulation areas" displayed on the maps in this plan (see the map below) encompass both existing, occupied, and potentially occupied, suitable habitat for each metapopulation for regional conservation planning purposes. Critical habitat for

the Santa Barbara County DPS of the California tiger salamander has been designated within portions of each of the six metapopulations (Service 2004b).

Areas designated as critical habitat for the Santa Barbara County DPS of the California tiger salamander is determined by areas that have the physical and biological features that are essential to the conservation of the species. These physical and biological features, or primary constituent elements, for the California tiger salamander are: (1) standing bodies of fresh water, including natural or man-made 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; (2) barrier-free uplands adjacent to breeding ponds that contain small mammal burrows; and (3) upland areas between breeding locations (primary constituent element 1) and areas with small mammal burrows (primary constituent element 2) that allow for dispersal among such sites.

Currently, there are approximately 60 known extant tiger salamander breeding ponds in Santa Barbara County (Service 2009) distributed across the six metapopulations (Table 1). Since listing, the Service and the Department, developed guidance for protocol survey efforts (Service and Department 2003), and this guidance aided in the detection of additional breeding ponds discovered post-listing. Several of the additional ponds were discovered as a result of surveys conducted as a part of proposed development or land conversion projects.

Threats and the Decline to the California Tiger Salamander

The California tiger salamander requires a combination of pond habitat for breeding and upland habitat for its life cycle. The species depends on a series of interconnected breeding and upland habitats as a metapopulation, making it particularly sensitive to changes in the amount, configuration, and quality of these habitats. The loss, destruction, degradation, and fragmentation of habitat represent the primary threats to the California tiger salamander (Service 2000a, b; 2009). Within the range of the Santa Barbara County DPS of the California tiger salamander, significant portions of its habitat have been altered or destroyed. Additional threats to the species include hybridization with non-native tiger salamanders, predation and competition by non-native species, vehicle-strike mortality, and lack of regulatory compliance. Other potential threats include contaminants, disease, and climate change. A majority of the known California tiger salamander occurrences in Santa Barbara County currently occur on private lands, requiring continual coordination with multiple private and local government entities for management.

The ponds available to Santa Barbara County California tiger salamanders for breeding, and the associated upland habitats inhabited by salamanders for most of their life cycle, have been degraded and reduced in area through agricultural conversion, urbanization, and the building of roads and highways. Maintaining inter-pond dispersal potential (connectivity between ponds) is important for the long-term viability of California tiger salamanders; however, the inter-pond linkages between populations of California tiger salamanders in Santa Barbara County are considerably degraded (Pyke 2005).

Habitat loss reduces the available feeding, breeding, and sheltering opportunities required for California tiger salamander survival and reproduction and thus, lowers the carrying capacity of the landscape and threatens the continued existence of the species. Habitat fragmentation reduces

population connectivity needed for dispersal and migration, resulting in isolation of metapopulations within the DPS, making them more vulnerable to small population and stochastic effects. Conversion of California tiger salamander habitat to intensive agricultural uses results in the habitat loss and fragmentation that threatens the Santa Barbara County DPS. Agriculture is the foremost industry in northern Santa Barbara County, and some of the largest agricultural operations of over 1,000 acres are located in the Santa Maria Valley (Santa Barbara County Association of Governments 2007), where two of the six metapopulations occur. Grading and leveling or deep-ripping operations associated with agricultural conversion of uplands have destroyed ponds and pools (Coe 1988), reducing breeding habitat and causing direct injury and mortality to larvae and juveniles occupying the pools. Also, conversion to intensive agriculture can create permanent barriers that can isolate California tiger salamanders and prevent them from moving to new breeding habitat, or prevent them from returning to their breeding ponds or upland habitat.

In addition to agricultural conversion, habitat loss and fragmentation resulting from urban development also threatens aquatic and upland habitat in the range of the Santa Barbara County DPS of the California tiger salamander. Urban growth causes habitat loss and fragmentation as build-outs convert habitat to pavement and creates structures that inhibit normal California tiger salamander movements. The City of Santa Maria and surrounding land is the fastest-growing area in the County, and the population within the City of Santa Maria is forecasted to grow 35 percent by 2040 (City of Santa Maria 2006). To meet the needs of the increasing population, several thousand acres of residentially zoned land will be needed for residences, and several thousand more acres of commercial and industrial development (e.g., schools, parks, and other urban infrastructure) will be needed to support the new residents. Service (2009) contains a detailed description of the threats of agricultural and urban development to each metapopulation of the California tiger salamander in Santa Barbara County.

Roads and highways also create permanent physical obstacles and increase habitat fragmentation. Road construction can reduce or completely eliminate the viability of a breeding site, and in some cases, large portions of a metapopulation. Large roads and highways represent physical obstacles to California tiger salamanders and can prevent them from returning to their breeding ponds or upland habitat, hinder their ability to move to new breeding habitat, and prevent the recolonization of breeding sites; thus, significantly reducing the local breeding population (Trombulak and Frissell 2000).

Santa Barbara County California tiger salamanders are also negatively affected by factors that alter the quality of their habitat, including: measures to control burrowing rodents; dense vegetation, often non-native invasive species, that overtakes vernal pool habitats in the absence of grazing; alteration of hydrology; and pond water quality due to agricultural runoff. California tiger salamanders are strongly associated with California ground squirrel and pocket gopher populations, as the burrows created by active colonies of ground squirrels are necessary for the salamanders to survive (Shaffer et al. 1993, Loredo et al. 1996). Because ground squirrels and pocket gophers are critical for burrow construction and maintenance, and therefore critical to the California tiger salamander, rodent population control efforts are a threat to salamander habitat quality (Shaffer et al. 1993, Loredo-Prendeville et al. 1994). Recovery of ground squirrel populations can be very rapid through immigration from nearby populations with high levels of

reproductive success (Gilson and Salmon 1990), so once control efforts are halted, and the California tiger salamander habitat can recover relatively quickly.

Although poor grazing practices can have negative impacts on California tiger salamanders, grazing generally is compatible with the continued use of rangelands by the California tiger salamander as long as best management practices are followed, intensive burrowing animal control programs are not implemented, and grazing is not excessive (Jones 1993, Shaffer et al. 1993). Cattle ranching can be compatible with California tiger salamander conservation (Service 2003) because cattle also need open grasslands and ponds. Cattle grazing may mediate the effects of increased drying rates on vernal pools due to climate change, by reducing vegetation and allowing for longer periods of inundation that are adequate enough for California tiger salamanders to successfully breed (Pyke and Marty 2005). By keeping vegetation cover low, grazing can make areas more suitable for ground squirrels (whose burrows are used by California tiger salamanders), can facilitate the movement of California tiger salamanders from upland areas to breeding ponds (Service 2003), and allows more surface runoff into the pool basin thereby helping to maintain water available for California tiger salamander breeding. Exclusion of livestock grazing may also allow invasion of aquatic habitat by non-native annual grasses and forbs within and around the bed and shoreline of the pond (Barry 1998). In Santa Barbara County, the remaining vernal pool complexes and isolated ponds with large amounts of suitable California tiger salamander habitat are currently being grazed. Some seasonal ponds have been converted to irrigation ponds, which are often modified or managed in ways that reduce the quality of these pools as California tiger salamander breeding habitat. Such modifications and management include: lining of ponds that cause changes in substrate and water quality; pumping methods that can result in mortality of California tiger salamander larvae; and frequent (often daily) changes in water levels that can result in desiccation of eggs (Collins 2000). Ponds and California tiger salamander larvae inhabiting the ponds are also subject to indirect effects of conversion to row crops such as increased siltation and eutrophication (the process of increased nutrient input) from runoff containing fertilizers which reduces water quality and introduces toxins that can interfere with normal larval development.

Disease is an important causative factor in the global amphibian decline crisis (Daszak et al. 2003). Because the Santa Barbara County DPS of the California tiger salamander has limited genetic variation, it is likely to be more vulnerable to unpredictable factors, including disease (Shaffer et al. 2013). A pathogenic (disease-causing) chytrid fungus (*Batrachochytrium dedrobatidis*), the causative agent of the amphibian disease chytridiomycosis, has been linked to amphibian declines worldwide (Berger et al. 1998, Bosch et al. 2001, Fellers et al. 2001, Skerratt et al. 2007, Kilpatrick et al. 2010). Chytrid fungus was first documented in California tiger salamanders in Santa Clara County, California (Central DPS) (Padgett-Flohr and Longcore 2005). In a short-term laboratory study of the effects of chytrid fungus on California tiger salamanders, the species was found to be susceptible to chytrid fungus, but did not die from chytridiomycosis infection (Padgett-Flohr 2008). Longer-term studies are needed to determine the negative effects of chytrid fungus infection in California tiger salamanders in the wild. Chytrid fungus has been documented in a population of California red-legged frogs in southern Santa Barbara County (AECOM 2009), and from Vandenberg Space Force Base in northern Santa Barbara County (J. LaBonte et al., unpublished data). Although chytrid fungus has not been found responsible for California tiger salamander mortality in the laboratory conditions or the field, its potential to cause mortality or reduced fitness cannot be ruled out (Department

2010). A recently discovered, salamander-specific species of pathogenic chytrid fungus, *Batrachochytrium salamandrivorans* Bsal, has been associated with a mass die-off of salamanders in the Netherlands (Martel et al. 2013); however, the pathogenicity of Bsal to California tiger salamanders, as well as its distribution in North America, is unknown.

Although their impact on the Santa Barbara California tiger salamander is unknown, several disease-causing agents have been associated with die-offs of closely related tiger salamanders and other amphibian species, including: the bacterium Acinetobacter (Worthylake and Hovingh 1989); Ambystoma tigrinum virus, an iridovirus that has caused amphibian die-offs and is lethal to California tiger salamanders (Picco et al. 2007, Picco and Collins 2008); and the water mold Saprolegnia parasitica (Lefcort et al. 1997).

California tiger salamanders in Santa Barbara County are susceptible to predation by several non-native species (Morey and Guinn 1992) such as non-native tiger salamanders (*Ambystoma tigrinum mavortium*), bullfrogs, mosquitofish, other introduced fish, and non-native crustaceans. Bullfrogs prey on California tiger salamander larvae (Anderson 1968) and have been found in at least four California tiger salamander breeding ponds in Santa Barbara County (Service 2009). Introduced predators can be indicators of ponds that are so highly disturbed that California tiger salamanders cannot survive to reproduce successfully (Shaffer et al. 1993). Non-native tiger salamanders from the central United States, which are known to prey on many native amphibians, were introduced to California for fishing bait over 60 years ago (Ryan et al. 2009). Non-native tiger salamanders can have negative effects on California tiger salamander populations through hybridization, resulting in loss of genetically pure native salamanders (Shaffer et al. 1993, Riley et al. 2003).

Two co-occurrence sites have been documented within the Purisima Hills metapopulation, making the Santa Barbara County DPS of the California tiger salamander susceptible to predation (and hybridization) by non-native tiger salamanders. Until recently, it was not known whether non-native tiger salamanders co-occurred with native California tiger salamanders within Santa Barbara County. Ongoing work by the University of California, Los Angeles indicates that hybrid genes are not present in known ponds that are occupied by the Santa Barbara County DPS of the California tiger salamander (Toffelmier 2021).

Mosquitofish, which prey on mosquito larvae, have been widely introduced in California by vector control agencies to control mosquitoes. Mosquitofish are also known to prey on the eggs and larvae of many amphibian species, including the California newt (*Taricha torosa*) (Graf and Allen-Diaz 1993, Gamradt and Kats 1996), California red-legged frog (Schmieder and Nauman 1994), and Pacific tree frog (Goodsell and Kats 1999). Significantly reduced survival of California tiger salamanders has been observed in permanent ponds with high densities of adult mosquitofish (Leyse and Lawler 2000, Loredo-Prendeville et al. 1994), suggesting that mosquitofish also prey on eggs and larvae of California tiger salamanders. California tiger salamanders may be especially vulnerable to mosquitofish predation due to their fluttering external gills, which may attract these visual predators (Graf and Allen-Diaz 1993). Although we do not have specific presence/absence data, mosquitofish may become a more serious threat to California tiger salamander breeding ponds within Santa Barbara County as they are increasingly used for mosquito control. As urban areas continue to expand, the introduction of mosquitofish into previously untreated ponds, in combination with other threats, may result in the elimination of California tiger salamanders from these breeding sites.

In addition to mosquitofish, predation from other introduced, non-native fish threatens the California tiger salamander. Bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), and fathead minnow (*Pimephales promelas*) are some of the fish species that have been found in California tiger salamander breeding ponds in Santa Barbara County (Collins 2000). A number of ponds in or near occupied California tiger salamander habitat in the west Orcutt area have been occupied by introduced fish for more than 20 years (B. Daniels, pers. comm. 2000), likely extirpating any California tiger salamanders that may have bred there. The distribution of the California tiger salamander in the West Los Alamos metapopulation may be limited by catfish (order Siluriformes) that were introduced several years ago (Sweet 2000). California tiger salamanders are absent from a pond with introduced catfish that appears to have suitable breeding habitat, although a pond less than 250 feet away that appears less suitable for breeding, but is free of catfish, is occupied by California tiger salamanders (Sweet 2000). Louisiana red swamp crayfish (*Procambarus clarkii*) may have eliminated some California tiger salamander populations in the Central DPS (Shaffer et al. 1993, Jennings and Hayes 1994), and have been documented in California tiger salamander ponds in Santa Barbara County (Sweet, pers. comm. 1999).

Additionally, California tiger salamander eggs, larvae, and adults are also prey for a variety of native species. Native predators include great blue heron (*Ardea herodias*), great egret (*Casmerodius albus*), western pond turtle (*Clemmys marmorata*), various garter snakes (*Thamnophis spp*.), larger California tiger salamander larvae, larger western spadefoot (*Spea hammondii*) larvae, California red-legged frogs, and raccoons (*Procyon lotor*) (Baldwin and Stanford 1987, Hansen and Tremper 1993, Petranka 1998). Predation by native species is not considered a threat to the Santa Barbara County DPS of the California tiger salamander; however, when combined with other impacts, such as predation by non-native species and habitat alteration, the collective result may be a substantial decrease in population abundance and viability and constitute a significant threat to the DPS.

Introduced species also can have negative effects on California tiger salamander populations through competition (Shaffer et al. 1993). Competition with non-native tiger salamanders can reduce metamorphic size and lengthen time to metamorphosis in California tiger salamanders (Ryan et al. 2009), which can increase desiccation and predation risk as well as competitive ability (Trenham et al. 2000). Therefore, when competing with non-native tiger salamanders and hybrids in ponds, California tiger salamanders are at a distinct disadvantage (Ryan et al. 2009). Competition from fish that prey on mosquito larvae and other invertebrates can reduce the survival of salamanders. Both California tiger salamanders (Stebbins 1962, Anderson 1968, Holomuzki 1986) and mosquitofish feed on microinvertebrates and macroinvertebrates. Large numbers of mosquitofish may out-compete California tiger salamander larvae for food (Graf and Allen-Diaz 1993). The introduction of other fish inadvertently (e.g., fathead minnow; P. Collins, Santa Barbara Museum of Natural History, pers. comm. 1999), for recreational fishing (e.g., largemouth bass, green sunfish; Sweet, pers. comm. 1999), or other purposes may also affect the prey base, reducing survival and growth rates of salamanders.

Climate variability, such as fluctuations between wet and dry periods, is part of natural processes; however, climatic models suggest that much of the recent trends in climate are driven by anthropogenic causes, and models indicate that these trends are likely to continue into the future (Barnett et al. 2008). Current climate change predictions for terrestrial areas in the

Northern Hemisphere indicate warmer air temperatures, more intense precipitation events, and increased summer continental drying (Field et al. 1999, Cayan et al. 2005, Intergovernmental Panel on Climate Change 2014). Climate simulations have shown that California temperatures are likely to increase by 2.7 degrees Fahrenheit under a lower emissions scenario, and by up to 8.1 degrees Fahrenheit under a higher emissions scenario (Cayan et al. 2008). Because of the diversity of California's landscape, however, it is unknown at this time what effect (e.g., changes in precipitation, number and severity of storm events) increasing temperatures will have at the local level.

While it appears reasonable to assume that California tiger salamanders may be affected by factors resulting from climate change, it is difficult to predict how such climatic changes will affect the Santa Barbara County DPS of the California tiger salamander. Because California experiences highly variable annual rainfall events and droughts, environmental conditions for California tiger salamander breeding and metamorphosis are not consistent. In years of drought, some pools/ponds may not fill at all. Breeding migrations and breeding events are dependent on weather. A lack of rain results in the temporal loss of vernal pools and can result in the degradation of complexes of long-lasting pools that provide important breeding habitat. Droughts may occasionally preclude reproductive success at a given pond; therefore, maintaining connectivity between ponds is important for the long-term viability of the Santa Barbara County California tiger salamander. In addition to direct climatic effects on habitat, warmer temperatures are associated with increased locomotor performance of hybrids, suggesting that increased temperatures may translate to increased movement of the "hybrid swarm" (hybrid population with interbreeding between hybrid individuals and its parent types) of non-native tiger salamander alleles through the landscape (Johnson et al. 2010a).

California Tiger Salamander Conservation Priority Areas

In general, large sites functionally connected to other permanently conserved lands are essential for conservation as they would likely contribute the greatest toward meeting recovery criteria. Within each metapopulation, areas prioritized for conservation should be directed to areas encompassing known breeding ponds and their associated upland habitat that contribute in the greatest extent to meeting the aforementioned recovery criteria. Areas sought for conservation should be steered away from ponds that are isolated from other ponds in a metapopulation area and/or that do not have sufficient functional upland habitat to support long-term viability of a metapopulation. Conservation areas should aim to protect and manage sufficient habitat to support long-term viability of the Santa Barbara County DPS of the California tiger salamander in each metapopulation. These areas should be located within areas that are capable of supporting a minimum viable population of California tiger salamanders. As specified in the Service's (2016) recovery plan, a minimum of 623 acres of fully preserved, functional upland habitat around a preserved pond is necessary to support a minimum viable population.

California Red-legged Frog Species Information

Description of the California Red-legged Frog

The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949). Adult females attain a significantly longer body length than males (5.4 inches versus 4.5 inches snout-urostyle length) (Hayes and Miyamoto 1984). The posterior abdomen

and hind legs of adults are often red or salmon pink; the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish-brown background color. Dorsal spots usually have light centers (Stebbins 1985). Dorsolateral folds (the ridges of skin along the back) are prominent. Larvae (tadpoles) range from 0.6 to 3.1 inches in length, and the background color of the body is dark brown or olive with darker spots (Storer 1925). A line of very small, indistinct gold-colored spots becomes the dorsolateral fold (G. Rathbun *in litt*. 1998).

The California red-legged frog has paired vocal sacs and calls in air. Female California red-legged frogs deposit egg masses on emergent vegetation so that the masses float on the surface of the water (Hayes and Miyamoto 1984).

Life History of the California Red-legged Frog

California red-legged frogs breed from November through April (Storer 1925). Males appear at breeding sites from 2 to 4 weeks before females (Storer 1925). At these sites, males frequently call in small groups of two to seven individuals, although in some instances they may call individually (Jennings *et al. in litt.* 1992). Females are attracted to the calling males. A pair in amplexus (breeding position) moves to an oviposition site (the location where eggs are laid) and the eggs are fertilized while being attached to a brace. Braces include emergent vegetation such as bulrushes (Scirpus spp.) and cattails (Typha spp.) or roots and twigs; the egg masses float on the surface of the water (Hayes and Miyamoto 1984). Each mass contains about 2,000 to 5,000 eggs that are each about 0.08 to 0.11 inches in diameter. The eggs are dark reddish brown (Storer 1925).

Eggs hatch in 6 to 14 days depending on water temperatures (Jennings 1988b). Egg predation is infrequent and most mortality probably occurs during the tadpole stage (Licht 1974), although eggs are susceptible to being washed away by high stream flows. Schmeider and Nauman (1994) report that California red-legged frog eggs have a defense against predation which is possibly related to the physical nature of the egg mass jelly, although Rathbun (1998) has documented newt predation on eggs and suggested that this predation may be an important factor in the population dynamics of the California red-legged frog. Typically, most adult frogs lay their eggs in March. Eggs require approximately 20-22 days to develop into tadpoles, and tadpoles require 11 to 20 weeks to develop into terrestrial frogs. (Bobzien et. al. 2000, Storer 1925, Wright and Wright 1949).

Sexual maturity can be attained at 2 years of age by males and 3 years of age by females (Jennings and Hayes 1985); adults may live 8 to 10 years (Jennings *et al. in litt*. 1992). Schmieder and Nauman (1994) reported that California red-legged frog larvae are highly vulnerable to fish predation, especially immediately after hatching, when the non-feeding larvae are relatively immobile.

Hayes and Tennant (1985) found juvenile frogs to be active diurnally and nocturnally, whereas adult frogs were largely nocturnal. The season of activity for the California red-legged frog seems to vary with the local climate (Storer 1925); individuals from coastal populations, which rarely experience low temperature extremes because of the moderating maritime effect, are rarely inactive. Individuals from inland sites, where temperatures are lower, may become

inactive for long intervals (Jennings *et al. in litt*. 1992) and no information is available on the activity levels of California red-legged frogs at higher elevations.

The diet of California red-legged frogs is highly variable. The foraging ecology of larvae has not been studied, but they are thought to be algal grazers (Jennings *et al. in litt*. 1992). Hayes and Tennant (1985) found invertebrates to be the most common food items of adult frogs. Vertebrates, such as Pacific tree frogs (*Hyla regilla*) and California mice (*Peromyscus californicus*), represented over half of the prey mass eaten by larger frogs, although invertebrates were the most numerous food items. Feeding typically occurs along the shoreline and on the surface of the water; juveniles appear to forage during both daytime and nighttime, whereas subadults and adults appear to feed at night (Hayes and Tennant 1985).

California red-legged frogs spend most of their lives in and near sheltered backwaters of ponds, marshes, springs, streams, and reservoirs. Deep pools with dense stands of overhanging willows and an intermixed fringe of cattails are considered optimal habitat. However, California red-legged frogs can breed in many aquatic habitats. Eggs, larvae, transformed juveniles, and adults also have been found in ephemeral creeks and drainages and in ponds that do not have riparian vegetation. California red-legged frogs frequently breed in artificial impoundments such as stock ponds, if conditions are appropriate. Although California red-legged frogs successfully breed in streams and riparian systems, high seasonal flows and cold temperatures in streams often make these sites risky environments for eggs and larvae.

The importance of riparian vegetation for this species is not well understood. When riparian vegetation is present, California red-legged frogs spend considerable time resting and feeding in it; the moisture and camouflage provided by the riparian plant community likely provide good foraging habitat and may facilitate dispersal in addition to providing pools and backwater aquatic areas for breeding. Accessibility to sheltering habitat is essential for the survival of California red-legged frogs within a watershed, and can be a factor limiting population numbers and distribution.

Juvenile and adult California red-legged frogs may disperse long distances from breeding sites throughout the year. They can be encountered living within streams at distances exceeding 1.8 miles from the nearest breeding site, and have been found up to 400 feet from water in adjacent dense riparian vegetation (Bulger et al. 2003). Some California red-legged frogs have moved long distances over land between water sources during winter rains. Adult California red-legged frogs have been documented to move more than 2 miles in northern Santa Cruz County “without apparent regard to topography, vegetation type, or riparian corridors” (Bulger et al. 2003). Most of these overland movements occur at night. These individual California red-legged frogs were observed to make long-distance movements that are straight-line, point to point migrations over variable upland terrain rather than using riparian corridors for movement between habitats. For the California red-legged frog, suitable habitat is considered to include all aquatic and riparian areas within the range of the species and includes any landscape features that provide cover and moisture (61 FR 25813). California red-legged frogs exhibit strong site fidelity, traveling over 1 mile of steep terrain to return to a pool from where they were translocated (AECOM 2011).

<u>Status of the California Red-legged Frog</u>

The California red-legged frog was federally listed as threatened on May 23, 1996 (61 FR 25813). The Service completed a recovery plan for the species in 2002 (Service 2002). Critical habitat for the California red-legged frog was finalized on March 17, 2010 (75 FR 12816) after multiple revisions. Detailed information on the biology of California red-legged frogs can be found in Storer (1925), Stebbins (2003), and Jennings et al. (1992).

The historical range of the California red-legged frog extended coastally from southern Mendocino County and inland from the vicinity of Redding, California, southward to northwestern Baja California, Mexico (Jennings and Hayes 1985, Storer 1925). California red-legged frogs have been found at elevations that range from sea level to about 5,000 feet. The California red-legged frog has been extirpated or nearly extirpated from 70 percent of its former range. Historically, this species was found throughout the Central Valley and Sierra Nevada foothills. In the Sierra Nevada Mountains, California red-legged frogs typically occur below 4,000 feet in elevation.

At present, California red-legged frogs are known to occur in 243 streams or drainages in 22 counties, primarily in central coastal California. Four additional occurrences have been recorded in the Sierra Nevada foothills since listing, bringing the total to five extant populations, compared to approximately 26 historical records in that area (61 FR 25813). Currently, California red-legged frogs are known from three disjunct regions in 26 California counties and one region in Baja California, Mexico (Grismer 2002, Fidenci 2004).

The recovery plan for the California red-legged frog identifies eight recovery units. These recovery units are based on the Recovery Team's determination that various regional areas of the species' range are essential to its survival and recovery. The recovery status of the animal is considered within the scale of Recovery Units as opposed to the overall range. Because of the varied status of this species and differing levels of threats throughout its range, recovery strategies differ per recovery unit to best meet the goal of delisting the species. For example, in areas where California red-legged frog populations appear to be stable, recovery strategies are intended to protect existing population numbers, whereas in areas where California red-legged frogs have been extirpated or are declining, strategies are to stabilize, increase, augment, or reestablish populations.

The recovery units are delineated by major watershed boundaries as defined by U.S. Geological Survey hydrologic units and the limits of the range of the California red-legged frog. The goal of the recovery plan is to protect the long-term viability of all extant populations within each recovery unit. Within each recovery unit, core areas have been delineated and represent contiguous areas of moderate to high California red-legged frog densities that are relatively free of exotic species such as bullfrogs. The goal of designating core areas is to protect metapopulations that, combined with suitable dispersal habitat, will allow for the long-term viability within existing populations. This management strategy allows for the recolonization of habitat within and adjacent to core areas that are naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of the California red-legged frog.

Threats and the Decline to the California Red-legged Frog

Over-harvesting, habitat loss, non-native species introduction, and urban encroachment are the primary factors that have negatively affected the California red-legged frog throughout its range (Jennings and Hayes 1985, Hayes and Jennings 1988). Habitat loss and degradation, combined with over-exploitation and introduction of exotic predators, were important factors in the decline of the California red-legged frog in the early to mid-1900s. Continuing threats to the California red-legged frog include direct habitat loss due to stream alteration and loss of aquatic habitat, indirect effects of expanding urbanization, competition or predation from non-native species including the bullfrog, catfish, bass (*Micropterus spp*.), mosquitofish, red swamp crayfish , and signal crayfish (*Pacifastacus leniusculus*). Chytrid fungus (*Batrachochytrium dendrobatidis*) is a waterborne fungus that can decimate amphibian populations, and is considered a threat to California red-legged frog populations.

As we mentioned above, Chytrid fungus, the causative agent of the amphibian disease chytridiomycosis, has been linked to amphibian declines worldwide (Berger et al. 1998, Bosch et al. 2001, Fellers et al. 2001, Skerratt et al. 2007, Kilpatrick et al. 2010). Chytrid fungus has been documented in a population of California red-legged frogs in southern Santa Barbara County (AECOM 2009), and from Vandenberg Air Force Base in northern Santa Barbara County (J. LaBonte et al., unpublished data).

The most secure aggregations of California red-legged frogs are found in aquatic sites that support substantial riparian and aquatic vegetation and lack non-native predators. Although the presence of California red-legged frogs is correlated with still water deeper than approximately 1.6 feet, riparian shrubbery, and emergent vegetation (Jennings and Hayes 1985), there are numerous locations in the species' historical range where these elements are well represented yet California red-legged frogs appear to be absent. The cause of local extirpations does not appear to be restricted solely to loss of aquatic habitat. The most likely causes of local extirpation are thought to be changes in faunal composition of aquatic ecosystems (i.e., the introduction of non-native predators and competitors) and landscape-scale disturbances that disrupt California red-legged frog population processes, such as dispersal and colonization. The introduction of contaminants or changes in water temperature may also play a role in local extirpations. These changes may also promote the spread of predators, competitors, parasites, and diseases.

California Red-legged Frog Conservation Priority Areas

Conservation priority areas for California red-legged frog and their habitat are areas within all core areas are protected and/or managed for California red-legged frogs in perpetuity, and the ecological integrity of these areas is not threatened by adverse anthropogenic habitat modification (including indirect effects of upstream/downstream land uses). Protecting areas that support known populations of California red-legged frogs and protecting suitable habitat, corridors, and core areas are the highest conservation priority areas.

Lompoc Yerba Santa Species Information

Description of Lompoc Yerba Santa

Lompoc yerba santa is an evergreen shrub with narrow, leathery leaves in the borage family (*Boraginaceae*) and grows to approximately 9.8 feet tall. The lavender flowers are tubular and clustered in heads that bloom from May to August. Historically and currently, the species is known only from five populations scattered across the southwestern corner of Santa Barbara County. It is found in association with central coast maritime chaparral (maritime chaparral) and stands of Bishop Pine (*Pinus muricata*). Although each population appears to be comprised of a number of separate individuals, genetic analyses of several of the populations have determined that they are comprised of only 11 to 20 individuals. Several populations occur in remote areas and are presumably far from human activities that could cause changes in habitat conditions, while populations in closer proximity to human activities are more vulnerable to such changes. Since the time of listing, the most recent surveys for Lompoc yerba santa were those of the populations on Vandenberg.

Life History of Lompoc Yerba Santa

Lompoc yerba santa was first described by Alice Eastwood in 1932 based on a collection made by Ralph Hoffmann a year earlier "5 miles north of Lompoc on the road to Casmalia" (Eastwood 1933). Research indicates that Lompoc yerba santa is a self-incompatible species; intentionally cross-pollinated flowers produced a mean of 1.77 seeds per fruit, and intentionally self-pollinated flowers produced a mean of 0.03 seed per fruit (Elam 1994). This species spreads vegetatively through the production of rhizomes (underground stems), and thus producing colonies of ramets (genetically identical stems) from only a few individuals. The species has been observed to readily resprout following fire (Jacks et al. 1984). A recent germination study showed that germination of Lompoc yerba santa seeds was strongly cued when treated with liquid smoke treatment and in dark conditions, suggestive that the species is adapted to periodic fire (Schneider et al. 2021 in prep). Pollination ecology has not been specifically studied for Lompoc yerba santa, other *Eriodictyon* taxa are known to be pollinated by wasps, butterflies, and a variety of bee taxa, especially from the genera *Anthophora, Bombus, Chelostoma, Hylaeus, Osmia*, and *Nomadopsis* (Moldenke 1976).

Lompoc yerba santa occurs within two different habitat types. Near the coast, it occurs within maritime chaparral and coastal sage scrub on sandstone soils from the Orcutt, Marina, and Oceano series. In this habitat type, it typically occupies disturbed areas near roads or exposed ridgetops (Jacks et al. 1984). Associated species include buckbrush (*Ceanothus cuneatus*), chamise (*Adenostoma fasciculatum*), black sage (*Salvia mellifera*), coyotebrush (*Baccharis pilularis*), California sagebrush (*Artemsia californica*), bush poppy (*Dendromecon rigida*), California scrub oak (*Quercus berberidifolia*), and manzanita (*Arctostaphylos* spp.) (Jacks et al. 1984; California Natural Diversity Database [CNDDB] 2021). On sites that are farther inland, Lompoc yerba santa is found on diatomaceous Monterey shales. The structurally dominant Bishop pine (*Pinus muricata*) is one species that occurs at these sites. These sites have characteristic soils that are highly acidic and have a high water-retaining capacity (Cole 1974). Both maritime chaparral and Bishop Pine forest were identified by Holland (1986) as rare plant communities with a limited distribution.

Distribution of Lompoc Yerba Santa

Currently, two Lompoc yerba santa populations are documented to occur on Vandenberg and the other three occur on private lands. As previously mentioned, Lompoc yerba santa occurs within maritime chaparral and coastal sage scrub near the coast. Originally, there was an estimated 22, 239 acres of maritime chaparral on Vandenberg; however, by 1988, approximately 8,649 acres remained (Hickson 1988). Surrounded by a dense human population and development, the remaining maritime chaparral has been further degraded and fragmented (Hickson 1988).

According to records available through the CNDDB (2010) and the Consortium of California Herbaria (2010), all historical collections and unvouchered observations of Lompoc yerba santa are from the southwestern corner of Santa Barbara County. Other studies (Elam 1994, Jacks et al. 1984) recognized seven populations of Lompoc yerba santa based on the number of "Element Occurrences" (occurrences) at the time and as defined by CNDDB criteria. For the purposes of this review, we are recognizing five populations (comprised of six occurrences) based on differences in location and habitat type. These five populations are from three geographically distinct areas referred to here as Solomon Hills, west Burton Mesa, and Santa Ynez Mountains. The five populations are distributed within these three geographic areas as follows:

1. Solomon Hills: two large populations occur here on privately owned lands, approximately 12 miles north of the city of Lompoc. One population (occurrence 1) is associated with Bishop Pine, while the second population (occurrence 11) occurs in coastal sage scrub and chaparral.

2. West Burton Mesa: two populations encompassing three occurrences are located within the boundaries of Vandenberg. The 35th Street population adjacent to the cantonment area (occurrences 9 and 10) occurs in maritime chaparral. The Pine Canyon population (occurrence 2) is on the less-used eastern edge of the base and occurs in chaparral and Bishop Pine forest.

3. Santa Ynez Mountains: approximately 10 miles south of Lompoc, one population (occurrence 5) is scattered along a 5-mile stretch of the mountains, from the ridgeline to halfway down the south-facing slopes. The land, known as Hollister Ranch, is privately-owned.

Overall, few surveys have been completed for Lompoc yerba santa across its range since it was federally listed in 2000. The most recent information available on surveys for Lompoc yerba santa is from those conducted on Vandenberg. In 2006, special status plant surveys were conducted on Vandenberg and included surveys for Lompoc yerba santa (SRS 2007). In 2010, special status plant surveys were again conducted on Vandenberg. During the 2010 surveys, Lompoc yerba santa populations surveyed in 2006 were revisited and invasive species were documented (SRS 2010). The 2010 surveys were conducted during the peak blooming period for Lompoc yerba santa to locate any new populations; however, no new populations were found (SRS 2010). Helicopter surveys were conducted during the summer on Vandenberg in 2015 and were able to locate multiple new populations and subpopulations within the Lake, Santa Lucia and Pine Canyon areas (Spears 2021). Surveys conducted in 2018 and 2019 identified two new populations, one in upper LaSalle Canyon, south base, and another at the southern end of an airfield located in north base, Vandenberg (Spears 2021). One additional new small population was found on the Jack and Laura Dangermond Preserve in 2012 (Batuik 2020)

An updated 5-year review (in prep) will contain changes on the information on the distribution of Lompoc yerba santa since the time of listing. The majority of the updated information available is from the surveys for Lompoc yerba santa conducted on Vandenberg.

Threats to and Decline of the Lompoc Yerba Santa

Threats to Lompoc yerba santa populations on Vandenberg were documented during the Space Force's 2006 and 2010 surveys. The information on the degree and type of threat to each population helps to inform future management decisions. During the 2006 surveys, extensive damage from feral pigs (*Sus scrofa*) was noted at the 35th Street population; however, little evidence of feral pigs was found during the 2010 surveys. Habitat degradation from erosion and the increasing spread of the invasive species jubata grass (*Cortaderia jubata*) threatens the Pine Canyon population. Maritime chaparral has been converted to residential, agricultural, and military uses, with the remaining habitat threatened by development and invasion by weeds such as iceplant and jubata grass (D'Antonio et al. 1993, Griffin 1978, Jacks et al. 1984). At the time of listing Lompoc yerba santa (Service 2000c), activities related to increased use of Vandenberg as other military bases closed, alteration of habitat due to an increase in nonnative species, and altered fire regimes were threats to the species.

Human activities have the potential to alter important ecosystem processes such as fire. The Burton Mesa fire regime (frequency, intensity, extent, and seasonality of fire) and its effects on the surrounding vegetation have been studied by both Hickson (1988) and Davis et al. (1988). Historically, the vegetation of Burton Mesa has been subjected to varying fire regimes because of fires intentionally started by indigenous people and early settlers (Hickson 1988). Presently, the Space Force is developing a Wildfire Management Plan to implement a controlled burning program with the intended purpose of protecting the surrounding population and development on Burton Mesa. However, presently, the manipulation of the vegetation (i.e., proliferation of nonnative species concurrent with a reduction in the number of native species) at Burton Mesa may have resulted in a fire regime that is, according to Davis et al. (1988), "entirely anthropogenic."

Habitat alteration and loss from development for military and commercial purposes was identified as a threat to this species at the time of its listing (Service 2000c). Habitat fragmentation within the Burton Mesa area continues. The original extent of Burton Mesa chaparral was approximately 22,000 acres; by 1938, the extent had been reduced to 14,554 acres, and by 1988, less than 8,649 acres remained (Davis et al. 1988). Two populations of Lompoc yerba santa on Vandenberg that could be threatened by future development include the 35th Street population as well as a newly discovered population adjacent to the north base airfield (SRS 2020). These population are subject to disturbance from human activities because of their close proximity to paved and unpaved roads and the cantonment area. At present, it appears that the destruction and alteration of habitat due to an increased use of Vandenberg remains a threat to Lompoc yerba santa.

Lompoc yerba santa populations are threatened by nonnative species that compete with them for light, space, and other resources. On Vandenberg, veldt grass (*Ehrharta calycina*) was planted to stabilize sand dunes in the 1950s; with the aid of the prevailing onshore winds, it rapidly spread

across Vandenberg and onto Burton Mesa between 1979 and 1996 (Air Force 1996). This species spreads rapidly, both vegetatively and through a persistent seedbank, and is extremely difficult to eradicate once it has become established (Bossard et al. 2000). Iceplant and sea fig (*Carpobrotus* spp.) are other nonnative species that threaten to alter the maritime chaparral habitat by forming dense mats (Odion et al. 1992).

The Lompoc yerba santa population located at 35th Street is the only population on Vandenberg whose habitat is actively managed (e.g., removal of nonnative and invasive plant species). This population is located next to paved and unpaved roads and the cantonment area. Nonnative species have all invaded Lompoc yerba santa habitat in this area. Alteration of habitat due to an increase in nonnative species is a threat to Lompoc yerba santa populations located on Vandenberg. There is no information available on nonnative species that may threaten the populations of Lompoc yerba santa located in the Solomon Hills and Santa Ynez Mountains.

Habitat for Lompoc yerba santa may be altered by the increase in veldt grass and subsequent increases in the frequency of wildfires. The corresponding type conversion of habitat from scrub with openings to fields of veldt grass has been discussed by numerous researchers including D'Antonio and Vitousek (1992), Bossard et al. (2000) and Brooks et al. (2004). Invasive plants such as veldt grass can change the fuel properties of a site, which can in turn affect fire behavior, and ultimately alter fire regime characteristics such as frequency, intensity, extent, and seasonality of fire. If the regime changes subsequently promote the dominance of invasive species, then an invasive plant-fire regime cycle may be established, and restoration to native conditions becomes more difficult (Brooks et al. 2004). The fire return interval, or fire frequency, on Vandenberg has been estimated in different ways and ranges from 15 to 35 years (Coulombe and Copper 1976, Zedler 1977), while others estimate that, because of the coastal location, the fire return interval in central coastal California could be as long as 100 years (Wells 1962, Keeley and Keeley 1986). Although the natural fire return interval is unknown, because of its low elevation and infrequent lightning strikes, it was probably greater than the 20 to 30-year fire return interval found across most of Vandenberg (Hickson 1988). A shorter fire return interval than the one that naturally occurs could negatively impact native plant species if seedlings are unable to reach sexual maturation or if non-native species post-fire invasion occurs, outcompeting native vegetation recruitment. The effects of fire on Burton Mesa chaparral (i.e., maritime chaparral) have been specifically studied by Hickson (1988) and Davis et al. (1988).

Oil extraction and refinement (e.g., maintenance activities, hazardous waste cleanup) are activities taking place at the Solomon Hills site where this species occurs. These oil extraction activities are ongoing, but are restricted to existing areas and trimming and removal of Lompoc yerba santa does not occur frequently.

At the time of listing, development of Hollister Ranch was not identified as a threat to Lompoc yerba santa. Hollister Ranch is designated as an "agricultural preserve" through the County of Santa Barbara's Agricultural Preserve Program. Although the entire ranch is in an agricultural preserve, the 14,000-acre ranch has been subdivided into 100-acre parcels. The County of Santa Barbara has since recognized that because of the 100-acre parcellation of the ranch, grazing is no longer a viable economic activity and is secondary to residential uses (County of Santa Barbara Planning and Development Department 2009). While development on Hollister Ranch is

considered low-density (approximately 50 single-family homes as of 2009), these residential homes are often associated with other development including accessory buildings, agricultural development, reservoirs and roads, all of which have increased the demand on limited water resources and have resulted in the alteration and degradation of portions of the natural landscape (County of Santa Barbara Planning and Development Department 2009).

Vandenberg Space Force Base includes Lompoc yerba santa in their drafted Integrated Natural Resource Management Plan (INRMP). The INRMP incorporates specific measures that addressed the conservation of Lompoc yerba santa (Service 2002). The INRMP identifies management strategies to protect Lompoc yerba santa from degradation or destruction of its habitat. These management strategies include: the development of a Fire Management Plan and Invasive Plant Species Management Plan and restricting development in Lompoc yerba santa habitat unless required to fulfill the Space Force's mission. The INRMP does not replace the interagency consultation process required for effects on federally listed species pursuant to section 7(a)(2) of the Act.

The existence of five recognized populations of Lompoc yerba santa and the species' restricted distribution place this species at risk of extinction from stochastic events. The conservation biology literature commonly notes the vulnerability of taxa known from very few locations and/or from small and highly variable populations (e.g., Shaffer 1981, 1987; Groom et al. 2006; Primack 2006). This vulnerability can arise due to uncertainty with stochastic events, such as environmental stochasticity, natural catastrophes, genetic stochasticity, and demographic stochasticity. Populations of Lompoc yerba santa are subject to all of these stochastic events. Elam (1994) found that two of the six populations she studied were uniclonal (comprised of a single genetic unique individual). Being that Lompoc yerba santa is self-incompatible and cannot produce viable seed, a uniclonal population can be extirpated by both environmental stochasticity (e.g., prolonged drought) and natural catastrophes (e.g., wildfire). Furthermore, genetic stochasticity can result in a loss of genetic variation and subsequently decrease population viability. While demographic stochasticity can be viewed as a natural flux of the population, a uniclonal population with a low reproductive and survival rate could be at higher risk of extinction.

Current climate change predictions for terrestrial areas in the Northern Hemisphere indicate warmer air temperatures, more intense precipitation events, and increased summer continental drying (Field et al. 1999, Cayan et al. 2005, Intergovernmental Panel on Climate Change 2007). Recently, the potential impacts of climate change on the flora of California were discussed by Loarie et al. (2008). Based on modeling, they predicted that species' distributions will shift in response to climate change, specifically that the species will "move" or disperse to higher elevations and northward, depending on the ability of each species to do so. Species diversity will also shift in response to these changes with a general trend of increasing diversity shifting towards the coast and northwards with these areas becoming defacto future refugia. However, predictions of climatic conditions for smaller sub-regions such as California remain uncertain. It is unknown at this time if climate change in California will result in a warmer trend with localized drying, higher precipitation events, or other effects. While we recognize that climate change is an important issue with potential effects to listed species and their habitats, we lack

adequate information to make accurate predictions regarding its effects to Lompoc yerba santa at this time.

Status of Lompoc Yerba Santa

Because of its clonal habit (reproducing asexually such that all "individuals" in a population are genetically identical), the number of genetically unique Lompoc yerba santa individuals is difficult to count. Most surveys have counted stems or what appear to be separate shrubs without knowing how many different genotypes were represented. A genetic study of several Lompoc yerba santa populations indicated that one-half of the Pine Canyon population and the 35th Street population were a single genotype, while the other half of the Pine Canyon population, as well as the Santa Ynez Mountains (i.e., Hollister Ranch) population, were comprised of several genetically unique genotypes (Elam 1994). Therefore, populations that appear to be comprised of many separate individuals may be one clone. In an effort to monitor known populations of Lompoc yerba santa on Vandenberg, surveys conducted during 2010 also focused on documenting population health and identifying any potential threats to the populations (SRS Technologies (SRS 2010). Surveyors also attempted to quantify the number of individual plants instead of counting the number of ramets (an independent member or stem of a clone). The surveyors counted a plant as one individual based on the proximity of ramets or if they could trace the rhizome back to a specific individual/ramet (L. Lum, Vandenberg, pers. comm. 2010).

During surveys for Lompoc yerba santa at Vandenberg in 2010, approximately 1,520 individuals were documented within known populations (SRS 2010). The results of this monitoring effort were used to approximate the percent change in number of individuals between surveys conducted in 2006 and 2010. The stands located at 35th Street, Lompoc Gate, and two of the four Pine Canyon stands showed a decrease in the number of individuals, while the Lake Canyon and the other two Pine Canyon stands showed an increase. Between 2010 and 2006, there was an 8.5 percent decrease in the total number of individuals. This decline in the number of individuals has been attributed to low rainfall in previous years (SRS 2010). The Service recently received additional information on multiple newly encountered populations on Vandenberg between 2015-2019. This information is currently being reviewed and will be incorporated into the Service's next 5-year review on the species.

Although the Space Force noted an increase or decrease in the Lompoc yerba santa populations in 2010, we consider the data inconclusive. The monitoring information for the populations is limited to 2 years; therefore, we cannot conclude that the populations are in decline or increasing. Additionally, because of the species' clonal habit, the number of genetically unique individuals could be less than the number of individuals counted during the survey. Finally, there is no information documenting the consistency in survey protocol between the two survey years.

As mentioned above, several oil extraction and refinement activities have been conducted within habitat for this species in the Solomon Hills. In 2007 and 2010, projects to maintain well pads and adjacent roads were undertaken by Breitburn Energy Company. The purpose of these projects was to trim or remove Lompoc yerba santa stems that had encroached onto cleared well pads, oil drilling and processing equipment, wells, power poles, and other areas. During such activities, only stems that are in areas where they pose a fire safety risk or operational constraint are removed.

In a botanical survey conducted on Hollister Ranch before Lompoc yerba santa was listed, the species was described as occurring in mixed chaparral along a ridge crest west of Bulito Canyon and common in previously disturbed areas (Fletcher 1983). An undated botanical survey (Hollister Ranch Conservancy 2003) indicates that Lompoc yerba santa occurs on six contiguous parcels in the western portion of Hollister Ranch. All six of these parcels are located within designated critical habitat for the species and could be developed. Development on Hollister Ranch is regulated under CEQA and requires the lead agency (i.e., County of Santa Barbara) to avoid or mitigate a project's significant environmental impacts if alternatives or mitigation measures are feasible. However, the Service anticipates that development is a threat to the population of Lompoc yerba santa located on Hollister Ranch.

Lompoc Yerba Santa Conservation Priority Areas

The current distribution of Lompoc yerba santa is restricted and only five recognized populations exist. These factors make Lompoc yerba santa populations vulnerable and at risk of extinction from stochastic events. Uniclonal populations are especially vulnerable to stochastic events because of limited genetic diversity which consequently, restricts a species' ability to adapt to changing conditions. Climate change and its effects on Lompoc yerba santa are largely uncertain. Presently, we cannot adequately predict climatic changes at the sub-region level. Research has shown that species will "move" or disperse to higher elevations and northward; however, this depends on the ability of each species to do so. Therefore, the conservation priority areas for Lompoc yerba santa are these five areas that support known populations of Lompoc yerba santa and protecting suitable habitat for the species.

California Tiger Salamander

Anticipated Effects on the California Tiger Salamander

Approximately 67,525 acres of the Planning Area is within the known dispersal distance (1.3 miles) of known or potential California tiger salamander breeding ponds. Construction of well pads and associated infrastructure, including project roads, and telecommunication and power line infrastructure, will result in the temporary and permanent disturbance of California tiger salamander upland habitat. We also anticipate some projects may need to conduct activities within suitable aquatic California tiger salamander habitat. Artificial and natural breeding ponds may require maintenance during the non-breeding season. These activities can provide important habitat benefits for future breeding seasons and would only result in temporary impacts to the aquatic feature and overall provide benefits to the California tiger salamander by keeping these suitable breeding features functioning. No permanent impacts to or loss of California tiger salamander aquatic habitat is allowed under this Plan.

Ground disturbance associated with geophysical exploration (seismic), development, extraction, transport, and/or distribution of crude oil, natural gas, and/or other petroleum products, electrical distribution lines and substations, and offsite reservoirs have the potential to result in take of California tiger salamanders that occur in or within dispersal distance of the project areas. California tiger salamanders dispersing from areas adjacent to covered lands are subject to mortality or injury from earth-moving equipment, debris, and worker foot traffic vehicle strikes and construction activities associated with the proposed projects.

California tiger salamanders may experience a significant disruption of normal behavioral patterns from work activities and the associated noise and vibration that makes them susceptible to injury or mortality. This disruption could cause California tiger salamanders to leave or avoid suitable habitat and may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways.

The area surrounding the individual projects may be altered due to changes in vegetation structure and environmental conditions to the extent that rodent and small mammal abundance or use is reduced. This would constitute a loss of suitable refugia habitat for California tiger salamanders. California tiger salamanders remaining in burrows may be killed or injured by the large machinery used to dig trenches; by project filling or grading activities; or they may become entombed in their burrows and die if the entrance to their upland sheltering habitat is crushed or covered. Large machinery and other vehicles and construction equipment could also spill or leak

industrial chemicals, fuels, and lubricants that could result in fouling or poisoning of California tiger salamanders and contamination of their habitat.

Activities that occur during the rainy season would likely cause greater impacts to California tiger salamanders than activities during the dry season because the species is typically more active during the rainy season. During periods of rainfall (typically greater than 0.5 inch of rain in a 24-hour period), we expect a higher likelihood of California tiger salamanders dispersing above ground towards or away from breeding ponds in the vicinity of the project areas. Any salamanders moving through the project areas would be at risk of injury or death caused by vehicles, equipment, or workers.

Roads are a source of direct mortality for California tiger salamanders traveling to and from breeding areas. Significant numbers of California tiger salamanders are killed by vehicular traffic while crossing roads (Hansen and Tremper 1993, S. Sweet in litt. 1993, J. Medeiros pers. comm. 1993; all cited in Service 2005). California tiger salamander road-kill mortality in the vicinity of breeding sites has been reported to be 25 to 72 percent of the observed salamanders crossing roads (Twitty 1941, S. Sweet in litt. 1993, Launer and Fee 1996). Jackson (1996) stated that roads separating breeding and upland habitat can be the cause of significant population declines and even local extinctions for the related spotted salamander (*Ambystoma maculatum*). The construction of new roads could result in increased mortality of California tiger salamanders. California tiger salamanders could be killed or injured by being hit or run over by nighttime worker traffic during operations and maintenance activities. California tiger salamanders most often killed by vehicle strikes are those making breeding migrations. This risk would be greatest during or after rainfall when individuals may be moving through the project area towards or away from breeding ponds.

Roads and highways can create permanent barriers, isolating metapopulations (Service 2016) and contribute to habitat fragmentation and salamander mortality. California tiger salamanders require both breeding and upland habitat in proximity such that the animals can move between the two. Consequently, impediments to movement such as roads or barriers, or loss of either habitat type are a threat to the species' normal habitat use. Barrier-free landscapes are essential for California tiger salamander dispersal and annual migration (Loredo et al. 1996). Access roads proposed as part of the covered activities would contribute to this habitat fragmentation and salamander mortality. Barriers to migration and dispersal also include habitat entirely lost to development, as well as suboptimal habitats that do not provide adequate refuge in the form of small mammal burrows or other cover. Covered activities such as construction of well pads, wells, pipelines, communication towers, tank batteries, etc., would result in loss of upland habitat that could contribute to barriers to migration and dispersal.

Other impacts of roads to California tiger salamanders include mortality during road construction, the effects of habitat fragmentation, predator attraction, disruption of normal animal behavior, home range shifts, altered movement patterns, altered reproductive success, invasive species (by serving as dispersal corridors), landscape pollution (via hydrological changes, increased sedimentation, vehicle by-products and compounds), and increased human use of an area (Trombulak and Frissel 2000, Andrews et al. 2008).

Trash left during or after project activities could attract predators to work sites, which could, in turn, prey on California tiger salamanders. For example, raccoons (*Procyon lotor*) and feral cats (*Felis catus*) are attracted to trash and also prey opportunistically on California tiger salamanders.

While capture and relocation of California tiger salamanders is expected to reduce the number killed or injured by project construction activities, capture and relocation could result in the injury or death of individual California tiger salamanders. Although survivorship for translocated California tiger salamanders has not been estimated, survivorship of translocated wildlife, in general, is reduced due to intraspecific competition, lack of familiarity with the location of potential breeding, feeding, and sheltering habitats, and increased risk of predation.

Releasing amphibians following a period of captivity, during which time they can be exposed to infections, may cause an increased risk of mortality in wild populations. Amphibian pathogens and parasites can also be carried between habitats on the hands, footwear, or equipment of fieldworkers, who can spread them to localities containing populations which have had little or no prior contact with such pathogens or parasites. For example, chytrid fungus is a water-borne fungus that can be spread through direct contact between aquatic animals and by a spore that can move short distances through the water. The fungus only attacks the parts of an animal's skin that have keratin (thickened skin), such as the mouthparts of tadpoles and the tougher parts of adults' skin, such as the toes. It can decimate amphibian populations, causing fungal dermatitis, which usually results in death in 1 to 2 weeks. Infected animals may spread the fungal spores to other ponds and streams before they die. Once a pond has become infected with chytrid fungus, the fungus stays in the water for an undetermined amount of time. Relocation of individuals captured from the project area could contribute to the spread of chytrid fungus. In addition, infected equipment or footwear could introduce chytrid fungus into areas where it did not previously occur. Other pathogens could be similarly introduced into uninfected localities.

Use of Impacts to Habitat as a Proxy for Take

Because quantification of the number of California tiger salamanders that would be taken incidental to Covered Activities is not possible given available data, relying on impacts to occupied California tiger salamander habitat is a suitable surrogate to estimate the amount of take that is likely to occur. Within this plan, "occupied California tiger salamander habitat" is defined as:

1) Areas within California tiger salamander dispersal distance (1.3 miles) from a documented known breeding pond;

OR

2) Where California tiger salamanders are assumed present by the applicant/permittee (no surveys have been conducted).

Calculating Impacts to California Tiger Salamanders

The California Tiger Salamander Conservation Strategy and Mitigation Guidance (Service 2019) explains the methodology for calculating impacts to California tiger salamander and its habitat. The mitigation methodology outlined in the California Tiger Salamander Conservation Strategy

is based on work by Searcy and Shaffer (2008) who demonstrate that there are two components of habitat loss for California tiger salamanders: (1) project footprint plus (2) "deficit wedge." The project footprint is the direct loss of habitat where the impact occurs, which is straight-forward in concept. More complex is the "deficit wedge" that results from the impact to habitat. The deficit wedge is the habitat that becomes isolated from a given breeding pond as a consequence of the impact and is rendered inaccessible to a California tiger salamander migrating in a straight line away from the center of a pond. The total impact of the project includes a sum of the footprint and the deficit wedges (or shadows) where habitat has become inaccessible to salamanders from ponds within dispersal distance of the project.

In calculating mitigation necessary to offset impacts to California tiger salamander and/or the habitat that supports them, impacts that impede dispersing salamanders (shadowed impacts) are treated differently from impacts that do not impede dispersing salamanders. Impacts that impede dispersing California tiger salamander are calculated using the methodology outlined in Searcy and Shaffer (2008), as described above. The deficit wedge (shadow) described above is only created by impermeable, long-term, or vertical impacts that impede California tiger salamanders that are dispersing across the landscape. Examples of impacts that do not impede dispersing California tiger salamander include: temporary impacts occurring over one dry season, certain linear features such as roads without curbs or medians, buried pipelines, restoration activities, etc. For temporary impacts occurring over one dry season (approximately May to October), there is no shadow because California tiger salamanders are not migrating or dispersing during the dry season. Calculating mitigation owed for permeable impacts only includes the direct loss of habitat within the project footprint where the impact to habitat occurs.

Not all permeable or temporary impacts occur over one dry season. For impacts spanning more than one dry season, the aforementioned methodology does not account for impacts that could occur to migrating California tiger salamanders over a rainy season. While the effects are still temporary, a temporary deficit wedge is created over the rainy season because the impact would impede salamanders that are migrating or dispersing across the landscape during the rainy season rendering the habitat within the deficit wedge unusable to individuals. We assess the temporary effects by examining the lifetime reproductive success of California tiger salamanders. Lifetime reproductive success is typically low because metamorphs have low survivorship; in some populations, less than 5 percent survive to breed (Trenham 1998). In addition, metamorphs require an extended amount of time before they reach sexual maturity (4 to 5 years) (Trenham et al. 2000). Less than 50 percent of first-time breeding California tiger salamanders typically survive to breed more than once (Trenham et al. 2000). Therefore, we assume that an impact lasting more than 5 years could affect the entire reproductive output of an individual California tiger salamander, such that the impact is the same as a permanent impact. Thus, any impact lasting 5 or more years will be treated as a permanent impact as described above. If an impact occurs over one rainy season, we assume that 1/5 of the entire population is affected during that rainy season and we calculate the impact of the deficit wedge as 1/5 of the total reproductive value of the wedge. The following table shows the percentage of the population and the associated percentage of the deficit wedge for which mitigation would be required.

Years of Disturbance	Percent of Deficit Wedge to Mitigate

1	20
2	40
3	60
4	80
5	100

While use of the methodology outlined in Searcy and Shaffer (2008) provides biologically meaningful mitigation, the methodology may not account for all effects to the species. Project components, such as roads or artificial aquatic features that could act as an attractive nuisance, can have effects that extend far beyond the loss of habitat that is used as a proxy to calculate effects to the species. These project components and associated effects will be assessed by the Service on a project-by-project basis and additional mitigation may be required for such components to ensure the effects of the action are being mitigated to the maximum extent practicable.

Impacts Analysis and Estimated Incidental Take

Covered Activities under this GCP are likely to result in take of California tiger salamander and impacts to their habitat. Take of California tiger salamanders in the form of mortality or injury of adults or larvae may result from crushing and collision; impacts to upland habitat; increased habitat fragmentation; and changes from one vegetation community to another. Take of California tiger salamanders is expected to result from human and equipment movement and ground disturbance associated with construction and installation of well pads, pipelines, access roads, electrical distribution lines and substations, and offsite reservoirs. Operation and maintenance, and decommissioning of these activities, are also expected to result in take of the California tiger salamander. Take of California tiger salamanders and impacts to their habitat will differ with methodologies implemented and with activity level when these activities occur.

We cannot definitively estimate the number of California tiger salamanders that will be taken because no density estimate (e.g., number of California tiger salamanders/acre) for the planning area has been or could be calculated. Take of California tiger salamanders is also difficult to quantify because: 1) individuals are small, making them difficult to locate, which makes encountering dead or injured individuals unlikely; 2) California tiger salamander losses may be masked by temporal fluctuations in numbers; 3) California tiger salamanders spend the majority of their lifespan underground; and 4) the species is primarily active at night. Although we cannot predict the exact number of individual California tiger salamanders that will be incidentally taken, the Service is providing impacts to habitat as a proxy to quantify take levels and define the permitted limits. The following table shows the amount of California tiger salamander habitat loss allowed under this plan.

California Tiger Salamander Metapopulation	**Amount of California Tiger Salamander Habitat (Acres)**	**Allowed Permanent Impacts to Habitat (Acres)**	**Allowed Temporary Impacts to Habitat (Acres)**
West Santa Maria	12,963	130	260

East Santa Maria	10,411	104	208
West Los Alamos/Careaga	14,570	146	196
East Los Alamos	6,024	60	120
Purisima	11,938	119	238
Santa Rita	11,619	116	232

The amount of California tiger salamander habitat loss allowed under this plan was calculated based on the amount of habitat necessary to meet the recovery criteria and the amount of existing California tiger salamander habitat in each of the six metapopulation areas. While there are six metapopulations of the Santa Barbara County distinct population segment of the California tiger salamander, the East and West Santa Maria metapopulation areas are under the greatest threat from land conversion and habitat loss. In order to ensure that there remains enough available habitat to achieve the recovery criteria as described in the California tiger salamander final Recovery Plan (Service 2016) in this metapopulation area, it may be necessary to acquire conservation easements and restore habitat to properly function as California tiger salamander habitat in these metapopulation areas.

While we cannot estimate the number of California tiger salamander that will be taken as a result of most covered activities, access roads are a common aspect of oil and gas facilities where the potential exists to document injury or mortality of individual California tiger salamanders. Therefore, we provide take coverage for access roads in the form of injury or mortality of individual California tiger salamanders. Under each permit issued under this GCP, we allow for the take in the form of injury or mortality of up to two individual California tiger salamanders per year as a result of vehicles using access roads.

The planning area overlaps with all of the designated critical habitat areas of the California tiger salamander across the six metapopulation areas (Service 2004). Critical habitat receives protection under section 7 of the Act through the prohibition against destruction or adverse modification of critical habitat with regard to actions carried out, funded, or authorized by a Federal agency. Section 7 requires consultation on Federal actions that are likely to result in the destruction or adverse modification of critical habitat. As a federal agency authorizing and approving use of this Plan, the Service is required to evaluate the effects of authorizing and approving this Plan, which is a federal nexus, on both the California tiger salamander and its critical habitat under a section 7 consultation. The Service will conduct a section 7 consultation in which we will analyze the effects of issuing the permit on affected listed species and critical habitat to determine whether that permit action is likely to jeopardize the continued existence of the listed species or to destroy or adversely modify designated critical habitat.

Aside from the added protection that may be provided under section 7, the Act does not provide other forms of protection to lands designated as critical habitat. Because consultation under section 7 of the Act does not apply to activities on private or other non-Federal lands that do not involve a Federal nexus, critical habitat designation would not afford any additional protections

under the Act against such activities. Therefore, the Service did not include critical habitat in this Plan.

California Red-legged Frog

Anticipated Effects on the California Red-legged Frog

The entire 674,220-acre plan area is within the range of the California red-legged frog and the majority of the project area contains suitable California red-legged frog habitat. Construction of well pads and associated infrastructure including project roads, telecommunication lines, and power lines will result in the temporary and permanent disturbance and loss of California red-legged frog upland and dispersal habitat. Furthermore, artificial and natural breeding ponds may require maintenance during the non-breeding season. These activities can provide important habitat benefits for future breeding seasons and would only result in temporary impacts to the aquatic feature and overall provide benefits to the California red-legged frog by keeping these suitable breeding features functioning. No permanent impacts to or loss of California red-legged frog aquatic breeding habitat is allowed under this Plan.

Ground disturbance associated with geophysical exploration (seismic), development, extraction, transport, and/or distribution of crude oil, natural gas, and/or other petroleum products, electrical distribution lines and substations, and offsite reservoirs have the potential to result in take California red-legged frogs that occur in or within dispersal distance of the project areas. Ground disturbing activities in the project areas could result in long-term and short-term effects on California red-legged frogs from permanent and temporary disturbance to their habitat. California red-legged frogs dispersing from areas adjacent to the covered lands are subject to mortality or injury from earth-moving equipment, debris, and worker foot traffic vehicle strikes and construction activities associated with the proposed projects. Accidental spills of hazardous materials or careless fueling or oiling of vehicles or equipment could degrade aquatic or upland habitat to a degree where California red-legged frogs are adversely affected or killed.

California red-legged frogs may experience a significant disruption of normal behavioral patterns from work activities and the associated noise and vibration that makes them susceptible to injury or mortality. This disruption could cause California red-legged frogs to leave or avoid suitable habitat and may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways.

Activities that occur during the rainy season could cause greater impacts to California red-legged frogs than activities during the dry season, because the species is typically more active during the rainy season. During periods of rainfall (typically greater than 0.5 inch of rain in a 24-hour period), we expect a higher likelihood of California red-legged frogs dispersing above ground towards or away from breeding habitats in the vicinity of the project areas. Any California red-legged frogs moving through project areas would be at risk of injury or death caused by vehicles, equipment, or workers.

California red-legged frogs could be killed or injured by being hit or run over by nighttime worker traffic during operations and maintenance activities. California red-legged frogs most often impacted by vehicle strikes are those making breeding migrations; that is, those in breeding

condition. This risk would be greatest during or after rainfall when individuals may be moving through the project area towards or away from breeding habitat.

Threats to the California red-legged frog are primarily continued and long-term habitat loss/conversion and fragmentation. California red-legged frogs require both breeding and upland habitat in proximity such that the animals can move between the two. Consequently, impediments to movement such as roads or barriers, or loss of either habitat type, are a threat to the species' normal behavioral patterns and could lead to injury or mortality of individuals. Other impacts of roads to California red-legged frogs include mortality during road construction, the effects of habitat fragmentation, predator attraction, disruption of normal behaviors, home range shifts, altered movement patterns, altered reproductive success, invasive species (by serving as dispersal corridors), landscape pollution (via hydrological changes, increased sedimentation, vehicle by-products and compounds) and increased human use of an area (Trombulak and Frissel 2000, Andrews et al. 2008).

Trash left during or after project activities could attract predators to work sites, which could, in turn, prey on California red-legged frogs. For example, raccoons and feral cats are attracted to trash and also prey opportunistically on California red-legged frogs.

While capture and relocation of California red-legged frogs is expected to reduce the number killed or injured by project construction activities, capture and relocation could result in the injury or death of individual California red-legged frogs. Although survivorship for translocated California red-legged frogs has not been studied, survivorship of translocated wildlife, in general, is reduced due to intraspecific competition, lack of familiarity with the location of potential breeding, feeding, and sheltering habitats, and increased risk of predation. Recent observations suggest that California red-legged frogs exhibit strong site fidelity (AECOM 2011). Therefore, relocated individuals may attempt to return to the site of their capture, making them susceptible to fatigue, desiccation, or predation

Releasing amphibians following a period of captivity, during which time they can be exposed to infections, may cause an increased risk of mortality in wild populations. Amphibian pathogens and parasites can also be carried between habitats on the hands, footwear, or equipment of fieldworkers, who can then spread them to localities containing populations that have had little or no prior contact with such pathogens or parasites. For example, chytrid fungus is a water-borne fungus that can be spread through direct contact between aquatic animals and by a spore that can move short distances through the water. The fungus only attacks the parts of an animal's skin that have keratin (thickened skin), such as the mouthparts of tadpoles and the tougher parts of adults' skin, such as the toes. It can decimate amphibian populations, causing fungal dermatitis, which usually results in death in 1 to 2 weeks. Infected animals may spread the fungal spores to other ponds and streams before they die. Once a pond has become infected with chytrid fungus, the fungus stays in the water for an undetermined amount of time. Relocation of individuals captured from the project area could contribute to the spread of chytrid fungus. In addition, infected equipment or footwear could introduce chytrid fungus into areas where it did not previously occur. Other pathogens could be similarly introduced into uninfected localities.

Use of Impacts to Habitat as a Proxy for Take

Because quantification of the number of California red-legged frogs that would be taken incidental to Covered Activities is not possible given available data, relying on impacts to occupied California red-legged frog habitat is a suitable surrogate to estimate the amount of take that is likely to occur. Within this plan, "occupied California red-legged frog habitat" is defined as:

1) Areas where suitable California red-legged frog habitat occurs unless absence is documented in accordance with the Service's (2005) Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog.

OR

2) Where California red-legged frogs are assumed present by the applicant/permittee (no surveys have been conducted).

Factors Influencing Impacts to the California red-legged frog

Temporary vs. Permanent Impacts

The average lifespan of a California red-legged frog adult following metamorphosis is approximately 3 years. Accordingly, impacts with a duration of 1 year or fewer would impact only one-third of the adult lifespan of the average California red-legged frog and mitigation required to offset impacts would be one-third that of an equivalent permanent impact. Similarly, impacts with a duration of 2 years or fewer would impact only two-thirds of the adult lifespan of the average California red-legged frog and mitigation required to offset impacts would be two-thirds that of an equivalent permanent impact. Conversely, temporary impacts with durations of 3 years or greater would affect the entire adult lifespan of an average adult California red-legged frog and would be regarded as permanent impacts.

Differentiating Habitat Impacts

Approximately 80 percent of California red-legged frogs in coastal California remain in aquatic habitat or upland habitat within approximately 328 feet of aquatic habitat for their entire lives (Bulger et al. 2003). The remaining 20 percent utilize dispersal habitat (up to approximately 1.7 miles away from aquatic habitat) to migrate between aquatic habitat areas during the wet season. Because only approximately 20 percent of California red-legged frogs use dispersal habitat, projects with permanent or temporary impacts to dispersal habitat may require less compensation to offset impacts.

Impacts Analysis and Estimated Incidental Take

Covered Activities under this GCP are likely to result in take of California red-legged frogs and result in adverse impacts to their habitat. Take of California red-legged frogs in the form of mortality or injury of adults or larvae may result from crushing and collision; impacts to upland habitat; increased habitat fragmentation; and changes from one vegetation community to another. Take of California red-legged frogs is expected to result from human and equipment movement and ground disturbance associated with construction and installation of well pads, pipelines, access roads, electrical distribution lines and substations, and offsite reservoirs. Operations,

maintenance, and decommissioning of these features are also expected to result in take of the California red-legged frogs. Take of California red-legged frogs and impacts to their habitat will differ with methodologies implemented and with activity level when these activities occur.

We cannot definitively estimate the number of California red-legged frogs that will be taken because no density estimate for the planning area has been or could be calculated. Take of California red-legged frogs is also difficult to quantify because: 1) individual California red-legged frogs are small, making them difficult to locate, which makes encountering dead or injured individuals unlikely; 2) losses of individuals may be masked by normal temporal fluctuations in numbers; and 3) the species is primarily active at night. Although we cannot predict the exact number of individual California red-legged frogs that will be incidentally taken, the Service is providing impacts to habitat as a proxy to quantify take levels and define the permitted take limits. The Service will allow for up to 1% of the total planning area (6,742 acres) as the cap for allowable impacts to California red-legged frog habitat under this plan. Applicants would compensate for these impacts according to the requirements described in Section 5 of this document.

While we cannot estimate the number of California red-legged frogs that will be taken as a result of most covered activities, access roads are a common aspect of oil and gas facilities where the potential exists to document injury or mortality of individual California red-legged frogs. Therefore, we provide take coverage for access roads in the form of injury or mortality of individual California red-legged frogs. Under each permit issued under this GCP, we allow for the take in the form of injury or mortality of up to three individual California red-legged frogs per year as a result of vehicles using access roads.

Lompoc Yerba Santa

Anticipated Effects on the Lompoc Yerba Santa

All of the Solomon Hills population and the Santa Ynez Mountains population of Lompoc yerba santa are located within the project area. These populations also makeup the two units designated critical habitat: the first unit encompasses 2,239 acres of private land in the Solomon Hills, and the second unit encompasses 4,162 acres of private land in the Santa Ynez Mountains. Construction of well pads and associated infrastructure, including project road, and telecommunication and power line infrastructure, will result in the temporary and permanent disturbance, loss of Lompoc yerba santa habitat, and remove individual plants. Indirect effects to Lompoc yerba santa may occur in the form of altered surface hydrology, potentially resulting in increased erosion; an increase, decrease, or changes in the period and amounts of moisture content in the soil to which the subspecies has adapted; increases in the abundance of nonnative plants species as a result of the project activities; dust that could affect reproduction; and loss or change in the abundance of pollinators.

Road maintenance activities could adversely affect existing Lompoc yerba santa if individuals occur immediately adjacent to roads and are removed or destroyed as a result of maintenance activities. However, Lompoc yerba santa establishes well in disturbed soils so roadside habitat that is disturbed can be beneficial to the species by stimulating proliferation. Lompoc yerba santa sprouts adventitiously when roots are exposed following mechanical site preparation (Howard 1992). In addition, seeds may germinate in disturbed areas.

Ground disturbance associated with geophysical exploration (seismic), development, extraction, transport, and/or distribution of crude oil, natural gas, and/or other petroleum products, electrical distribution lines and substations, and offsite reservoirs has the potential to result in adverse effects to Lompoc yerba santa by removing plants, damaging root systems, disturbing soils, and/or stimulating growth of non-native plant species. Operations and maintenance activities could adversely affect the Lompoc yerba santa if it occurs in an area that is occupied by Lompoc yerba santa. Personnel and vehicles moving within occupied habitat could crush individual plants.

Habitat fragmentation as a result of the covered activities has the potential to adversely affect Lompoc yerba santa within the planning area. While pollination ecology has not been specifically studied for Lompoc yerba santa, other plants in the same taxa are known to be pollinated by wasps, butterflies, and a variety of bee taxa, especially *Anthophora*, *Bombus*, *Chelostoma*, *Hylaeus*, *Osmia*, and *Nomadopsis* (Moldenke 1976). Evidence shows that habitat size and connectivity directly or indirectly influence the abundance of both plant and pollinator species. In general, plant and pollinator diversity and population size decrease with the decreasing size and habitat connectivity (Xiao et al. 2016). Habitat fragmentation can clearly disrupt plant-pollinator interactions and threaten the local persistence of plants and pollinators (Rathcke and Jules 1993). Fragmentation can also restrict pollinator movement which may reduce gene flow and result in increased inbreeding. Inbreeding depression could further lower the reproductive success of plants in fragments (Rathcke and Jules 1993). In areas where the covered activities isolate Lompoc yerba santa from other populations of the plant or surrounding native habitat, or introduce sensory pollutants including persistent noise, light, or herbicides, may overall disrupt plant-pollinator interactions. Inhibition of successful out-crossing of pollen may overall decrease seed set and contribute to population decline.

This plan allows for impacts of up to 27.5 acres of Lompoc yerba santa habitat. The planning area spans the two geographic areas that encompass three populations of Lompoc yerba santa. Because the Service does not want all 27.5 acres of impacts to occur within either of the two populations given the relatively small size of each of the populations, we have further categorized the allowed impacts by area. The following table shows the amount of impacts we anticipate as a result of the covered activities allowed within each subpopulation.

Lompoc yerba santa subpopulation	**Acres of impacts to habitat**
Solomon Hills	11
Santa Ynez	16.5

Documented habitat requirements for Lompoc yerba santa consist of: (1) Soils with a large component of sand and that tend to be acidic; (2) Plant communities that support associated species, including maritime chaparral (Burton mesa chaparral), particularly where the following associated species are found: bush poppy (*Dendromecon rigida*), chamise (*Adenostoma fasciculatum*), manzanita (*Arctostaphylos* spp.), coyotebrush (*Baccharis pilularis*), coast live oak (*Quercus agrifolia*), California scrub oak (*Quercus berberidifolia*), Santa Cruz Island oak (*Quercus parvula*), and buck brush (*Ceanothus cuneatus*); and in southern bishop pine forests that intergrade with manzanita and black sage (*Salvia mellifera*); and (3) frequently along ridgelines in open, disturbed areas within chaparral. Compensatory mitigation for the Lompoc

yerba santa may result in the protection of habitat that supports these requirements, which would benefit the species.

Biological Goals and Objectives

Section 10(a)(2)(A) of the Act requires that a conservation plan specify the measures that the permittee will take to minimize and mitigate to the maximum extent practicable the impacts of the taking of any federally listed wildlife species as a result of covered activities addressed by the plan.

Conservation plans must establish biological goals and objectives. The purpose of the biological goals is to ensure that the operating conservation program in the conservation plan is consistent with the conservation and recovery goals established for the species. The goals are also intended to provide the applicant with an understanding of why these actions are necessary. These goals are developed based upon the species' biology, threats to the species, the potential effects of the Covered Activities, and the scope of the conservation plan.

Goal 1: Avoid and minimize take and related disturbance to the California tiger salamander and California red-legged frog and their habitats within the project areas.

- Objective 1.1 Avoid and minimize the potential for migrating California tiger salamanders and California red-legged frogs to come in contact with project related equipment or be taken as a result of construction-related activities.

- Objective 1.2 Remove any California tiger salamanders or California red-legged frogs from impact areas by performing surveys prior to and, if necessary, during construction, and relocate any individuals to suitable habitat outside impact areas.

- Objective 1.3 Site project impacts in areas outside of occupied and suitable habitat for the California tiger salamander and/or California red-legged frog to the maximum extent feasible.

- Objective 1.4 Restore disturbed areas to original conditions, as feasible, to emulate the previous conditions.

Goal 2: Preserve, maintain, and restore occupied and suitable aquatic and upland habitat for California tiger salamander and California red-legged frog in the Plan Area.

Objective 2.1 Maintain or increase the value of all aquatic habitats in project or mitigation areas known to support or with potential to support the California tiger salamander and/or California red-legged frog.

Objective 2.2 Maintain or increase the suitable and accessible upland habitat adjacent to all known or potential breeding ponds in project or mitigation areas for California tiger salamander and California red-legged frog.

Objective 2.3 Eliminate or reduce non-native wildlife that depredates California tiger salamander and California red-legged frog in known and potential upland and aquatic habitat within the Planning Area.

Objective 2.4 Control hybrid California tiger salamanders in aquatic habitat.

Goal 3: Avoid and minimize disturbance to the Lompoc yerba santa and its habitat within the project areas.

Objective 3.1: Avoid and minimize the potential for project-related equipment to affect Lompoc yerba santa plants or be adversely affected as a result of construction-related activities.

Objective 3.2 Site project impacts in areas unoccupied by the Lompoc yerba santa to the maximum extent feasible.

Objective 3.3 Remove any Lompoc yerba santa plants from impact areas by performing surveys prior to and, if necessary, during construction, and relocating and transplanting any individuals to suitable habitat outside impact areas.

Objective 3.4 Restore disturbed areas to original conditions, as feasible, to emulate the previous conditions.

Goal 4: Preserve and maintain or enhance the Lompoc yerba santa populations within the Planning Area.

Objective 4.1: Maintain or increase the distribution of Lompoc yerba santa individuals and/or populations within project areas wherever surveys indicate occurrence or areas known to be occupied.

Objective 4.2 Maintain or increase the abundance of Lompoc yerba santa individuals and/or populations within project areas wherever surveys indicate occurrence or areas known to be occupied.

Objective 4.3 Reduce anthropogenic factors that negatively affect Lompoc yerba santa, including exotic plants and unnatural disturbances and erosion.

Objective 4.4 Increase understanding of the ecological factors influencing the distribution, abundance, and population persistence of the Lompoc yerba santa within project areas in order to inform management and monitoring.

Goal 5: Provide compensatory mitigation to help meet recovery criteria and/or support long-term viability of the California tiger salamander, California red-legged frog, and Lompoc yerba santa.

Objective 5.1 To mitigate impacts on the California tiger salamander, California red-legged frog, Lompoc yerba santa, applicants will protect and manage habitat to ensure conservation benefits for the California tiger salamander, California red-legged frog, and Lompoc yerba santa.

Compensatory Mitigation for the California Tiger Salamander

In support of goal 5, objective 5.1, compensatory mitigation will be implemented in accordance with the Conservation Strategy and Mitigation Guidance for the California tiger salamander (Service 2019) or the most current version and support recovery needs as stated in the recovery plan (Service 2016) for the California tiger salamander, Santa Barbara DPS. The final recovery plan (Service 2016) for the California tiger salamander, Santa Barbara DPS establishes the following recovery criteria to support long-term viability:

1. At least four functional breeding ponds are in fully preserved status per metapopulation area.

2. A minimum of 623 acres of functional upland habitat around each preserved pond is in fully preserved status.

3. Adjacent to the fully preserved ponds and fully preserved upland habitat, a minimum of 1,628 acres of additional contiguous, functional upland habitat is present, which is at least 50 percent unfragmented and partially preserved.

4. Effective population size in the metapopulation is, on average, increasing for 10 years.

5. Management is implemented to maintain the preserved ponds free of non-native predators and competitors (e.g., bullfrogs and fish).

6. Risk of introduction and spread of non-native genotypes is reduced to a level that does not inhibit normal recruitment and protects genetic diversity within and among metapopulations.

Compensatory Mitigation for the California Red-legged Frog

In support of goal 5, objective 5.1, compensatory mitigation will be implemented to address conservation needs for the California red-legged frog within the Plan Area. The recovery plan

(Service 2002) for the California red-legged frog establishes the following recovery criteria to support long-term viability:

1. Suitable habitats within all core areas are protected and/or managed for California red-legged frogs in perpetuity.

2. Existing populations, throughout the range, are stable (i.e., reproductive rates allow for long term viability without human intervention).

3. Populations are geographically distributed in a manner that allows for the continued existence of viable metapopulations despite fluctuations in the status of individual populations (i.e. when populations are stable or increasing at each core area).

4. The species is successfully reestablished in portions of its historic range such that at least one reestablished population is stable/increasing at each core area where frogs are currently absent.

5. The amount of additional habitat needed for population connectivity, recolonization, and dispersal has been determined, protected, and managed for California red-legged frogs.

Over fifteen years have passed since the publication of the Service's 2002 Recovery Plan for the California red-legged frog and the status of the species within the Planning Area has changed during this period. Therefore, the Service conducted an expert elicitation workshop on November 18, 2016, to update conservation needs of California red-legged frogs within the Planning Area. Following this expert elicitation workshop the Service identified the following updated conservation needs for the California red-legged frog within the Plan area: (1) Removal of non-native predators from the Burton Mesa area, (2) Permanent protection and management of aquatic features occupied by the California red-legged frog on or near Burton Mesa, Shuman Canyon Creek, backdune areas near the town of Callender, Oso Flaco Creek, Campbell road, Gypsy Canyon Road, Refugio Road near the Santa Ynez River, and Guadalupe Lake. Of these priority recovery actions, the highest priority recovery action is the permanent protection and management of aquatic features near Guadalupe Lake.

In general, compensatory mitigation implemented under this Plan must address these updated conservation needs for the California red-legged frog within the Planning area. The Service is developing a conservation strategy for the California red-legged frog to provide guidance when assessing land use and project development impacts to the California red-legged frog and to strategically identify our preferred approaches to offset unavoidable impacts through compensatory mitigation when triggered under the Act. The document will be based on the best available science. The work represented in the document draws from our listing documents, in-house analysis, work products, and best professional judgement of the Service and species experts. This work is informed by Service policy and guidance. This document will be updated as needed to reflect new scientific information, species needs, or policy changes.

<u>Conservation Benefit for the Lompoc Yerba Santa</u>

We have not developed a recovery plan for the Lompoc yerba santa to which we can refer to recovery criteria for developing a compensatory mitigation program. In the absence of a recovery plan, we default to standard conservation practices for this species. For the Lompoc yerba santa with a narrow, limited distribution, recovery focuses on the preservation the remaining habitat that supports the species. In support of goal 5, objective 5.1, compensatory mitigation actions for Lompoc yerba santa will be implemented in accordance with the quantifiable criteria discussed below under Measures to Mitigate Unavoidable Impacts – Lompoc Yerba santa. The intent of these actions is to contribute to recovery of this species.

Avoidance, Minimization, and Mitigation Measures

Section 10 of the Act requires that conservation plans "minimize and mitigate" the impacts of take authorized by an incidental take permit, and that issuance of the permit will not "appreciably reduce the likelihood of the survival and recovery of the species in the wild." In general, conservation plans should include mitigation programs that are based on sound biological rationale, and are practicable and commensurate with the impacts of the project on species for which take is requested. If the proposed project is expected to result in permanent habitat loss, then the mitigation strategy must include compensatory mitigation consisting of the permanent preservation of suitable habitat or similar measures. Applicants under this plan must provide mitigation for permanent impacts to the California tiger salamander, California red-legged frog, and Lompoc yerba santa.

In accordance with these guidelines and the requirements of the federal Endangered Species Act, the conservation program of this General Conservation Plan is intended to achieve its biological goals and objectives and to ensure that the impacts of Covered Activities on California tiger salamander, California red-legged frog, and Lompoc yerba santa are minimized and mitigated to the maximum extent practicable. If applicants intend to fulfill State permitting requirements, the Department should be included in any approval processes for avoidance, minimization, and mitigation measures (e.g., biologists, mitigation plans, conservation easements, etc.). Avoidance and minimization measures are provided below.

Measures to Avoid and Minimize Impacts

1. At least 15 days prior to ground-disturbing activities, the applicant will submit the names and credentials of biologists and monitors to the Service for approval to conduct the minimization measures outlined below. Excluding an emergency activity, no project activities will begin until the applicant has received notice from the Service that the biologists and monitors are approved to do the work.

2. During the project planning phase, applicants will site all impacts away from known and potential California tiger salamander and California red-legged frog breeding habitats, avoid high quality upland and dispersal habitat, and avoid habitats supporting or immediately surrounded Lompoc yerba santa to the maximum extent feasible.

3. A Service-approved biologist will conduct a biological resources training program for all construction workers and their contractors to minimize potential impacts to Covered

Species and sensitive habitats. Training will occur prior to initial construction activities and be repeated, annually and as needed for new workers for the duration of each project covered by the permit. The training program will be reviewed and approved by the Service and will include a description of: (1) important biological resources within their project site, specifically California tiger salamander, California red-legged frog, and Lompoc yerba santa that have potential to occur within or adjacent to work areas; (2) the applicable avoidance and minimization measures; (3) the roles and responsibilities of personnel; and (4) communication protocols if Covered Species are detected. Applicants who submit their training programs along with their permit applications should expect to receive an approval at the time they receive their Permit. Applicants who submit their training programs after they submit their permit application should expect to receive an approval within 30 days of receipt of the training program.

4. A Service-approved biologist will periodically review and monitor construction and restoration efforts and will be responsible for ensuring that conditions of approval are being enforced and that success criteria are being met. Except for emergency situations, a Service-approved biologist will have the authority to temporarily halt activities if permit requirements and conditions are not being met.

5. Prior to construction activities, all grading limits and construction boundaries, including staging areas, parking, and stockpile areas, will be delineated and clearly marked in the field. All Covered Species' habitats located within 10 feet of construction activities will be delineated with specific sensitive species labeling (e.g., permanent signage stating "No Entry — Sensitive Habitat."). A service-approved biologist(s) will work with the Service to identify these areas.

6. All proposed linear routes (i.e., roads and pipelines) will be reviewed and modified, if necessary, in the field to minimize impacts to Covered Species with assistance by the onsite biologist or environmental monitor.

7. Personnel will limit their vehicle use to existing routes of travel. Travelling off designated roads will be prohibited unless access is determined critical for a particular activity and the route has been flagged to avoid or minimize adverse effects.

8. To minimize the potential for road mortality of covered wildlife within their habitats, nighttime traffic will be minimized during the construction phase to the extent feasible; all hauling activities within habitat for covered wildlife will be restricted to daylight hours, defined as the hours after sunrise and before sunset.

9. Except in areas with posted speed limits greater than 10 miles-per-hour, project-related vehicle speeds will not exceed 10 miles-per-hour when driving within California tiger salamander or California red-legged frog habitats.

10. Prior to moving vehicles or equipment, personnel will look under the vehicles or equipment for the presence of California tiger salamanders or California red-legged frogs. If a California tiger salamander, California red-legged frog or any other wildlife species

is observed, the vehicle will not be moved until the animal has vacated the area on its own accord or has been relocated out of harm's way in accordance with Measure 12.

11. A Service-approved biologist will conduct pre-construction surveys of Covered Species' habitats within project disturbance boundaries immediately prior to the onset of any ground disturbance associated with the project to determine if any individuals of the Covered Species are present, and to refine the final habitat mitigation acreages. The Service-approved biologist will monitor construction activities in the vicinity of habitats to be avoided. Upon completion of initial ground disturbance, the biologist or monitor will periodically (minimum twice per week) visit the project site throughout the construction period to ensure that impacts to the project site are in compliance with the permit. After periods of rain, a Service-approved biologist will conduct daily pre-activity surveys to ensure no California tiger salamanders or California red-legged frogs have migrated into the work area prior to ground disturbing activities resuming. No construction work will be initiated until a Service-approved biologist determines that the work area is clear of California tiger salamanders and California red-legged frogs. Should any California tiger salamanders or California red-legged frogs be observed within harm's way, the animal will be allowed to vacate the area on its own accord or be relocated in accordance with Measure 12.

    Biologists will conduct surveys for Lompoc yerba santa in areas that have potential to support the species. Applicants will perform an Information, Planning, and Consultation System (IPaC) query for the project area to inform biologists where surveys should occur. An IPaC query can be obtained from: https://ecos.fws.gov/ipac/.

12. Any California tiger salamander, California red-legged frog, or individuals of other wildlife species will be allowed to vacate the project areas on its own accord under the observation of a Service-approved biologist. If any California tiger salamander, California red-legged frog or individuals of other wildlife species does not relocate on their own, or if they are in harm's way, they will be relocated out of harm's way to nearby suitable habitat, similar to that in which it was found, and outside the project area. Only a Service-approved biologist will relocate California tiger salamanders or California red-legged frogs. The biologists conducting relocation activities will follow the Declining Amphibian Task Force Fieldwork Code of Practice.

    A Service-approved biologist will relocate any California tiger salamanders found within the project footprint to an active rodent burrow system located no more than 300 feet outside of the project area unless otherwise approved by Department and the Service. A Service-approved biologist will relocate any California red-legged frogs found within the project footprint to habitat similar to where it was captured but no more than 300 feet outside of the project area, unless otherwise approved by the Service. The individuals will be handled with clean and wet hands. During relocation they will be placed in a clean, covered plastic container with a wet non-cellulose sponge. Captured California red-legged frogs will be relocated immediately; individuals will not be stored for lengthy periods or in heated areas. The relocation container will be kept out of direct sunlight.

A Service-approved biologist will monitor relocated California tiger salamanders or California red-legged frogs until they enter a burrow and are concealed underground or otherwise deemed safe in the relocation area by the biologist. Relocation areas will be identified by the Service-approved biologist based on the best suitable habitat available. The Service-approved biologist will document both the capture site and the relocation site by photographs and GPS positions. The Covered Species will be photographed and measured (Snout-Vent) for identification purposes prior to relocation. All documentation will be provided to the Service within 24 hours of relocation.

13. Rodent burrows within the project areas that overlap the Covered Species' habitat will be excavated by a Service-approved biologist using hand tools until it is certain that the burrows are unoccupied. In lieu of burrow excavation, steel plates or plywood may also be utilized to protect small mammal burrows from ground disturbance. Plates and plywood will be removed nightly and will be removed if work is scheduled to cease for consecutive days. Any individual California tiger salamanders or California red-legged frogs encountered will be allowed to vacate the area on their own accord or be relocated out of harm's way in accordance with Measure 12.

14. Exclusionary silt fencing (or other suitable fence material) will be installed at the discretion of a Service-approved biologist to minimize the potential for California tiger salamanders or California red-legged frogs to enter the worksite. Exclusionary fencing will be maintained for the duration of the project. If an individual of the Covered Species or other wildlife species is observed within an enclosed worksite, a portion of the fencing will be removed to allow the individual to vacate the area on its own. Alternatively, the animal may be relocated out of harm's way in accordance with Measure 12.

15. Exclusionary silt fencing (or other suitable fence material) will be installed at the discretion of a Service-approved biologist to minimize potential impacts to Lompoc yerba santa plants located near proposed activities. In addition, excavations adjacent to Lompoc yerba santa (within 30 feet) should be conducted so that impacts to the root/rhyzomes are minimized. A Service-approved biologist will be retained to ensure that effects are minimized to the maximum extent practicable.

16. All construction and sediment control fencing will be inspected each workday during construction activities to ensure they are functioning properly.

17. Steep-walled excavations (e.g., trenches) that may act as pitfall traps will be inspected for wildlife at least once per day and immediately before backfilling. In lieu of daily inspections (weekends, etc.), exclusionary fencing, covers, ramps, or similar measures will be taken to prevent wildlife entrapment.

18. Open pipe segments will be capped or sealed with tape (or equivalent material) nightly, or otherwise stored at least three feet above ground. Should a pipe segment become occupied by a California tiger salamander, California red-legged frog, or any other wildlife species, the animal will be allowed to vacate the pipe on its own or will be removed and relocated in accordance with Measure 12.

19. If covered activities must occur during the rainy season, permittees will not work during rain events, 48 hours prior to significant rain events (>0.5 inch), or during the 48 hours after these events, to the extent practicable. If work must occur 48 hours prior to significant rain events (>0.5 inch), or during the 48 hours after these events, a Service-approved biologist will conduct a pre-activity survey to ensure that the work area is clear (refer to Measure 10 above).

20. The applicant will ensure that all staging areas, equipment storage areas, stockpile sites, and refueling areas are located at least 100 feet from surface water bodies and wetland habitats to minimize the potential for releases into surface water or wetland habitat. In lieu of the 100-foot buffer, secondary containment measures may be employed to prevent contamination of soil and water.

21. Applicants for projects involving oil drilling, oil wells and/or oil pipelines will prepare an Emergency Response Action Plan that addresses protection of sensitive biological resources and revegetation of any areas disturbed during an oil spill or cleanup activities. The Emergency Response Action Plan will, at a minimum, include specific measures to avoid impacts to native vegetation and wildlife habitats, plant and animal species, and environmentally sensitive habitat areas during response and cleanup operations. These measures will include integration of a service-approved biologist on the initial response team to assist with avoidance of sensitive resources and to quantify impacts resulting from control, cleanup, and maintenance. Where feasible, low-impact, site-specific techniques such as hand-cutting contaminated vegetation and using low-pressure water flushing will be specified to remove spilled material from particularly sensitive wildlife habitats, such as riparian woodlands, because procedures such as shoveling, bulldozing, and raking can cause more damage to a sensitive habitat than the oil spill itself. The Emergency Response Action Plan will evaluate the non-cleanup option for ecologically vulnerable habitats as identified by the applicants. When habitat disturbance cannot be avoided, the Emergency Response Action Plan will provide stipulations for development and implementation of site-specific habitat restoration plans and other site-specific and species-specific measures appropriate for mitigating impacts to local populations of special-status plant and wildlife species and to restore native plant and animal communities to pre-spill conditions. Access and egress points, staging areas, and material stockpile areas that avoid sensitive habitat areas will be identified. The Emergency Response Action Plan will include species- and site-specific procedures for collection, transportation and treatment of oiled wildlife, particularly for sensitive species. The Emergency Response Action Plan will include procedures for timely re-establishment of vegetation that replicates the habitats disturbed (or, in the case of disturbed habitats dominated by nonnative species, replaces them with suitable native species).

22. When working in areas with a predominance of native plants, the upper layer of topsoil material (6 inches) will be segregated during excavations to preserve the seed bank. The preserved topsoil will be covered to protect it from erosion and invasion of non-native plants until completion of the activity, when the topsoil will be replaced in the affected area. Existing access roads are not subject to this measure.

23. Disturbed areas will be restored and stabilized to reflect pre-existing contours and gradients to the extent practicable. Erosion and sediment controls (e.g., silt fences, fiber rolls, sandbags) will be installed, where necessary, utilizing weed-free materials in areas with a predominance of native plants. Where necessary, restored areas will be maintained and monitored, including weed removal (focused on noxious weeds and excluding non-native annual grasses). All planting and seeding will occur the first year after construction is complete, after the first significant rain event of the year (i.e., > 0.25 inch of precipitation.

24. Upon locating California tiger salamander or California red-legged frog individuals that may be dead or injured as a result of project-related activities, notification will be made within 72 hours to the Service Ventura Field Office at (805) 644-1766. Notification of dead or injured California tiger salamander should also be made to the Department at (562) 342-7100.

Measures to Mitigate Unavoidable Impacts

For projects that have unavoidable adverse impacts on the California tiger salamander, California red-legged frog, Lompoc yerba santa, and/or their habitats, mitigation is needed to compensate for impacts to these species. Mitigation would be undertaken in a strategic way such that it contributes to meeting the recovery criteria in the affected population. The amount of compensatory mitigation to offset a proposed project's impacts should be determined by assessing a project's level of impacts to California tiger salamanders, California red-legged frogs, Lompoc yerba santa, and their habitat. Compensatory mitigation, in this plan, refers to actions that support the permanent conservation, management, and endowment of habitat to ensure conservation benefits for the Covered Species.

<u>California Tiger Salamander</u>

The strategy to recover the Santa Barbara County California tiger salamander focuses on alleviating the threat of habitat loss and fragmentation. The goal of the final Recovery Plan (Service 2016), which was drafted in partnership with the Department, is to reduce the threats to the Santa Barbara County California tiger salamander to ensure its long-term viability in the wild, and allow for its removal from the list of threatened and endangered species. Recovery of this species can be achieved by addressing the conservation of remaining aquatic and upland habitat that provides essential connectivity, reduces fragmentation, and sufficiently buffers against encroaching development. To recover the species, recovery criteria must be met in a sufficient number of metapopulation areas to support long-term viability of the Santa Barbara County California tiger salamander. The Service presently believes that the recovery criteria must be met in all six metapopulation areas for delisting to be warranted; further research and monitoring should clarify the exact number of metapopulations necessary.

Unavoidable impacts to the California tiger salamander or its habitat will be mitigated in accordance with the Conservation Strategy and Mitigation Guidance for the California tiger salamander (Service 2019). The Conservation Strategy and Mitigation Guidance provides

guidance for assessing land use and project development impacts to the Santa Barbara County DPS of the California tiger salamander and identifies our preferred approaches to offset unavoidable impacts through compensatory mitigation. Compensatory mitigation can be provided by the project proponent by buying credits from a mitigation provider (mitigation bank) or by establishing a mitigation site that meets the Service's specification for approved mitigation (permittee-responsible mitigation). Any future mitigation options would be approved by the Service and may be available for use by applicants seeking take coverage under this plan.

In general, the Conservation Strategy and Mitigation Guidance (Service 2019) states that the value of the impacted habitat should be calculated using the methodology outlined in Searcy and Shaffer (2008), which incorporates the amount of California tiger salamander aquatic breeding habit and upland habitat covering the site to be impacted. The value of the land proposed for mitigation habitat should also be calculated using the Searcy and Shaffer methodology. A mitigation ratio of 1.25:1 [as calculated in Searcy and Shaffer (2008)] will be required for applicants seeking take coverage for the California tiger salamander under this plan. In other words, the reproductive value of habitat proposed for mitigation should be 25% more than the calculated reproductive value of the impacted habitat.

Mitigation Bank

Applicants may purchase credits from an approved conservation bank commensurate with the required mitigation, to provide compensation for impacts to California tiger salamanders. Performance and success criteria for providing compensation for impacts to the California tiger salamander will be deemed to have been met upon purchase of such credits.

In order to determine how many credits an applicant must purchase, the applicant must calculate the loss of reproductive value that would result from their project. The Service has calculated the average reproductive value of one credit at approved conservation banks as a means to determine how many credits a project proponent must purchase to offset the loss in reproductive value resulting from a project. An applicant must purchase as many credits needed to reach a mitigation ratio of 1.25:1 for reproductive value. For example, if a credit at a conservation bank has a reproductive value of 125 and a project results in a reproductive loss of 200, that project proponent must purchase 2 credits from that bank to offset the loss in reproductive value. Project proponents that are proposing to purchase mitigation credits from a conservation bank should coordinate with the Service to ensure they are using the correct reproductive value of one credit from the conservation bank in which the project proponent proposes to purchase credits from.

Permittee-Responsible Mitigation

Applicants may acquire compensation land to satisfy compensation requirements for impacts to the California tiger salamander. Compensation land must be acquired prior to initiating ground-disturbing activities within the Planning Area and financial assurances must be provided to ensure funding for the long-term management of the compensation lands. All compensation land must be recorded, managed and maintained and endowed in perpetuity prior to the onset of ground-disturbing activities. The compensation land will conserve sufficient reproductive value, as addressed in the Conservation Strategy and Mitigation Guidance for the California tiger

salamander (Service 2019), to offset the impacts to the California tiger salamander. As stated above, a mitigation ratio of 1.25:1 [as calculated in Searcy and Shaffer (2008)] will be required for applicants seeking take coverage for the California tiger salamander under this plan. In other words, the reproductive value of habitat proposed for mitigation should equal the calculated reproductive value of the impacted habitat. When potentially suitable compensation land is identified, the applicant will prepare and submit a report to the Service outlining the suitability of the land for compensatory purposes. Once the Service agrees to the suitability of the compensatory land and the land is placed into conserved status, the performance and success criteria for the provision of onsite compensation lands will be deemed to have been met.

For permittee-responsible onsite or offsite mitigation, applicants will provide for the long-term monitoring and management of the compensation lands by providing initial funding for a long-term, non-wasting endowment. All compensation land must be protected under a perpetual Conservation Easement and be recorded, managed and maintained and endowed in perpetuity prior to the onset of ground-disturbing activities. Applicants must develop a management plan for mitigation lands to be included in a Conservation Easement. The management plan provides for: 1) annual easement inspections, which will generate up-to-date information on the Easement Area's overall condition and biological resources; 2) periodic biological monitoring, which will generate detailed data describing onsite species: including population abundance, condition of habitat and condition of related human infrastructure, particularly water impoundment structures; 3) management, maintenance and enhancement tasks, which will ensure the sustainability of these resources and the health of the species' habitat; and 4) annual reports, which will summarize maintenance and management activities undertaken during the previous year, and provide an opportunity to creatively consider future needs and adaptive responses.

Other Mitigation Options

The Service is always looking for conservation opportunities that support recovery of listed species and protect the habitats in which they depend on. As such, future mitigation options may be approved by the Service and would be available for use by applicants seeking take coverage under this plan. The Service will consider such opportunities on a case-by-case basis to ensure the mitigation option fits within the scope of this Plan's conservation strategy.

<u>California Red-Legged Frog</u>

In the Service's 2002 Recovery Plan for the California red-legged frog (Service 2002), the Service identified conservation needs for the Santa Maria-Santa Ynez Core Recovery Area which encompasses the Plan Area. In general, the conservation needs for this Core Recovery Area within the 2002 Recovery Plan focused on protection of existing populations, removal of invasive species and non-native predators in particular, reducing contamination of habitat, and managing water availability for the species.

Unavoidable impacts to the California red-legged frog or its habitat will be mitigated by the project proponent by payment of mitigation fees into a mitigation account to provide the required compensation value (mitigation and conservation account), by establishing a mitigation site that meets the Service's specification for approved mitigation (permittee-responsible mitigation), or

through the purchase credits from an approved conservation bank (conservation bank). While the Service typically requires a mitigation ratio of 1:1 for temporary impacts and 3:1 for permanent impacts, the amount of mitigation that would be required for a project would be evaluated on a project-by-project basis to ensure that unavoidable take of California red-legged frog is mitigated to the maximum extent practicable.

California Red-Legged Frog Mitigation and Conservation Account

The Service is considering creating a California red-legged frog Mitigation and Conservation Account that would be intended to collect mitigation fees for impacts to the California red-legged frog within the Planning Area. The Account would be held, managed and administered by an entity qualified to receive monies paid by project applicants in connection with mitigation. These monies will be received as compensation for unavoidable impacts to the California red-legged frog and its habitat and be used to implement projects that will contribute to recovery of the species. A technical advisory committee, or other similar group, will inform the Service of appropriate projects available for funding.

To assist in project planning, the Service will develop advisory guidance for project proponents on appropriate payments to the account to compensate for project impacts to the California red-legged frog under this Plan. The Service will facilitate project planning during the design planning stage by providing such advisory guidance upfront in a simple, repeatable, transparent manner. As part of the Service's effort to develop a conservation strategy for the California red-legged frog, we are developing our advisory guidance on in-lieu fee payments. This guidance will be appended to the conservation strategy and be based upon various factors such as project implementation costs, per-acre cost of land, annual management, transaction, easement recording, endowment, environmental assessment, appraisal, and third-party fees, etc.

Permittee-Responsible Mitigation

Applicants may acquire compensation land to satisfy compensation requirements for impacts to the California red-legged frog. Compensation land must be acquired prior to initiating ground-disturbing activities within the Planning Area and financial assurances must be provided to ensure funding for the long-term management of the compensation lands. All compensation land must be recorded, managed and maintained and endowed in perpetuity prior to the onset of ground-disturbing activities. The compensation land will conserve sufficient habitat to offset the impacts to the California red-legged frog. This compensation would follow the advisory guidance provided for compensation in the form of mitigation account payments as described in the conservation strategy for the California red-legged frog. Typically, applicants would apply a mitigation ratio of 1:1 for temporary impacts and 3:1 for permanent impacts. Additionally, the Service would value compensation land within dispersal habitat for the California red-legged frog as 20 percent of the value of an equivalent amount of habitat within aquatic or upland habitat. When potentially suitable compensation land is identified, the applicant will prepare and submit a report to the Service outlining the suitability of the land for compensatory purposes. Once the Service agrees to the suitability of the compensatory land and the land is placed into conserved status, the performance and success criteria for the provision of onsite compensation lands will be deemed to have been met.

For permittee-responsible onsite or offsite mitigation, applicants will provide for the long-term monitoring and management of the compensation lands by providing initial funding for a long-term, non-wasting endowment. All compensation land must be protected under a perpetual Conservation Easement and be recorded, managed and maintained and endowed in perpetuity prior to the onset of ground-disturbing activities. Applicants must develop a management plan for mitigation lands to be included in a Conservation Easement. The management plan provides for: 1) annual easement inspections, which will generate up-to-date information on the Easement Area's overall condition and biological resources; 2) periodic biological monitoring, which will generate detailed data describing onsite species: including population abundance, condition of habitat and condition of related human infrastructure, particularly water impoundment structures; 3) management, maintenance and enhancement tasks, which will ensure the sustainability of these resources and the health of the species' habitat; and 4) annual reports, which will summarize maintenance and management activities undertaken during the previous year, and provide an opportunity to creatively consider future needs and adaptive responses.

Lompoc Yerba Santa

Unavoidable impacts to Lompoc yerba santa will be mitigated at a minimum of a 3:1 ratio (mitigation area: impact area) through onsite restoration of habitat suitable for Lompoc yerba santa directly adjacent to existing populations, establishment of new populations offsite within suitable habitat, or through acquisition of habitat that is currently occupied by Lompoc yerba santa. The Service believes that recovery of the Lompoc yerba santa will likely require establishment of new populations by propagation and such activities may be given precedence to habitat restoration. If an applicant decides to mitigate through restoration of suitable habitat or establishment of a new population through plant propagation, the applicant will develop a habitat restoration plan that is approved by the Service and Department that helps to reduce threats to the species that are described in the 5-year review (Service 2011). The habitat restoration plan must include consideration of the following criteria: defined schedules for restoration efforts, success criteria, weed management methods, propagation and outplanting methods, planting maintenance methods and monitoring schedules, reporting requirements, and long-term monitoring requirements. The plan must also carefully consider the use of fire as a management tool for this species due to the species' life history requirements as well as potential negative effects of post-fire invasive species competition. The objective of the long-term monitoring schedule will be to determine if the restored habitats are functioning equal to or better than pre-project conditions. Restoration monitoring would continue for five years or until the predetermined success criteria have been documented and met. The assessment of function would be based on indicators such as Lompoc yerba santa survivorship, wildlife use, and native and non-native floristic composition within the habitats compared to pre-project conditions. The habitat restoration plan will include sufficient funding for a period of five years to support research to determine whether and to what extent individual Lompoc yerba santa plants may be propagated to establish a new population in the wild. Any research project receiving such funding will first be reviewed and approved by the Service and Department.

If an applicant acquires habitat that supports Lompoc yerba santa as mitigation, the applicant will provide for the long-term monitoring and management of the compensation lands by providing initial funding for a long-term, non-wasting endowment. All compensation land must be

protected under a perpetual Conservation Easement and be recorded, managed and maintained and endowed in perpetuity prior to the onset of ground-disturbing activities. Applicants must develop a management plan for mitigation lands to be included in a Conservation Easement. The management plan provides for: 1) annual easement inspections, which will generate up-to-date information on the Easement Area's overall condition and biological resources; 2) periodic biological monitoring, which will generate detailed data describing onsite species: including population abundance, condition of habitat and condition of related human infrastructure; 3) management, maintenance and enhancement tasks, which will ensure the sustainability of these resources and the health of the species' habitat; and 4) annual reports, which will summarize maintenance and management activities undertaken during the previous year, and provide an opportunity to creatively consider future needs and adaptive responses.

The following table shows a summary of minimization and mitigation measures and corresponding biological goals and objectives resulting from threats associated with the covered activities.

Covered Activity	**Species Affected**	**Type of Impact (Take[1] or Impact – Take not applicable to Lompoc yerba santa)**	**Avoidance, Minimization, & Mitigation Measures**	**Biological Goals and Objectives met**
Ground Disturbance	California tiger salamander California red-legged frog Lompoc yerba santa	Injury or mortality Injury or mortality Removal (Destruction)	Surveys and relocation; Protective fencing; Personnel education; Minimizing impacts to natural areas; Habitat restoration to disturbed areas; Compensatory mitigation	Goal 1 Objectives 1.1, 1.2, 1.3 and 1.4 Goal 3 Objectives 3.1, 3.2, 3.3 and 3.4 Goal 5 Objective 5.1
Driving on Roads	California tiger salamander California red-legged frog	Injury or mortality	Surveys and relocation; Personnel education;	Goal 1 Objectives 1.1, 1.2

Human Presence	California tiger salamander California red-legged frog	Injury or mortality	Surveys and relocation; Personnel education; Minimizing impacts to natural areas	Goal 1 Objectives 1.1, 1.2 and 1.3
Vegetation Removal	California tiger salamander California red-legged frog Lompoc yerba santa	Harassment, injury or mortality	Surveys and relocation; Protective fencing; Personnel education; Minimizing impacts to natural areas; Habitat restoration to disturbed areas; Compensatory mitigation	Goal 1 Objectives 1.1, 1.2, 1.3 and 1.4 Goal 3 Objectives 3.1, 3.2, 3.3 and 3.4 Goal 5 Objective 5.1
Loss of Upland Habitat	California tiger salamander California red-legged frog	Harm, harassment, injury or mortality	Compensatory mitigation; Restore disturbed areas	Goal 1 Objective 1.4 Goal 2 Objective 2.2 Goal 5 Objective 5.1
Loss of Habitat (General)	Lompoc yerba santa	N/A	Compensatory mitigation; Restore disturbed areas onsite adjacent to existing populations or establish new populations offsite in suitable habitat	Goal 3 Objective 3.4 Goal 5 Objective 5.1
Capture/ Relocation	California tiger salamander California red-legged frog	Harassment, injury or mortality	Species surveys and relocation will be performed by a Service-approved Biologist	Goal 1 Objectives 1.1, 1.2

Barrier to Movement	California tiger salamander California red-legged frog	Harm, harassment, injury or mortality	Minimize impacts to natural resources; Compensatory mitigation	Goal 1 Objectives 1.1, 1.2 and 1.3 Goal 5 Objective 5.1
Onsite Restoration	California tiger salamander California red-legged frog Lompoc yerba santa	N/A	Surveys and relocation; Protective fencing; Personnel education; Restore disturbed and degraded areas	Goal 1 Objective 1.1, 1.2 and 1.4 Goal 3 Objective 3.1, 3.2 and 3.4
Offsite Mitigation	California tiger salamander California red-legged frog Lompoc yerba santa	Beneficial Impact	N/A	Goal 5 Objective 5.1

Monitoring

Monitoring tracks compliance with the terms and conditions of the HCP and incidental take permit. There are three types of monitoring: (1) compliance monitoring tracks the permit holder's compliance with the requirements specified in the GCP and permit; (2) effects monitoring tracks the impacts of the covered activities on the Covered Species; and (3) effectiveness monitoring tracks the progress of the conservation strategy in meeting the HCP's biological goals and objectives (includes species surveys, reproductive success, etc.). Monitoring provides information for making adaptive management decisions.

Compliance Monitoring

Compliance monitoring will be implemented via onsite construction monitoring, daily monitoring logs, and preparation of a post-construction compliance report.

Effects Monitoring

To quantify the incidental take at the end of the project, a biologist will measure the disturbance footprint (with sub-meter GPS) and count the number of individual California tiger salamanders and California red-legged frogs that were found and translocated, or injured or killed during construction. The biologist will measure the number of Lompoc yerba santa plants that were removed or damaged as a result of the covered activities.

Effectiveness Monitoring

The effectiveness of the conservation strategy will be determined during monitoring of initial ground-disturbing activities and periodic follow-up visits for onsite construction monitoring and daily monitoring logs. The post-construction compliance report will include an evaluation of the effectiveness of the Avoidance, Minimization, and Mitigation Measures. Permittees are responsible for management, monitoring, and reporting the biological monitoring on mitigation land for which the Permittee is responsible. Management, monitoring, and reporting the biological monitoring on Conservation Banks or other mitigation land is the responsibility of the banker or third party that is holds the easement on the mitigation land, respectively. Other than the biological monitoring that is being conducted on the mitigation land, the Service will monitor and evaluate biological effectiveness of the GCP through review of annual reports and subsequent surveys for listed species. Permittees will allow Service staff, or other persons designated by the Service, to access the property at any reasonable hour for the purpose of monitoring California tiger salamander, California red-legged frog, and Lompoc yerba santa populations or trapping California tiger salamanders or California red-legged frogs (50 CFR 13.47). Permittees will monitor restoration on project sites with temporary impacts to ensure that restoration goals are achieved. Results will be included in annual reports and restoration reports as described in the Reporting section of this document.

Adaptive Management Strategy

Service policy (65 CFR 35242) defines adaptive management as a formal, structured approach for addressing the uncertainty inherent in all natural systems. It involves examining alternative strategies for meeting measurable biological goals and objectives, and then, if necessary, adjusting future conservation, management, monitoring, or mitigation actions based upon what is learned. Adaptive management plans are required for conservation plans where there is substantial uncertainty regarding the effects of the action on the covered species or the efficacy of minimization and mitigation measures. The adaptive management program identifies the potential need for modification of a project and uses research and monitoring as an on-going feedback loop for continuous improvement. It should also identify triggers for certain responses and incorporate those triggers and responses into conservation plan implementation. Monitoring and reporting described in Section 5 of this plan as well as other project and survey information will provide the basis for determining when adaptive management strategies should be discussed and/or implemented. Minimization and mitigation actions prescribed in this conservation plan will be monitored and analyzed to determine whether they are producing the anticipated results. If the desired results are not being achieved, adjustments based on monitoring and the analysis of monitoring results can be made to increase the conservation plan's implementation effectiveness.

The conservation strategy described in this conservation plan is intended to minimize and mitigate for impacts to the California tiger salamander, California red-legged frog, and Lompoc yerba santa resulting from Covered Activities. The process of adaptive management is integral to ensuring that the biological goals and objectives specified in the conservation strategy will be achieved. The adaptive management strategy for this GCP involves new or refined management techniques to respond to new information about distribution of the Covered Species in the Plan Area as well as identifies adjustments to the conservation program that could be implemented as new information or data is obtained. The adaptive management strategy opens reassessment of an adopted strategy and identifies a specific threshold(s) that triggers implementation of a particular adaptive management strategy.

Biological Goal 1 and Biological Goal 2 is to avoid and minimize take and related disturbance to the California tiger salamander and California red-legged frog and their habitats within the project areas and to preserve, maintain, and restore occupied and suitable aquatic and upland habitat, respectively, for California tiger salamander and California red-legged frog in the Planning Area. Measures to avoid, minimize, and offset project impacts to California tiger salamander and California red-legged frog are described above under *Measures to Avoid and Minimize Impacts*. Modification or augmentation of these measures (such as newly developed methods to protect California tiger salamanders or California red-legged frogs) may be necessary to ensure maximum protection of the species. To that end, applicants will monitor the efficacy of the avoidance, minimization and mitigation measures and will quantify the actual extent of project impacts in annual reports. The review of mitigation measure effectiveness will be done by the Service at least once per year or as determined to be necessary. Annual reports will be submitted to Service for review in order to determine the quantification of actual take and assessment of avoidance and minimization effectiveness.

Biological Goal 3 and Biological Goal 4 is to avoid and minimize disturbance to the Lompoc yerba santa and its habitat within the project areas and to preserve and maintain or enhance the Lompoc yerba santa populations within the Planning Area, respectively. Measures to avoid, minimize, and offset project impacts to Lompoc yerba santa are described above under *Measures to Avoid and Minimize Impacts*. Modification or augmentation of these measures (such as newly developed methods to protect Lompoc yerba santa) may be necessary to ensure maximum protection of the species. To that end, applicants will monitor the efficacy of the avoidance, minimization and mitigation measures and will quantify the actual extent of project impacts in annual reports. The review of mitigation measure effectiveness will be done by the Service at least once per year or as determined to be necessary. Annual reports will be submitted to Service for review in order to determine the quantification of actual take and assessment of avoidance and minimization effectiveness.

Biological Goal 5 is to provide compensatory mitigation to further meet recovery criteria and support long-term viability of the California tiger salamander, California red-legged frog, and Lompoc yerba santa. While compensatory mitigation for a permit issued under this Plan will be completed in one step (i.e., purchasing credits from a conservation bank, making payment to a mitigation account, establishment of a conservation easement) and prior to the onset of project impacts, it is important to ensure that the mitigation is helping to meet recovery criteria and support the long-term viability of the Covered Species. Therefore, adaptive management actions

may be necessary to ensure the conservation program is supporting recovery of the covered species. Monitoring efforts will be used to determine if the biological goals and objectives of this plan are being met. If desired results are not being achieved, adjustments can be made to increase the conservation plan's implementation effectiveness.

For purposes of this Plan, specific thresholds are identified that trigger implementation of a particular adaptive management strategy or open reassessment of an adopted strategy for each of the covered species. We developed these triggers based on the species' biology and goals of the Santa Barbara County distinct population segment of the California tiger salamander's Recovery Plan (Service 2016), the California red-legged frog Recovery Plan (Service 2002) and the Lompoc yerba santa 5-Year Review (Service 2011). Each applicant must include a line item in the funding section of a project's individual project plan for adaptive management. Prior to approval of each individual permit package (see Section 6), there must be a clear understanding and agreement between the Service and the applicant as to what the funds are intended for and what thresholds would trigger collection of the adaptive management funds. The Service anticipates that the line item will be approximately 10 percent of the overall cost of the mitigation. This process will enable the applicant to assess the potential economic impacts of adjustments before agreeing to the Plan.

California Tiger Salamander Adaptive Management

Adaptive management actions will be implemented for the California tiger salamander if less than the required number of known breeding ponds required to meet recovery criteria in a metapopulation either: (1) do not have documented breeding for a period of five or more years or, (2) fewer than 10 larvae are captured during surveys for a period of five or more years, or (3) any combination of these scenarios. For example, if, over a five-year survey period, 9 California tiger salamander metamorphs are captured during aquatic surveys in year 3, and no California tiger salamanders are caught in years 1, 2, 4, and 5, adaptive management actions would be implemented. Results from annual range-wide surveys, project surveys and other information would be used to inform the Service when implementation of adaptive management actions is warranted. The number of known breeding ponds required to meet recovery criteria is shown in the table below.

A five-year period is significant because California tiger salamander metamorphs require 4 to 5 years before they reach sexual maturity (Trenham et al. 2000). Less than 50 percent of first-time breeding California tiger salamanders typically survive to breed more than once (Trenham et al. 2000). Therefore, we assume that the entire reproductive output of individual California tiger salamanders could be affected over a 5-year period. If the entire reproductive output of an individual California tiger salamander is affected, the same is assumed to be true for an entire metapopulation area or range of the species.

The Service and Department should be consulted with prior to implementation of adaptive management actions should the aforementioned triggers be met. Adaptive management actions that should be considered include, but are not limited to:

1) Construction of new pools - A hydrologist should conduct a thorough analysis to determine where suitable soils and other aspects necessary to ensure pond success. Proposed pond locations should be within 2,200 feet of existing known California tiger salamander breeding ponds. Pond success will be measured by its ability to maintain water for at least 12 weeks.

2) Enhancement of existing pools - Human-made water features and natural pools may be enhanced by adding water to them to ensure that they hold water for a longer period of time (at least 12 weeks for California tiger salamander metamorphosis to occur). If a human-made water feature or natural pools have some water present, additional water should be added slowly to existing ponds to minimize turbidity.

3) Removal of noxious species - Non-native fish (e.g., mosquitofish, bass, sunfish, goldfish), bullfrogs, crayfish, non-native tiger salamanders, and exotic aquatic turtles should be removed from any water body with within the geographic range of the California tiger salamander in Santa Barbara County. Noxious weeds that are invading breeding pools will be removed and managed according to the accepted standards of the Service and recommendations of a Service-approved biologist.

4) Livestock grazing - Manage grazing to maintain the desired amount of emergent vegetation in ponds and vernal pools, and to keep annual grassland generally short (Ford et al. 2013). Do not exclude grazing from extensive areas of grassland for more than one year.

5) Habitat restoration - Restoration of breeding and upland habitat can help to achieve proper functioning features that may support a stable and well-distributed population. Such activities include, but are not limited to, voluntary replacement of crops with native grassland or scrub (see Wang et al. 2009) and instituting low-intensity grazing or mowing in lieu of ground-disturbing activities such as tilling, deep ripping, or grading. If a breeding pond was historically ephemeral but converted through human-caused activities to become perennial, the breeding pond should be restored back to ephemeral to the extent feasible.

6) Headstarting program - A headstarting program can be used to help bolster local populations of California tiger salamanders. A headstarting program can help to reduce the mortality of California tiger salamander larvae while still providing all of the necessary factors for their proper development.

7) Reduction of threats - A number of management actions that could reduce threats include, but are not limited to: use of fencing (e.g., fencing roads), restrict the use of pesticides and herbicides, ensure proper water quality (e.g., dissolved oxygen, nitrate), etc.

<u>California Red-legged Frog Adaptive Management</u>

Adaptive management actions will be implemented for the California red-legged frog if survey and monitoring data provided to the Service on California red-legged frogs in the plan area

indicates a severe decline in California red-legged frog abundance within the plan area across a three-year period. For example, if annual monitoring reports from multiple areas permanently preserved and management for the California red-legged frog (e.g. Baron Ranch in Arroyo Quemado and Santa Barbara Land Conservancy Land in Arroyo Hondo) indicate severe (over 50 percent) declines in California red-legged frog abundance over a three-year period. Female California red-legged frogs require three years to reach sexual maturity, therefore a severe decline over a three-period period would represent a decline across entire generational cohort.

The Service should be consulted with prior to implementation of adaptive management actions should the aforementioned triggers be met. Adaptive management actions that should be considered include, but are not limited to:

1) Protection and enhancement of aquatic breeding habitat - Protection of existing aquatic breeding habitat for the California red-legged frog by either fee title purchase or establishment of conservation easements. Enhancement of water features via water supplementation to ensure that these features hold water for a period sufficient to support the entire obligate aquatic development stage of California red-legged frogs (up to eight and a half months).

2) Removal of noxious species - Removal of non-native fish (e.g., mosquitofish, bass, sunfish, goldfish), bullfrogs, and crayfish within aquatic habitat of the California red-legged frog. Removal of invasive plants (e.g. *Arundo donax*) that reduce availability of aquatic habitat for the California red-legged frog to the accepted standards of the Service and recommendations of a Service-approved biologist.

3) Population augmentation of California red-legged frogs - Development of a captive breeding program for the California red-legged frog and/or translocation to augment or reintroduce California red-legged frogs.

4) Scientific research on threats to the California red-legged frog.

<u>Lompoc Yerba Santa Adaptive Management</u>

Adaptive management actions will be implemented for the Lompoc yerba santa if survey, project and monitoring data for Lompoc yerba santa in the plan area indicates a severe decline in Lompoc yerba santa abundance or site-specific conditions within the planning area. A severe decline for the species would be if:

1) Site conditions deteriorate such that:
    a. A 20 percent increase in nonnative species is detected (density); or
    b. Nonnative species within or adjacent to occupied Lompoc yerba santa habitat makeup 20 percent of the plant cover.

2) A significant/notable decline in number of ramets (an individual or stalk of a clone) or occupied area such that:

a. A 20 percent decline in number of ramets is detected from the start the permit issuance; or
b. A 20 percent decline in the occupied area is detected from the start the permit issuance date.

The Service and Department should be consulted prior to implementation of adaptive management actions should the aforementioned triggers be met. Adaptive management actions that should be considered to include, but are not limited to:

1) Propagation/Population augmentation – Working in close coordination with the Service, the Department, and the Santa Barbara Botanic Garden, propagate Lompoc yerba santa for outplanting. Collection of seeds and cuttings must be properly permitted and must be sourced from the closest genetically diverse seed producing populations. Propagation may occur in both natural habitat and in controlled environments (e.g., botanical garden nursery, lab). Individuals produced will be outplanted into appropriate restored habitat in an effort to increase the species' distribution. A habitat restoration plan that includes propagation, experimental outplanting design, and long-term maintenance must be submitted and approved by the Service and the Department prior to restoration implementation. Propagation conducted in controlled environments must be tested for potential contaminants, including phytophthora, to avoid introduction into natural settings. The plan must also carefully consider the use of fire as a management tool for this species due to the species' life history requirements as well as potential negative effects of post-fire invasive species competition.

2) Habitat enhancement and restoration - In areas directly adjacent to where Lompoc yerba santa occurs, restore and enhance habitat to achieve suitable conditions for the species to increase the species survival and distribution. Restoration and enhancement activities may include (but is not limited to) removing nonnative weeds, planting associated native species, and removing waste or toxic materials.

3) Scientific research – Coordinated conservation and research are needed to further understand the species. Efforts should include management actions to benefit existing occurrences, searches for additional locations (helicopter or drone surveys conducted in summer months following bloom period in coordination with ManTech SRS), investigations of potential barriers to recruitment, studies on the associated pollinator network and potential disruptions that may preclude successful outcrossing, and investigations of the species' relationship with fire. Following thoughtful consideration for the use of fire as a management tool, in coordination with the Service and Department, establish experimental seed plots treated with variable levels of prescribed burn followed by supplemental irrigation. If transplantation is attempted, an excavation study should be performed to document Lompoc yerba santa's specific rooting depth as well as transplantation efficacy. Additionally, to contribute to existing study of population genetics, tissue analysis from CNDDB occurrences 11 and 12 should be performed in coordination with the Santa Barbara Botanic Garden.

4) Reduction of threats - A number of management actions that could reduce threats include, but are not limited to: redesign development projects that may encroach upon or near occupied habitat, use of fencing (e.g., fencing roads) to maintain appropriate distance from occupied habitat, restrict the use of pesticides and herbicides, remove trash and waste materials, etc.

Changed Circumstances

Section 10 of the Act regulations [(69 FR 71723, as codified in 50 CFR Sections 17.22(b)(2) and 17.32(b)(2))] require that a habitat conservation plan specify the procedures to be used for dealing with changed and unforeseen circumstances that may arise during the implementation of the habitat conservation plan. In addition, the No Surprises Rule [50 CFR 17.22 (b)(5) and 17.32 (b)(5)] describes the obligations of the permittee and the Service. The purpose of the No Surprises Rule is to provide assurance to the non-federal landowners participating in habitat conservation planning under the Act that no additional land restrictions or financial compensation will be required for species adequately covered by a properly implemented habitat conservation plan, in light of unforeseen circumstances, without the consent of the permittee.

If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances and these additional measures were already provided for in the plan's operating conservation program, then those measures will be implemented as specified in the plan. However, if additional conservation management and mitigation measures are deemed necessary to respond to changed circumstances and such measures were not provided for in the plan's operating conservation program, the Service will not require these additional measures absent the consent of the applicant, provided that the GCP is being "properly implemented" (properly implemented means the commitments and the provisions of the GCP and the Conservation Easement document have been or are fully implemented).

Applicants should identify up-front the range of possible operating conservation program adjustments that could be implemented as new information or data is obtained. This range defines the limits of what resource commitments may be required of the applicant. The applicant should identify specific actions that must be taken, not merely provide a general review of strategies. Prior to permit issuance, there must be a clear understanding and agreement between the Service and the applicant as to the range of adjustments to the management actions that might be required as a result of any changed or unforeseen circumstances. This process will enable the applicant to assess the potential economic impacts of adjustments before agreeing to the GCP.

To fund the remedial management to address changed circumstances, applicants must add a line item to the estimated management costs. The amount should be commensurate with the costs to address the changed circumstances, based on the anticipated restoration, management and/or monitoring costs. The following sections outline reasonably foreseeable circumstances and their anticipated effects on the covered species.

<u>Newly Listed Species</u>

If a new species is listed or critical habitat is designated under the Act and could be taken by Covered Activities, any incidental take permits issued under this plan will be reevaluated by the Service. If, after reevaluation, the Service determines that modification of Covered Activities for any specific project would be necessary to avoid or minimize the likelihood of take of this newly listed species, then the permittee and the Service will work together to develop and implement mutually agreeable measures to the Covered Activities in the incidental take permit ("Modification Measure(s)"). Each Modification Measure must be approved by the Service and the permittee before implementation. The permittee will be allowed to continue undertaking Covered Activities that would not result in take of the newly listed species while such Modification Measures are being developed. The permittee, or their legal successor(s) in ownership, will continue to implement such Modification Measures until such time as the permittee has applied for and the Service has approved an amendment of the Section 10(a)(1)(B) permit, in accordance with applicable statutory and regulatory requirements, to cover the newly listed species or until the Service notifies the permittee in writing that the Modification Measures to the Covered Activities are no longer required to avoid the take of the newly listed species and/or impacting any newly designated critical habitat.

Newly Discovered Listed Species

In the event that an already listed species is discovered in a project area, and, after evaluation of this already listed species, the Service determines that modification of the Covered Activities would be necessary to avoid or minimize the likelihood of take of this already listed species, then the permittee and the Service will work together to develop and implement mutually agreeable Modification Measures to the Covered Activities in the incidental take permit. Each Modification Measure must be approved by the Service and the permittee before implementation. The permittee will be allowed to continue undertaking Covered Activities that would not result in take of the newly listed species while such Modification Measures are being developed. The permittee, or their legal successor(s) in ownership, will continue to implement such Modification Measures until such time as the permittee has applied for and the Service has approved an amendment of the Section 10(a)(1)(B) permit, in accordance with applicable statutory and regulatory requirements, to cover the listed species or until the Service notifies the permittee in writing that the Modification Measures to the Covered Activities are no longer required to avoid the likelihood of take of the listed species.

Oil Spill

Oil and gas activities could result in spills due to geologic hazards, mechanical failure, structural failure, corrosion, or human error. Such spills could potentially result in water quality impacts to nearby creeks. Small leaks or spills, which are contained and remediated quickly, may have minor or negligible impacts to water resources. In contrast, large spills such as from pipelines or tank ruptures, which could spread to surface waters and/or offsite groundwater, may substantially degrade water quality, with potential long-term impacts to beneficial uses and biological resources. Spills have the potential to harm and/or kill the covered species and/or destroy their habitats or food sources. Incidental take that occurs from spills or associated cleanup activities are unlawful and not covered by the permit.

In compliance with County and United States Environmental Protection Agency requirements, the permittee has on file with CalGEM and the County a Spill Prevention Control and Countermeasure (SPCC) Plan. The SPCC Plan contains operating procedures to prevent oil spills, control measures to prevent a spill from reaching navigable waters, and countermeasures to contain, clean up and mitigate the effects of an oil spill. and gas companies are required to develop protocols to respond to potential spills as defined in the Spill Control and Countermeasures section of the Oil Pollution Act (40 CFR §112.3). The Spill Control and Countermeasures plans describe how a company would implement oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters and adjoining shorelines. Operation and maintenance activities are not expected to impact water quality.

If a spill occurs within a project area, the permittee will notify the Service of this changed circumstance, and then implement the following actions:

- Assess the damage caused by the spill, including the areal extent of natural communities and covered species habitat affected;
- Employ Best Management Practices;
- Develop and implement a monitoring program to evaluate recovery of the affected area for five years; and
- If monitoring indicates that indirect effects of the spill are degrading habitat in ways that impact the covered species, develop and implement a restoration plan designed to improve habitat conditions, through an adaptive management and monitoring program.

The permittee will coordinate with the Service throughout implementation of the cleanup and response actions until it is decided by both parties that impacts of the spill have been adequately assessed and remediated.

Fire

Fire is a component of the natural disturbance regime in the Planning Area. While the covered species exhibit many important adaptations to fire and/or the habitat conditions it creates, fire can have detrimental effects on the populations, particularly if the fire occurs outside of the range of natural variation of the disturbance regime (e.g., inappropriate season, intensity, severity, or frequency), or if it promotes the invasion and spread of invasive plants. Fire may negatively impact the covered species populations by causing soil erosion, which can preclude native plant re-establishment, and by promoting the invasion and spread of exotic plant species.

Habitat for Lompoc yerba santa may be altered by the increase in veldtgrass (*Ehrharta calycina*), a perennial grass that is not native to California, and subsequent increases in the frequency of wildfires. The corresponding type conversion of habitat from scrub with openings to fields of veldtgrass has been discussed by numerous researchers including D'Antonio and Vitousek (1992), Bossard et al. (2000) and Brooks et al. (2004). Invasive plants such as veldtgrass can change the fuel properties of a site, which can in turn affect fire behavior, and ultimately alter fire regime characteristics such as frequency, intensity, extent, and seasonality of fire. If the fire regime changes subsequently promote the dominance of invasive plants, restoration to pre-invasion conditions becomes more difficult (Brooks et al. 2004).

The effects of wildfire on watersheds include first-order impacts, such as burned vegetation and reduced soil infiltration, and second order impacts, such as increased runoff, hillslope erosion, stream sedimentation, and significant alteration of terrestrial and aquatic habitat. Increased erosion and flooding emanating from burned areas not only impacts rates of sediment delivery and transport but also the structure and function of streams downslope and downstream. Greater flow and increased sediment loading can produce episodes of exceptionally high rates of sediment transport (Ryan et al. 2010). Increased erosion can lead to sedimentation that could smother California red-legged frogs or reduce the availability of plants and insects that serve as their habitat and food sources. Increased erosion and sediment delivery could also cause a decrease in the holding capacity of the vernal pools that function as breeding habitat for California tiger salamanders.

If a wildfire occurs within a project area, the permittee will notify the Service of this changed circumstance, and then implement the following actions:

- Assess the damage caused by the fire, including the areal extent of natural communities and covered species habitat affected;
- Develop and implement an exotic plant early detection and rapid response plan, to prevent the affected area from becoming dominated by invasive plants;
- Develop and implement a monitoring program to evaluate recovery of the affected area for five years; and
- If monitoring indicates that native plant re-establishment is insufficient, or that the indirect effects of fire including erosion and the invasion and spread of exotic plants, are degrading habitat in ways that impact the covered species, develop and implement a restoration plan designed to improve habitat conditions, through an adaptive management and monitoring program.

The permittee will coordinate with the Service after implementing the aforementioned actions to discuss the magnitude of impacts the fire had on the covered species and what appropriate actions should be taken to help the species recover.

Drought

Climate variability, such as fluctuations between wet and dry periods, is part of natural processes; however, climatic models suggest that much of the recent trends in climate are driven by anthropogenic causes, and models indicate that these trends are likely to continue into the future (Barnett et al. 2008). Current climate change predictions for terrestrial areas in the Northern Hemisphere indicate warmer air temperatures, more intense precipitation events, and increased summer continental drying (Field et al. 1999, Cayan et al. 2005, Intergovernmental Panel on Climate Change 2014). Climate simulations have shown that, by 2100, California temperatures are likely to increase by 2.7 degrees Fahrenheit (1.5 degrees Celsius) under a lower emissions scenario, and by up to 8.1 degrees Fahrenheit (4.5 degrees Celsius) under a higher emissions scenario (Cayan et al. 2008). Because of the diversity of California's landscape, however, we do not know what effect (e.g., changes in precipitation, number and severity of storm events) increasing temperatures will have at the local level.

Global amphibian declines have been increasingly attributed to factors resulting from global climate change over the last decade (Corn 2005, Wake 2007, Reaser and Blaustein 2005). Factors such as epidemic disease (Pounds et al. 2006), changes in breeding phenology (Terhivuo 1988; Gibbs and Breisch 2001; Beebee 1995), changes in environmental conditions such as leaf litter (Whitfield et al. 2007), increased evaporation rate (Corn 2005, but see Pyke and Marty 2005), increased frequency of storm events and drought (Kagarise-Sherman, and Morton 1993) and ultraviolet radiation (Blaustein et al. 1998) have been linked to climate change and declines in amphibian populations.

Diseases, such as the amphibian chytrid fungus, may become more virulent in changing climatic conditions (Pounds et al. 2006). Chytrid fungus is a water-borne fungus that can be spread through direct contact between aquatic animals and by a spore that can move short distances through the water. The fungus can decimate amphibian populations, causing fungal dermatitis, which usually results in death in 1 to 2 weeks. Infected animals may spread the fungal spores to other ponds and streams before they die. Once a pond has become infected with chytrid fungus, the fungus stays in the water for an undetermined amount of time. If drought causes the amphibian chytrid fungus to become more virulent, California tiger salamanders and California red-legged frogs could be impacted.

Changes to the hydroperiod of ephemeral ponds due to changing weather patterns have significant implications for the diversity of amphibians that rely on those ponds for breeding (Corn 2005). California tiger salamanders and California red-legged frogs may also be adversely affected by drought conditions if the hydroperiods of ephemeral ponds that these species use as breeding habitat is limited to a point where the ponds do not retain water long enough for successful breeding to occur. Ultraviolet radiation has been shown to have negative effects on amphibian eggs and embryos around the world (Blaustein et al. 1998). The precise effects that climate change will have on the Santa Barbara County DPS of the California tiger salamander and the California red-legged frog are unknown. Drought is a natural part of the climatic variability of the ecoregion; however, drought may be exacerbated by climate change.

Populations of Lompoc yerba santa and the species' restricted distribution place this species at risk of extinction from stochastic events (Service 2011). The conservation biology literature commonly notes the vulnerability of taxa known from very few locations and/or from small and highly variable populations (e.g., Shaffer 1981, 1987; Groom et al. 2006; Primack 2006). This vulnerability can arise due to uncertainty with stochastic events, such as unpredictability in environmental conditions, natural catastrophes (e.g., floods, earthquakes), variability in population growth, etc. Populations of Lompoc yerba santa are subject to all of these stochastic events. Elam (1994) found that two of the six populations she studied were uniclonal meaning a single plant is made up of many stems produced by the vegetative spread of the root system. Because Lompoc yerba santa is self-incompatible (which prevents inbreeding and promotes outcrossing) and cannot produce viable seed, a uniclonal population can be extirpated by environmental stochasticity such as prolonged drought.

The potential impacts of climate change on the flora of California were discussed by Loarie et al. (2008). Based on modeling, they predicted that species' distributions will shift in response to

climate change, specifically that the species will "move" or disperse to higher elevations and northward, depending on the ability of each species to do so. Species diversity will also shift in response to these changes with a general trend of increasing diversity shifting towards the coast and northwards with these areas becoming de facto future refugia. However, predictions of climatic conditions for smaller sub-regions such as California remain uncertain. We don't know at this time if climate change in California will result in a warmer trend with localized drying, higher precipitation events, or other effects. While we recognize that climate change is an important issue with potential effects to Lompoc yerba santa, we lack adequate information to make accurate predictions regarding its effects to this species at this time (Service 2011).

For purposes of this GCP, a drought is defined as two or more consecutive years with rainfall below 75% of average. Over the 62-year period of record for which daily rainfall was measured at weather stations in Santa Maria City and Lompoc City Hall (Santa Barbara County 2017), 23 and 27 years, respectively, had precipitation under 75% average rainfall; however, two or more consecutive dry years occurred just four times in Santa Maria: 1970 – 1972, 1984 – 1985, 1989 – 1990, and 2012 – 2016, and seven times in Lompoc: 1959 – 1961, 1970 – 1972, 1976 – 1977, 1981 – 1982, 1984 – 1985, 1989 – 1990, and 2012 – 2016.

Recognizing that climate change may increase the frequency of drought, for purposes of the GCP, drought is defined as a changed circumstance if it occurs more than four times during the 20-year permit term, or if a single drought extends up to four years in duration.

In the event that a drought during the permit term negatively impacts the covered species or efforts to promote their persistence as part of the conservation strategy, the permittees will prepare a report assessing the impacts and identify strategies to ameliorate or repair them. The report will be provided to the Service for review and comment and the permittee will implement the remedial measures identified in the report or as recommended by Service.

Exotic Species

Habitat within the Planning Area has been degraded by a suite of invasive species not native to the area. These species include both invasive plants and aquatic species. Exotic species can have strong, negative impacts on the covered species and their habitats through a variety of direct and indirect mechanisms, including competition for resources, predation, habitat degradation, and promotion of fire.

The introduction of exotic predators was an important factor in the decline of the California red-legged frog in the early to mid-1900s (Service 2002). Competition and/or predation from non-native species including the bullfrog, catfish (*Ictalurus* spp.), bass (*Micropterus* spp.), mosquito fish (*Gambusia affinis*), red swamp crayfish (*Procambarus clarkii*), and signal crayfish (*Pacifastacus leniusculus*) is a continuing threat to the California red-legged frog. These species prey on California red-legged frog larvae and have adverse impacts on the species' survivability. The California red-legged frog relies on aquatic habitat for breeding and an important factor influencing the suitability of aquatic breeding sites is a general lack of introduced aquatic predators. The suite of invasive species that compete and/or prey on California red-legged frog larvae, affect California tiger salamander larvae in the same fashion.

Larval and adult individuals of the non-native tiger salamander (*Ambystoma tigrinum mavortium*) were widely sold as fish bait in California during the past century, and a number of populations of the species have become established in the state, some within the range of the California tiger salamander. Non-native tiger salamanders can have negative effects on California tiger salamander populations through hybridization, resulting in loss of genetically-pure native salamanders (Shaffer et al. 1993, Riley et al. 2003). Non-native tiger salamanders are present at the Lompoc Federal Penitentiary grounds in Santa Barbara County (outside of but near the Santa Barbara County California tiger salamander's range), and a hybrid was discovered at a site in the Purisima Hills metapopulation area in 2009, which is the closest metapopulation to the penitentiary. The potential loss of any metapopulation of the Santa Barbara County DPS of the California tiger salamander to hybridization is a serious threat.

In this GCP, the detection of new invasive aquatic species within suitable California tiger salamander or California red-legged frog aquatic habitat within an individual project area is considered a changed circumstance for which remedial actions will be implemented. The permittee will conduct an assessment and develop a plan to control and to the extent possible, eradicate, the hybridized individuals and, if necessary, remediate the impacts caused to the covered species and habitats.

Habitat for Lompoc yerba santa may be altered by an increase in invasive plants. Invasive plants can change the fuel properties of a site, which can in turn affect fire behavior, and ultimately alter fire regime characteristics such as frequency, intensity, extent, and seasonality of fire. If the fire regime changes subsequently promote the dominance of invasive non-native plants, an invasive plant-fire regime cycle may be established, and restoration to pre-invasion conditions becomes more difficult (Brooks et al. 2004).

In this GCP, the invasion of new invasive plants up to 25% total percent cover within an individual project area is considered a changed circumstance for which remedial actions will be implemented. The nature of the actions will depend on the exotic species and its impacts. The permittee will be responsible for conducting an assessment and develop a plan to control and to the extent possible, eradicate, the species; and, if necessary, remediate the impacts it caused to the covered species and habitats, including through restoration of the affected areas.

Unforeseen Circumstances

Unforeseen circumstances are defined at 50 CFR 17.3 as changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the Service at the time of the conservation plan's negotiation and development, and that result in a substantial and adverse change in status of the covered species (50 CRF 17.3). The term "Unforeseen Circumstances" is used to define the limit of the applicant's obligation under the "No Surprises" regulations set forth in 50 code of Federal Regulations, Sections 17.22 (b)(5) and 17.32 (b)(5).

In case of an unforeseen circumstance, the Permittee will immediately notify the Service. In deciding whether Unforeseen Circumstances exist, which might warrant requiring additional

conservation measures, the Service will consider, but not be limited to, the factors identified in 50 CFR, 17.22(b)(5)(C) and 17.32(b)(5)(C) (the No Surprises Rule), which are: size of the current range of the affected species, percentage of range affected by the GCP, percentage of range conserved by the GCP, ecological significance of that portion of the range affected by the GCP, level of knowledge about the affected species and the degree of specificity of the species' conservation program under the GCP, and whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

As described in 50 C.F.R., Sections 17.22(b)(5)(C) and 17.32(b)(5)(C), the Service will have the burden of demonstrating that Unforeseen Circumstances exist, using the best data available. Any findings of Unforeseen Circumstances must be clearly documented and based upon reliable technical information regarding the biological status and habitat requirements of the affected species

Except where substantial threat of imminent, significant adverse impacts to a Covered Species exists, the Service will provide the Permittee at least sixty (60) calendar-days written notice of a proposed finding of Unforeseen Circumstances, during which time the Service will meet with the Permittee to discuss the proposed finding, to provide the Permittee with an opportunity to submit information to rebut the proposed finding, and to consider any proposed changes to the conservation program or the incidental take permit.

Pursuant to the No Surprises rule, if the Service determines that additional conservation and mitigation measures are necessary to respond to the Unforeseen Circumstances, the additional measures must be as close as possible to the terms of the original GCP. If the Service determines that additional conservation and mitigation measures are necessary to respond to Unforeseen Circumstances, then the Permittee will work with the Service to develop mutually agreeable conservation and mitigation measures, each of which must be approved by the Service and the Permittee before implementation. Additional conservation and mitigation measures will not involve the commitment of additional land, additional financial commitment or funding by the Permittee, additional restrictions on the use of a project's area or covered activities, or the commitment of other natural resources otherwise available for development or use under original terms of the GCP without the consent of the Permittee.

Reporting

By March 31st following each year of permit issuance and project implementation, permittees will submit a report to the Ventura Fish and Wildlife Office to document the status of the project. The reports will be sent to the Ventura Fish and Wildlife Office by email or other means. Annual reports to the Service will include the following information:

1. Brief summary or list of project activities accomplished during the reporting year (e.g. this includes development/construction activities, and other covered activities);

2. Project impacts (e.g. number of acres graded, number of buildings constructed, etc.);

3. Description of any take that occurred to California tiger salamander, California red-legged frog, and/or their habitats (includes cause of take, form of take, take amount, location of take and time of day, and deposition of dead or injured individuals), and/or any impacts that occurred to Lompoc yerba santa and/or its habitat (includes cause of impact, form of impact, amount of impact, and location of impact);

4. Brief description of the use of access roads (estimation of use and general description of use) and any take that occurred as a result of vehicles using the roads as well as any California red-legged frogs or California tiger salamander that were observed on the roads;

5. Brief description of conservation strategy implemented;

6. Monitoring results (compliance, effects, and effectiveness monitoring) and survey information (if applicable);

7. Description of circumstances that made adaptive management necessary and how it was implemented, including a table showing the cumulative totals; by reporting period all adaptive management changes to the GCP, including a very brief summary of the actions;

8. Description of any changed or unforeseen circumstances that occurred and how they were dealt with;

9. Funding expenditures, balance, and accrual;

10. Description of any minor or major amendments; and

11. Description of any surveys that were conducted for each Covered Species and/or their habitats.

Once an applicant completes activities covered by a permit, the applicant will notify the Ventura Fish and Wildlife Office that they have completed all covered activities and mitigation measures and provide a final report to the Ventura Fish and Wildlife Office; subsequent annual compliance reports will not be necessary thereafter.

Section 6
Permit Processing and Implementation

To apply for a Permit under the GCP, project proponents must submit a complete Permit Application Package. This section describes the Permit Application Package and provides information on the development and submission of the package. The Permit Application Package includes the following items:

- Submission of a 3-200-56 Federal Fish and Wildlife Permit Application Form (including supplementary information requested in the Permit application form: total number of acres, covered activities requested under the Permit, etc.);
- Application processing fee of $100;
- A copy of the GCP Eligibility Determination document:
    - Project proponents interested in applying for a Permit must complete the Eligibility Determination document. This document can assist potential applicants with determining whether their project, or projects, may be eligible for a Permit under this GCP. If a proposed project is determined to not be eligible to participate through the GCP, the Eligibility Determination document provides recommendations intended to assist project proponents to identify alternate processes that can help them achieve compliance with the Act. If project proponents determine that their project, or projects, may be eligible for coverage, they may seek Permit issuance through the application process.
- Individual Project Package, which includes:
    - Map and description of the location of impacts, including photographs;
    - Duration of proposed Covered Activities;
    - Description or proposed Covered Activities;
    - Survey results for the Covered Species or notification that the presence of these species will be assumed based on habitat;
    - Species assessment and estimation of take (more information below);
    - List of minimization measures appropriate for the project;
    - Proposed mitigation and associated calculations; and
    - Funding assurances and commitment necessary to implement the proposed minimization and mitigation measures (more information below).
        - If conservation banks are the selected mitigation method, documentation of credit purchase must be provided to the Service prior to the onset of any activities that have the potential to result in take of California tiger salamander or California red-legged frog, or impacts to Lompoc yerba santa. If Permittee-responsible mitigation is the selected mitigation method, these lands must be acquired, have established endowments and completed management plans, and be approved by the Service prior to any

impacts that may result in take of California tiger salamander or California red-legged frog, or impacts to Lompoc yerba santa. If payment into a mitigation account is the selected mitigation method, documentation of payment must be provided to the Service prior to the onset of any activities that have the potential to result in take of California tiger salamander or California red-legged frog, or impacts to Lompoc yerba santa.

Applicants with newly-constructed oil and gas projects covered by the GCP may include both construction and operation and maintenance activities within the same Permit Application Package or may submit one Individual Project Package for construction and one for operation and maintenance activities. Applicants with oil and gas facilities existing prior to the GCP may submit Permit Application Package for their ongoing operation and maintenance activities. The Service recognizes that it may not be feasible to submit a Permit Application Package for each individual operation and maintenance activity proposed within the Planning Area. Therefore, Permittees may lump these activities for multiple projects into one Permit Application Package. Permit Application Package for operation and maintenance activities must include a general description of types of activities, estimations of typical size and frequency of operation and maintenance activities based on past activities, and typical impact type associated with activities. Operation and maintenance applications should provide as much information as possible for the Service to adequately evaluate proposed potential project(s). Mitigation completion for operation and maintenance must be documented in the Individual Project Package and be in place prior to impacts, unless it is an emergency repair.

Estimating the Amount of Take for the California Tiger Salamander

Take of California tiger salamanders would be in the form of harm, capture, injury, and/or mortality. Take for each permit that will be issued under the GCP will be determined by the amount of the impacted habitat. The Service will work with each Permittee to determine the amount of mitigation required to offset the impacts of incidental taking resulting from Covered Activities. The amount of mitigation required to offset the impacts will be calculated in accordance with the California Tiger Salamander Conservation Strategy and Mitigation Guidance (Service 2019) and is further described in Section 5 of this plan under *Measures to Mitigate Unavoidable Impacts*. Before the Service can approve a Permit Application Package, assurances of adequate mitigation must be provided. The Service will calculate the potential amount of mitigation needed prior to Permit Application Package approval.

Estimating Amount of Take for California Red-Legged Frog

Take of California red-legged frogs would be in the form of harm, capture, injury, and/or mortality. Take for each permit that will be issued under the GCP will be determined by the amount of the impacted habitat. The Service will work with each Permittee to determine the amount of mitigation required to offset the impacts of incidental taking resulting from Covered Activities. The amount of mitigation required to offset the impacts will be calculated in accordance with Section 5 of this plan under *Measures to Mitigate Unavoidable Impacts*. Before the Service can approve a Permit Application Package, assurances of adequate mitigation must

be provided. The Service will calculate the potential amount of mitigation needed prior to Permit Application Package approval.

Estimating Amount of Impacts to Lompoc Yerba Santa

Adverse impacts associated with the Covered Activities include crushing of plants and/or seeds by foot traffic and vehicles, surface disturbance and soil compaction, and erosion and/or changes in the hydrology. The amount of impact for each permit that will be issued under the GCP will be determined by the amount of impacted habitat. The Service will work with each Permittee to determine the amount of mitigation required to offset the impacts of incidental taking resulting from Covered Activities. The amount of mitigation required to offset the impacts will be calculated is described in Section 5 of this plan under *Measures to Mitigate Unavoidable Impacts*. Before the Service can approve a Permit Application Package, assurances of adequate mitigation must be provided. The Service will calculate the potential amount of mitigation needed prior to Permit Application Package approval.

Mitigation Assurances

Permittees must demonstrate adequate funding for mitigation. If conservation banks are the selected mitigation method, documentation of credit purchase must be provided to the Service prior to initiation of impacts. If Permittee-responsible mitigation lands are the selected mitigation method, these lands must be acquired, have completed management plans and perpetual protection (for example, a conservation easement) and be approved by the Service prior to the initiation of impacts. Applicants must submit their plans for mitigation (type, location, and status) in their Individual Project Packages.

Funding Assurances

In addition to mitigation funding, applicants must also demonstrate adequate funding sources to fully implement the GCP, complete and maintain required minimization and mitigation measures, conduct compliance and effectiveness monitoring, and implement measures that may be required due to changed circumstances. Funding options for changed circumstances and post-construction restoration are described below in Section 7. For each Permit Application Package, applicants must identify the selected funding option, submit applicable documentation of the selected funding assurance (as discussed in Section 7), and include an estimation of the cost to implement the GCP.

Service Review and Notification of Permit Application Package Approval or Denial

Following the receipt of a complete Permit Application Package, the Service will review the package for potential approval. The Service will notify applicants via e-mail (to the e-mail address included in the Individual Project Package Checklist) if and when their Permit Application Package is approved. The Service will also correspond via e-mail if the Permit Application Package is incomplete or has been denied for any reason within 30 days of receipt of Permit Application Package. The Service will provide the applicant with an explanation of why the Permit Application Package was deemed incomplete or not approved.

The number of acres to be covered by a permit for the specific project will be estimated in accordance with the activities proposed on their individual project site. Applicants that seek a permit for a specific project are eligible to seek further permits in the future. That is, if an applicant requests a permit for proposed activities and may need further coverage in the future, they can reapply for additional take coverage for future projects. The Service will track the amount of take permitted for each project under the GCP through the approval of incidental take permits (approval process described below). If the total take approved in incidental take permits reaches the total take analyzed under this GCP for a Covered Species, no additional Permit Application Packages will be approved by the Service for that Covered Species. Applicants can still apply for incidental take permits for the other species covered in this plan for which the take limit has not been reached.

The total amount of take approved by the Service in incidental take permits and the amount of take remaining within the GCP will be posted on the Service's website, http://www.fws.gov/ventura/. The amount of take will be updated following each approval of an incidental take permit or as end of year reports are submitted.

Permit Application Submission

Permit Application Packages, all associated information described above (and in the application instructions), and the processing fee must be submitted to the Service's Ventura Fish and Wildlife Office. Applicants should also submit an electronic copy of the application by email to sbc-oilandgasgcp@fws.gov and rachel_henry@fws.gov with the subject heading "GCP Application – <Your Company Name>."

Under section 10(c) of the Act and Federal regulations (50 CFR 17.22 and 17.32 or 50 CFR 222.302 and 222.303), the Services must publish a notice of receipt for each section 10 permit application received in the Federal Register. The information received by the Services as part of an application package must be made available for public review (section 10(c) of the Act). Notification to the public regarding permit issuance is through the publication of a notice in the Federal Register. A Section 10(a)(1)(B) incidental take permit may be issued upon a determination by the Service that all requirements for permit issuance have been met. Statutory criteria for issuance of the permit specify that: (1) the taking will be incidental; (2) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; (3) the applicant will ensure that adequate funding for the conservation plan and procedures to deal with unforeseen circumstances will be provided; (4) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and (5) the Service has received assurances, as may be required, that the conservation plan will be implemented. The Service also prepares an Intra-Service Section 7 Biological Opinion and a Set of Findings, the latter which evaluates the Section 10(a)(1)(B) permit application in the context of permit issuance criteria. Issuance of an incidental take permit is a federal action that requires Section 7 and NEPA compliance.

Permit Implementation

If a Permit is issued, the Permittee will be responsible for:

1) Fully implementing the actions described in this GCP;
2) Complying with all terms and conditions of the Permit;
3) Ensuring that minimization measures are implemented;
4) Providing receipt of mitigation to the Service prior to onset of any activities that have the potential to result in take of California tiger salamander or California red-legged frog, or impacts to Lompoc yerba santa. Permittees should submit documentation to sbc-oilandgasgcp@fws.gov and rachel_henry@fws.gov with the subject heading "GCP Mitigation Fulfillment – <Your Company Name>";
5) Monitoring and tracking their total take of and impacts to the Covered Species and their habitats; and
6) Reporting impacts to Covered Species, their habitats, and mitigation on an annual basis.

Impact, Mitigation, and Post-Construction Restoration Tracking

Following Service's issuance of a Permit, Covered Activities included in the Individual Project Package may begin. During and after implementation of Covered Activities, Permittees must:

1) Track Take of Covered Species

   After project completion, the Permittee will document the actual amount of impact to California tiger salamanders, California red-legged frogs, and Lompoc yerba santa and their habitats. This will be necessary for two reasons: 1) impacts to California tiger salamanders, California red-legged frogs, and their habitats must be monitored and tracked to ensure that incidental take identified in the Service's Biological Opinion for the GCP has not been exceeded and 2) the Permittee must ensure that impacts to habitat did not exceed project specific estimates identified in the Individual Permit Package.

2) Ensure Minimization and Mitigation

   The Act requires that the conservation program meeting the requirements for Permit issuance must include measures to minimize and mitigate impacts to covered species to the maximum extent practicable. All minimization and mitigation measures, as identified in Section 5 of this document, should be tracked by the Permittee and reported in accordance with Section 7 below. Adequate mitigation must be in place before the corresponding take occurs.

3) Tracking Restoration of Temporarily Impacted Areas and Mitigation

   An impact may be considered temporary if: (1) the impacted area within California tiger salamander habitat will be restored to an area suitable for use within 5 years of the initial impact or (2) the impacted area within California red-legged frog habitat will be restored to an area suitable for use within 3 years of the initial impact. Applicants will determine whether Covered Activities will cause temporary or permanent impacts and mitigate appropriately for those impacts (see Temporary and Permanent Impacts sections in Section 5). Following initial temporary impacts, the Permittee may conduct additional

Covered Activities within the impacted area without additional mitigation if the area has not yet been Service-validated as restored to suitable California tiger salamander, California red-legged frog, and/or Lompoc yerba santa habitat (not to exceed 5 years or 3 years from impact start date for California tiger salamander or California red-legged frog, respectively). For example, a Permittee determines that construction of a pipeline results in temporary impacts to California tiger salamander habitat and mitigates appropriately prior to impacts, additional Covered Activities (i.e., maintenance or repair) occurring within the original construction area would not need additional mitigation if the area has not yet been restored. If subsequent impacts or failure of restoration techniques will prevent the area from being restored to a condition suitable for Covered Species use within 5 years of the impact start date, then additional mitigation would be required before the 5th anniversary of the impact start date. Additional mitigation would be required because any temporary impact lasting more than 5 years is considered a permanent impact as discussed under Section 5 above. All additional mitigation provided for these impacts must be reported in the annual report.

Reporting

An annual report of Covered Activities, as well as management activities undertaken under the terms of this GCP, will be prepared by Permittees and submitted electronically to sbc-oilandgasgcp@fws.gov and rachel_henry@fws.gov. E-mail subject heading should read "Annual Report – Permit XXXXXXX – Individual Project Package #XXX" with the applicable year in four-digit format, Permit number (found in Box 3 of Permit) and Individual Project Package number (found in Permit Application Package approval e-mail from Service) for the project. A copy of the cover letter (or e-mail) must be submitted to the Ventura Fish and Wildlife Office with the same subject line as the e-mail. Annual reports will be submitted by March 31 of each year that the Permit is in effect (i.e., the Permittee is working under an active Permit). The report will summarize information on the monitoring and management activities for all issued Permits, including:

- Permit number;
- Description of activity conducted within California tiger salamander, California red-legged frog, and/or Lompoc yerba santa habitat;
- Location (County, Township/Range/Section) of impacts;
- Map identifying the location of impacts;
- Habitat type impacted;
- Annual area (in acres) disturbed within California tiger salamander, California red-legged frog, and/or Lompoc yerba santa habitat occurring within each reporting year;
- Type of impact (temporary/permanent) to California tiger salamander, California red-legged frog, and/or Lompoc yerba santa habitat occurring within each reporting year;
- Duration of all impacts in California tiger salamander, California red-legged frog, and/or Lompoc yerba santa habitat;
- Minimization measures implemented within California tiger salamander, California red-legged frog, and/or Lompoc yerba santa habitat;
- Amount and type (permittee-responsible, purchase of conservation bank credits, mitigation account) of mitigation required based on impacts;

- Date of mitigation fulfillment (credit purchase, deposit to mitigation account, approval of conservation easement);
- Total acres of mitigation provided for impacts but not yet applied to impacts;
- Summary of the above information by year and cumulative for entire duration of the Permit; and
- All Permits that include temporary impacts must also include:
    - Impact start date (used to determine 5-year restoration period for temporary impacts);
    - Map identifying the areas with temporary impacts and restoration status;
    - Number of acres with temporary impacts;
    - Number of acres with restoration still in progress;
    - Number of acres considered by Permittee to be restored;
    - Techniques implemented to restore areas with temporary impacts to California tiger salamander, California red-legged frog, and/or Lompoc yerba santa habitat; and
    - All color digital images previously taken for annual reports. Additionally, Permittees must submit photographs taken annually within two weeks of the date the pre-impact photographs were taken during the calendar year of the restoration report (for example, if pre-impact photographs were taken on July 15, 2015, the restoration report must include photographs taken within two weeks of July 15 of the given calendar year). Permittees will submit color digital images, the date the photograph was taken, and the location of established photograph points (latitude and longitude recorded in NAD83). Photographs must be taken in the four cardinal directions (North, South, East, and West) at the established photograph points. The established photograph points used for reporting must be the same photograph points identified during the Permit Application Package approval process (described above in Section 6) and annual reports.

Restoration reports must be submitted electronically to sbc-oilandgasgcp@fws.gov and rachel_henry@fws.gov. E-mail subject heading should read "Restoration Report – Permit XXXXXXX" with the applicable Permit number (found in Box 3 of Permit) for the project. This report, including the amount and type of information required, is subject to change as data organization or data needs are determined by the Service.

Permittees are not required to submit an annual report if their project activities conclude before the permit duration expires. If no impacts to California tiger salamander occur during a given year of the Permit's duration, Permittees may send an e-mail to the Ventura Fish and Wildlife Office at (sbc-oilandgasgcp@fws.gov and rachel_henry@fws.gov) stating that no impacts occurred during that calendar year. E-mail subject heading should read "Annual Report – Permit XXXXXXX – No Impacts."

Permit Amendments

<u>Clarifications and Administrative Changes</u>

Provisions of the GCP or Permits may need to be clarified to address issues with respect to administration of the process or the precise meaning and intent of the language contained within those documents. Permittees may also wish to have provisions clarified and may request that the Service provide such clarifications. Clarifications do not change the substantive provisions of any of the documents in any way but merely clarify and make more precise the provisions as they exist.

In addition, administrative changes to the GCP may be necessary that do not make substantive changes to any of the provisions, but which may be necessary or convenient, over time, to more fully represent the overall intent of the Permittee and the Service. Any request for clarification or any proposed clarification or administrative change will be reviewed by the Service. If the Service approves the clarification or administrative change, it will be processed and the Service will provide a response. Clarifications may be approved locally by the Field Supervisor of the Ventura Fish and Wildlife Office. Clarification or administrative changes to the GCP may be approved by the Field Supervisor of the Ventura Fish and Wildlife Office depending on the nature of the amendment. Clarifications or administrative changes to the GCP will be memorialized by a letter of agreement that will be archived at the Ventura Fish and Wildlife Office at http://www.fws.gov/ventura/.

Changes to the GCP may be made without amending issued Permits when the clarifications or changes are of a minor or technical nature such that the net impacts on Covered Species and levels of take resulting from the changes are not increased over those described in the original GCP and the Service's decision documents. Examples of clarifications or changes to the GCP that would not require a Permit amendment include, but are not limited to: (a) minor revisions to monitoring or reporting procedures; (b) minor revisions in accounting procedures; and (c) minor modifications to Covered Activities in response to evolving technologies (provided that impacts associated with such activities will not exceed the level of take authorized under the Permit and are compliant with other local and state laws and regulations). To propose a clarification or change to the GCP without amending their Permit, applicants must submit to the Service, in writing, a description of: (a) the proposed amendment; (b) an explanation of why the clarification or change is necessary or desirable; and (c) an explanation of why the applicant believes the effects of the proposal are not different from those described in the original GCP. If the Service concurs with the proposed amendment, then it will authorize the GCP amendment in writing, and the amendment will be considered effective upon the date of the written authorization from the Service. Other circumstances which may require clarifications or changes include (but are not limited to) requests to update Permits with changes to Permittee name (such as after merger or acquisition) or mailing address.

Major Amendments

Major Amendments are modifications that result in impacts not previously analyzed, such as (but not limited to), new listing as threatened or endangered of species not addressed by this GCP that may be affected by Covered Activities, expansion of the GCP Plan Area, or the addition of Covered Activities. Substantive changes will be processed as an amendment in accordance with the provisions of the Act and regulations at 50 CFR Parts 13 and 17 and will be subject to appropriate environmental review under the provisions of NEPA. Major Amendments to the

GCP may be implemented by the Service following publication of the approved, amended GCP. Following completion of a Major Amendment to the GCP, all future Permits would contain the modifications contained within the Major Amendment. Previously-existing Permits will not be required to incorporate any changes caused by a Major Amendment, unless a Permittee voluntarily chooses to modify their Permit.

Major Amendments to individual Permits would be required for any modification of the Covered Activities that is expected to cause take of Covered Species not analyzed or authorized in the original Permit or if the authorized amount of take is insufficient for the Permittee's need. These amendments must be completed prior to the activities causing take. If Permittees need to expand project areas, the Service recommends that Permittees apply for an additional Permit under the GCP, rather than requesting a Major Amendment to an existing Permit.

Permit Renewal

Section 10(a)(1)(B) permits may be renewed without the issuance of a new permit, provided that the permit is renewable, and that biological circumstances and other pertinent factors affecting Covered Species are not significantly different than those described in the original conservation plan. To renew a permit issued under this plan, the permittee will submit to the Service, in writing: (1) a request to renew the permit with reference to the original permit number; (2) certification that all statements and information provided in the original Individual Permit Package, together with any approved amendments, are still true and correct, and inclusion of a list of changes; (3) a description of any take that has occurred under the existing permit; and (4) a description of any portions of the project still to be completed, if applicable, or what activities under the original permit the renewal is intended to cover.

If the Service concurs with the information provided in the request, it will renew the permit consistent with permit renewal procedures required by Federal regulation (50 CFR 13.22). If the applicant files a renewal request and the request is on file with the issuing Service office at least 30 days prior to the permit expiration date, the permit will remain valid while the renewal is being processed. However, the applicant may not take listed species beyond the quantity authorized by the original permit. If the applicant fails to file a renewal request within 30 days prior to the permit expiration date, the permit will become invalid upon expiration. The applicant must have complied with all annual reporting requirements to qualify for a permit renewal.

Permit Transfer

In the event of a sale or transfer of ownership of a company, property or project during the life of the permit, the following will be submitted to the Service by the new owner(s): (1) a new permit application; (2) permit fee; and (3) written documentation providing assurances pursuant to 50 CFR 13.25 (b)(2) that the new owner will provide funding adequate to fully implement the actions described in their Individual Permit Package and 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 Plan unless otherwise specified in writing and agreed to in advance by the Service.

Such Other Measures that the Service May Require

If dead, injured, or sick endangered or threatened species, migratory birds, or eagles are discovered, Permittees are required to contact the Ventura Fish and Wildlife Office at (805) 644-1766 for care and disposition instructions within 72 hours of discovery. Extreme care must be taken in handling sick or injured individuals to ensure effective and proper treatment. Care must also be taken in handling dead specimens to preserve biological materials in the best possible state for analysis of cause of death. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials from any dead specimens, Permittees and their contractors/subcontractors have the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

Permittees will notify the Service (by e-mail to sbc-oilandgasgcp@fws.gov and rachel_henry@fws.gov) within 24 hours of spills or releases of crude oil, natural gas, and petroleum products (including fuel and other operational fluids) in areas with California tiger salamander, California red-legged frog, and/or Lompoc yerba santa habitat. A spill is defined as more than 42 gallons (1 barrel), or any oil spills that threaten or enter a waterway.

If during the tenure of Permits issued through participation in the GCP, the project design and/or the extent of habitat impacts is altered, such that there may be an increase in the anticipated take of the Covered Species, Permittees are required to contact the Service and obtain a new Permit or Individual Project Package approval and/or amendment of their Permit before commencing any construction or other activities that might result in take beyond that described in their Permit.

The incidental take authorization granted by Permits issued through participation in the GCP will be subject to full and complete compliance with, and implementation of, the GCP and all specific conditions contained in resulting Permits. Permit terms and conditions will supersede and take precedence over any inconsistent provisions in the GCP or other Permit documents.

Acceptance of Permits serves as evidence that Permittees understand and agree to abide by the terms of the Permit and all applicable Sections of 50 CFR Parts 13 and 17.

Section 7
Funding

Section 10(a)(2)(A)(ii) of the Act requires that funding will be available to implement actions that will be enacted to minimize and mitigate the impacts of the taking must be specified. The Act also requires that the Service must find that "the applicant will ensure that adequate funding for the plan will be provided" (Section 10(a)(2)(B)(iii)). Applicants must therefore demonstrate adequate funding sources to fully implement the actions described in this GCP and their Individual Project Package. Expenses related to these activities are the sole responsibility of the Permittee. Failure to commit appropriate funding prior to approval (discussed above in Section 6) or to meet funding obligations after the Permit is issued may be grounds for denying Individual Project Packages for future projects or revoking or suspending an existing Permit. Permittees unable to meet the financial requirements described here may not meet qualifications for approval of Individual Project Packages and should contact the Service for additional guidance or potential approval of alternative funding mechanisms.

Applicants must ensure that adequate funding sources for implementation, actions to be taken for changed circumstances and unforeseen events, alternatives to the proposed project, and other measures are included in their Individual Permit Package. Funding for mitigation obligations are directly related to the mitigation option(s) selected by the applicant. If a Permittee chooses to fulfill mitigation requirements through the purchase of credits from a Service-approved conservation bank, the conservation bank will be responsible for the management of the mitigation lands secured through the purchase of bank credits. If a Permittee elects to fulfill mitigation obligations through Permittee-responsible all management responsibilities, including adaptive management procedures associated with those lands, must be fully funded and managed by the Permittee or designated third party entity.

Section 8
References

AECOM. 2009. Results of chytrid testing for the Tajiguas Landfill reconfiguration and Baron Ranch restoration project. Report addressed to Santa Barbara County Department of Public Works. AECOM, Santa Barbara, California. J. LaBonte et al., unpublished data

AECOM. 2011. 2010 Baron Ranch California red-legged frog monitoring report. Prepared for County of Santa Barbara. Camarillo, California, dated March 2011. 23 pp.

Anderson, J.D. 1968. Comparison of the food habits of Ambystoma macrodactylum sigillatum, Ambystoma macrodactylum croceum, and Ambystoma tigrinum californiense. Herpetologica 24(4):273-284.

Anderson, P.R. 1968. The reproductive and developmental history of the California tiger salamander. Master's thesis, Department of Biology, Fresno State College, Fresno, California. 82 pp.

Andrews, K. M., J. W. Gibbons, and D. M. Jochimsen. 2008. Ecological effects of roads on amphibians and reptiles: A literature review, In Urban Herpetology, J. C. Mitchell, R. E. Jung Brown, and B. Bartholomew, Eds. Society for the Study of Amphibians and Reptiles, Salt Lake City, UT.

Baldwin, K.S. and R.A. Stanford. 1987. Life history notes: Ambystoma tigrinum californiense (California tiger salamander): predation. Herpetological Review 18(2):33.

Barnett, T.P., D.W. Pierce, H.G. Hidalgo, C. Bonfils, B.D. Santer, T. Das, G. Bala, A.W. Wood, T. Nozawa, A.A. Mirin, D.R. Cayan, and M.D. Dettinger. 2008. Human-induced changes in the hydrology of the western United States. Science 319:1080-1083.

Barry, S.F. 1998. Managing the Sacramento vernal pool landscape to sustain native flora. Pp.236-240 in: C. Witham, E.T. Bauder, D. Belk, W.R. Ferren Jr., and R. Ornduff (Eds.). Ecology, conservation, and management of vernal pool ecosystems. Proceedings from a 1996 Conference. California Native Plant Society, Sacramento, California.

Batuik S. 2020. Re: 5-year review Lompoc yerba santa (Eriodictyon captitatum [sic]): occurrence 12 Dangermond Preserve. Email dated 21 December from Scott Batuik, WRA, Inc., San Rafael, California, to Chris Kofron, U.S. Fish and Wildlife Service, Ventura, California. 26 pp

Beebee, T.J.C. 1995. Amphibian breeding and climate. Nature 374:219-220.

Berger, L., R. Speare, P. Daszak, D.E. Green, A.A. Cunningham, C.L. Goggin, R. Slocombe, M.A. Ragan, A.D. Hyatt, K.R. McDonald, H.B. Hines, K.R. Lips, G. Marantelli, and H. Parkes. 1998. Chytridiomycosis causes amphibian mortality associated with population declines in the rain forests of Australia and Central America. Proceedings of the National Academy of Sciences of the United States of America 95:9031-9036. Collins 2000

Blaustein, A.R., Kiesecker, J.M., Chivers, D.P., D.G. Hokit, A. Marco, L.K. Belden, and A. Hatch. 1998. Effects of ultraviolet radiation on amphibians: field experiments. American Zoologist 38:799-812.

Blaustein, A.R., L.K. Belden, D.H. Olson, D.M. Green, T.L. Root, and J.M. Kiesecker. 2001. Amphibian breeding and climate change. Conservation Biology 15:1804-1809.

Bobzien, S. and J.E. DiDonato. 2007. The status of the California tiger salamander (Ambystoma californiense), California red-legged frog (Rana draytonii), foothill yellow-legged frog (Rana boylii), and other aquatic herpetofauna in the East Bay Regional Park District, California. East Bay Regional Park District, Oakland, California.

Bobzien, S., J. E. DiDonato, P.J. Alexander. 2000. Status of the California red-legged frog (Rana aurora draytonii) in the East Bay Regional Park District, California. Oakland, California

Bosch, J., I. Martinez-Solano, and M. Garcia-Paris. 2001. Evidence of a chytrid fungus infection involved in the decline of the common midwife toad (Alytes obstetricans) in protected areas of central Spain. Biological Conservation 97:331-337.

Bossard, C., M.C., Hoshovsky, and J.M. Randall (eds.). 2000. Invasive plants of California's wildlands. University of California Press, Berkeley and Los Angeles, California. Species profile for Ehrharta spp. on pp. 164-170.

Brooks, M.L., C.M. D'Antonio, D.M. Richardson, J.B., Grace, J.E. Keeley, J.M. DiTomaso, R.J. Hobbs, M. Pellant, and D. Pyke. 2004. Effects of invasive alien plants on fire regimes. BioScience 54(7): 677–688.

Bulger, J.B., N.J. Scott, and R.B. Seymour. 2003. Terrestrial activity and conservation of adult California red-legged frogs Rana aurora draytonii in coastal forests and grasslands. Biological conservation 110:85-95.Alvarez, J.A., M.A. Shea, J.T. Wilcox, M.L. Allaback, S.M. Foster, G.E. Padgett-Flohr, and J.L. Haire. 2013. Sympatry in California tiger salamander and California red-legged frog breeding habitat within their overlapping range. California Fish and Game 99:42-48.

[Department] California Department of Fish and Wildlife. 2021. California Natural Diversity Database (CNDDB) – Government version 5.2.14. Retrieved June 25, 2021 from https://map.dfg.ca.gov/rarefind/view/RareFind.aspx.

[Department] California Department of Fish and Wildlife. 2010. A Status Review of the California Tiger Salamander (Ambystoma californiense). Report to the Fish and Game Commission. Betsy C. Bolster, Nongame Wildlife Program Report 2010-4, January 11, 2010. 57 pp + fig and appendices.

[CNDDB] California Natural Diversity Data Base. 2010. Element occurrence reports for Eriodictyon capitatum. California Department of Fish and Game, Sacramento, California.

Cayan, D.R., E.P. Maurer, M.D. Dettinger, M. Tyree, and K. Hayhoe. 2008. Climate change scenarios for the California region. Climatic Change 87 (Supplement 1):S21-S42.

Cayan, D., M. Dettinger, I. Stewart, and N. Knowles. 2005. Recent changes towards earlier springs: early signs of climate warming in western North America? U.S. Geological Survey, Scripps Institution of Oceanography, La Jolla, California.

City of Santa Barbara. 2007. Integrated pest management strategy: 2006 annual report. Available at: http://www.santabarbaraca.gov/NR/rdonlyres/8F9F1663-400D-4C20- AE06-V-3364BBFB028A3/0/2006IPMAnnualReportFinalNR.pdf. (Accessed: July 20, 2009).

City of Santa Maria. 2006. Housing Element Update of the General Plan. Available at: http://www.ci.santa-maria.ca.us/housing/Part1.pdf. (Accessed: March 31, 2009).

Coe, T. 1988. The application of section 404 of the Clean Water Act to vernal pools. Pp. 356-358 in: J. A. Kuslen, S. Daly, and G. Brooks, editors. Urban wetlands. Proceedings of the National Wetlands Symposium, June 26-29, 1988.

Cole, K.L. 1974. Edaphic restrictions in the La Purisima Hills with special reference to *Pinus muricata* D. Don. Master's thesis, California State University, Los Angeles. 67 pp.

Collins, P. 2000. Report addressed to the Ventura Fish and Wildlife Service. Santa Barbara Museum of Natural History, Santa Barbara, California.

Consortium of California Herbaria. 2010. Accessed records for Eriodictyon capitatum online on March 1, 2010, at http://ucjeps.berkeley.edu/consortium.

Corn, P.S. 2005. Climate change and amphibians. Animal Biodiversity and Conservation 28.1:59-67.

Coulombe, H.N. and C.F. Cooper. 1976. Ecological assessment of Vandenberg Air Force Base, California. Vol. 1. Evaluation and recommendations. AFCEC TR-76-15. Air Force Civil Engineering Center. Tyndall Air Force Base, Florida. 187 pp.Zedler 1977),

County of Santa Barbara. 2017. Average Annual Rainfall in Santa Barbara County. http://www.countyofsb.org/pwd/monthlyrain.sbc. Accessed November 2017.

County of Santa Barbara Planning and Development Department. 2009. Coastal land use plan. Accessed online at: http://longrange.sbcountyplanning.org/programs/genplanreformHat/PDFdocs/CoastalPlan.pdf. October 22, 2010.

D'Antonio, C.M. and P.M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. Annual Review of Ecology and Systematics 23: 63-87.

D'Antonio, C.M., D.C. Odion, and C.M. Tyler 1993. Invasion of maritime chaparral by the introduced succulent Carpobrotus edulis. Oecologica 19:25-41.

Daszak, P., A.A. Cunningham, and A.D. Hyatt. 2003. Infectious disease and amphibian population declines. Diversity and Distributions 9:141-150.

Davis, F.W., D.E. Hickson, and D.C. Odion. 1988. Composition of maritime chaparral related to fire history and soil, Burton Mesa, Santa Barbara County, California. Department of Geography, University of California, Santa Barbara.

DAPTF (Declining Amphibian Populations Task Force). 1998. The declining amphibian populations task force fieldwork code of practice. Froglog 27.

Eastwood, A. 1933. A new yerba santa. Leaflets of Western Botany, Vol 1, No. 5: 40-41.

Elam, D.R. 1994. Genetic variation and reproductive output in plant populations: effects of population size and incompatibility (Lilium parryi, Lilium humboldtii, Raphanus sativus, Eriodictyon capitatum). Ph. D. dissertation, University of California, Riverside. 221 pp.

Fellers, G.M., D.E. Green, and J.E. Longcore. 2001. Oral chytridiomycosis in the mountain yellow-legged frog (Rana muscosa). Copeia 2001: 945-953.

Ferren, W. and B. Hecht. 2003. Hydrology and physiography of California tiger salamander habitats in Santa Barbara County, California. Submitted to the Ventura Fish and Wildlife Office, Ventura, California.

Fidenci, P. 2004. The California red-legged frog, Rana aurora draytonii, along the Arroyo Santo Domingo, Northern Baja California, Mexico. The Herpetological Journal, Volume 88. London, England.

Field, C.B., G.C. Daily, F.W. Davis, S. Gaines, P.A. Matson, J. Melack, and N.L. Miller. 1999. Confronting climate change in California. Ecological impacts on the Golden State. A report of the Union of Concerned Scientists, Cambridge, Massachusetts, and the Ecological Society of America, Washington, DC.

Fisher, R.N. and H.B. Shaffer. 1996. The decline of amphibians in California's great central valley. Conservation Biology 10:1387-1397.

Fitzpatrick, B.M., J.R. Johnson, D.K. Kump, H.B. Shaffer, J.J. Smith, and S. Randal Voss. 2009. Rapid fixation of non-native alleles revealed by genome-wide SNP analysis of hybrid tiger salamanders. BMC Evolutionary Biology 9.

Fitzpatrick, B.M., J.R. Johnson, D.K. Kump, J.J. Smith, S.R. Voss, and H.B. Shaffer. 2010. Rapid spread of invasive genes into a threatened native species. Proceedings of the National Academy of Sciences of the United States of America 107:3606-3610.

Fitzpatrick, B.M., and H.B. Shaffer. 2007b. Hybrid vigor between native and introduced salamanders raises new challenges for conservation. Proceedings of the National Academy of Sciences of the United States of America 104:15793-15798.

Fletcher, M. 1983. A flora of Hollister Ranch, Santa Barbara County, California. Department of Biological Sciences, University of California, Santa Barbara. Publication number 2. 77 pp.

Gamradt, S.C. and L.B. Kats. 1996. Effect of introduced crayfish and mosquitofish on California newts. Conservation Biology 10:1155-1162.

Gibbs, J.P., and A. R. Breisch. 2001. Climate warming and calling phenology of frogs near Ithaca, New York, 1900-1999. Conservation Biology 15:1175-1178.

Gilson, A., and T.P. Salmon. 1990. Ground squirrel burrow destruction: control implications. Proceedings of the Vertebrate Pest Conference 14: 97-98.

Goodsell, J.A. and L.B. Kats. 1999. Effect of introduced mosquitofish on Pacific treefrogs and the role of alternative prey. Conservation Biology 14:921-924.

Graf, M. and B. Allen-Diaz. 1993. Evaluation of mosquito abatement district's use of mosquitofish as biological mosquito control: case study - Sindicich Lagoon in Briones Regional Park. Unpublished manuscript. 22 pp.

Griffin, J.R. 1978. Maritime chaparral and endemic shrubs of the Monterey Region, California. Madrono 25: 65-81.

Grismer, L. 2002. Reptiles and Amphibians of Baja California, including its Pacific island and the islands in the Sea of Cortez. University of California Press, Berkeley and Los Angeles, California.

Groom, M.J., G.K. Meffe, and C.R. Carroll. 2006. Principles of conservation biology, third edition. Sinauer Associates, Inc., Sunderland, Massachusetts.

Hansen, R.W. and R.L. Tremper. 1993. Amphibians and reptiles of central California. California Natural History Guides. University of California Press, Berkeley. 11 pp.

Hayes, M.P. and M.M. Miyamoto. 1984. Biochemical, behavioral and body size differences between Rana aurora aurora and Rana aurora draytonii. Copeia 1984(4): 1018-1022.

Hayes, M.P. and M.R. Jennings. 1988. Habitat correlates of distribution of the California redlegged frog (Rana aurora draytonii) and the foothill yellow-legged frog (Rana boylii): Implications for management. Pp. 144-158. In Proceedings of the symposium on the management of amphibians, reptiles, and small mammals in North America. R. Sarzo, K.E. Severson, and D.R. Patton, (technical coordinators). U.S.D.A. Forest Service 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). The Southwestern Naturalist 30:601-605.

Hickson, D.E. 1988. History of wildland fires on Vandenberg Air Force Base, California. NASA (National Aeronautics and Space Administration) Technical Memorandum 100983. The Bionetics Corporation, Kennedy Space Center, Florida.

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. California Department of Fish and Game, Sacramento, California.

Hollister Ranch Conservancy. 2003. Hollister Ranch Conservancy Botanical Resources. Accessed online at http://www.hollister-ranch.com/ on October 20, 2010.

Holomuzki, J.R. 1986. Intraspecific predation and habitat use by tiger salamanders (Ambystoma tigrinum nebulosum). Journal of Herpetology 20:439-441.

Howard, J.L. 1992. Eriodictyon californicum. In: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory 2001, May. Fire Effects Information System, [Online]. Available: http://www.fs.fed.us/database/feis/.

Hunt, L.E. 1993. Origin, maintenance, and land use of aeolian sand dunes in the Santa Maria Basin. Prepared for The Nature Conservancy, San Luis Obispo, California. 72 pp.

Intergovernmental Panel on Climate Change. 2007. Climate change 2007: the physical science basis. Summary for policymakers. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, IPCC Secretariat, World Meteorological Organization and United Nations Environment Programme, Geneva, Switzerland.

Intergovernmental Panel on Climate Change. 2014. Summary for policymakers. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S.

Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1-32.

Kilpatrick, A., C.J. Briggs, and P. Daszak. 2010. The ecology and impact of chytridiomycosis: an emerging disease of amphibians. Trends in Ecology and Evolution 25(2):109-118.

Jacks, P., C. Scheidlinger, and P.H. Zedler. 1984. Response of Eriodictyon capitatum to prescribed fire on Vandenberg AFB, California. Prepared for U.S. Fish and Wildlife Service, Sacramento, California. Order #11310-0263-81. San Diego State University, San Diego.

Jackson, S.D. 1996. Underpass systems for amphibians. 4 pp. In G.L. Evink, P. Garrett, D. Zeigler and J. Berry (eds.) Trends in Addressing Transportation Related Wildlife Mortality, proceedings of the transportation related wildlife mortality seminar. State of Florida Department of Transportation, Tallahassee, FL. FL-ER-58-96.

Jennings, M.R. 1988. Natural history and decline of native ranids in California. Pages 61–72 in H.F. De Lisle, P.R. Brown, B. Kaufman, and B.M. McGurty, editors. Southwestern Herpetologists Society special publication number 4: Proceedings of the Conference on California Herpetology. Southwestern Herpetologists Society, Van Nuys, California, USA.

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 (Rana aurora draytonii) and the western pond turtle (Clemmys marmorata) on the list of endangered and threatened wildlife and plants.

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. Herpetological Review 31:94-103.

Jennings, M.R., and M.P. Hayes. 1994. Amphibian and reptile species of special concern in California. Final report to California Department of Fish and Game. Pp. 12-16.

Johnson, J.R., B.M. Fitzpatrick, and H.B. Shaffer. 2010a. Retention of low-fitness genotypes over six decades of admixture between native and introduced tiger salamanders. BMC Evolutionary Biology 10.

Johnson, J.R., B.B. Johnson, and H.B. Shaffer. 2010b. Genotype and temperature affect locomotor performance in a tiger salamander hybrid swarm. Functional Ecology 24:1073-1080.

Johnson, J.R., R.C. Thomson, S.J. Micheletti, and H.B. Shaffer. 2011. The origin of tiger salamander (Ambystoma tigrinum) populations in California, Oregon, and Nevada: introductions or relicts? Conservation Genetics 12:355-370.

Jones, T.R. 1993. Intraspecific genetic variation and cladogenesis in California tiger salamanders Ambystoma tigrinum californiense Gray. Unpublished manuscript. 49 pp.

Kagarise-Sherman, C. and M.L. Morton. 1993. Population declines of Yosemite Toads in the Eastern Sierra Nevada of California. Journal of Herpetology 27(2):186-198.

Keeley, J.E. and S.C. Keeley. 1986. Chaparral and wildfires. Fremontia 14(3): 18-21.

Launer, A. and C. Fee. 1996. Biological research on California tiger salamanders at Stanford University. Annual report August 8, 1996. 25 pp. + figures, tables and appendices.

Lefcort, H., K.A. Hancock, K.M. Maur, D.C. Rostal. 1997. The effects of used motor oil, silt, and the water mold Saprolegnia parasitica on the growth and survival of mole salamanders (Genus Ambystoma). Archives of Environmental Contamination and Toxicology 32:383–388.

Leyse, K. and Lawler, S.P. 2000. Effect of mosquitofish (Gambusia affinis) on California tiger salamander (Ambystoma californiense) larvae in permanent ponds. Mosquito Control Research, annual report 2000.

Licht, L.E. 1974. Survival of embryos, tadpoles, and adults of the frogs Rana aurora aurora and Rana pretiosa pretiosa sympatric in southwestern British Columbia. Canadian Journal of Zoology 52(5):613-627.

Loarie S.R., B.E. Carter, K. Haydoe, S. McMahon, R. Moe, C.A. Knight, and D.D. Ackerly. 2008. Climate change and the future of California's endemic flora. Plos ONE 3(6): e2502 doi 10.1371/journal.pone 0002502.

Loredo, I. and D. VanVuren. 1996. Reproductive ecology of a population of the California tiger salamander. Copeia 1996:895-901.

Loredo-Prendeville, I., D. Van Vuren, A.J. Kuenzi, and M.L. Morrison. 1994. California ground squirrels at Concord Naval Weapons Station: alternatives for control and the ecological consequences. Pp. 72-77 in: W. S. Halverson and A. C. Crabb (editors). Proceedings of the 16th Vertebrate Pest Conference. University of California Publications.

Los Angeles Times. 1997a. Fires burn 7,000 acres near Temecula, 500 acres at Vandenberg Air Force Base. Newspaper article, September 2, p. A20.

Los Angeles Times. 1997b. Vandenberg brush fire is contained. Newspaper article, November 1, p. B17.

Martel, A., A. Spitzen-van der Sluijs, M. Blooi, W. Bert, R. Ducatelle, M.C. Fisher, A. Woeltjes et al. 2013. Batrachochytrium salamandrivorans sp. nov. causes lethal chytridiomycosis in amphibians. Proceedings of the National Academy of Sciences 110: 15325-15329.

Moldenke, A.R. 1976. California pollination ecology and vegetation types. Phytologia, vol. 34, no. 4. 56 pp.

Morey, S.R. and D.A. Guinn. 1992. Activity patterns, food habits, and changing abundance in a community of vernal pool amphibians. Pp. 149-157 In: D.F. Williams, S. Byrne, and T.A.

Rado (editors). Endangered and sensitive species of the San Joaquin Valley, California. California Energy Commission, Sacramento, California.

Odion, D.C., D.E. Hickson, C.M. D'Antonio. 1992. Central coast maritime chaparral on Vandenberg Air Force Base: an inventory and analysis of management needs for a threatened vegetation type. Prepared for The Nature Conservancy. University of California, Santa Barbara.

Orloff, S.G. 2007. Migratory movements of California tiger salamander in upland habitat – a five- year study, Pittsburg, California. Prepared for Bailey Estates LLC. 47 + pp.

Orloff, S.G. 2011. Movement patterns and migration distances in an upland population of California tiger salamander (Ambystoma californiense). Herpetological Conservation and Biology 6:266-276.

Padgett-Flohr, G.E., and J.E. Longcore. 2005. Ambystoma californiense (California tiger salamander). Fungal Infection. Herpetological Review 36:50-51.

Padgett-Flohr, G.E. 2008. Pathogenicity of Batrachochytrium dendrobatidis in two threatened California amphibians: Rana draytonii and Ambystoma californiense. Herpetological Conservation and Biology 3:182-191.

Petranka, J.W. 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, D.C.

Picco, A.M., J.L. Brunner, and J.P. Collins. 2007. Susceptibility of the endangered california tiger salamander, Ambystoma californiense, to Ranavirus Infection. Journal of Wildlife Diseases 43:286-290.

Picco, A.M., and J.P. Collins. 2008. Amphibian commerce as a likely source of pathogen pollution. Conservation Biology 22:1582-1589.

Pounds, J.A., M.R. Bustamante, L.A. Coloma, J.A. Consuegra, M.P.L. Fogden, P.N. Foster, E. La Marca, K.L. Masters, A. Merino-Viteri, R. Puschendorf, S.R. Ron, G.A. Sanchez-Azofeifa, C.J. Still and B.E. Young. 2006. Widespread amphibian extinctions from epidemic disease driven by global warming. Nature 439:161-167.

Primack, R.B. 2006. Essentials of conservation biology (fourth edition). Sinauer Associates, Sunderland, Massachusetts.

Pyke, C.R. 2005. Assessing suitability for conservation action: prioritizing interpond linkages for the California tiger salamander. Conservation Biology 19:492-503.

Pyke, C.R., and J. Marty. 2005. Cattle grazing mediates climate change impacts on ephemeral wetlands. Conservation chytridiomycosis: an emerging disease of amphibians. Conservation Biology 19:1619-1625.

Rathbun, G.B. 1998. Rana aurora draytonii egg predation. Herpetological Review 29(3): 165.

Rathcke, B.J., and E.S. Jules. 1993. Habitat fragmentation and plant-pollinator interactions. Current Science Association. Special Issue: Pollination Biology in Tropics 65(3): 273-277.

Reaser, J.K. and A. Blaustein. 2005. Repercussions of global change. Pp. 60-63. In: M. Lannoo, editor. Amphibian declines: The conservation status of United States species. University of California Press, Berkley, California, USA.

Riley, S.P.D., H.B. Shaffer, S.R. Voss, and B.M. Fitzpatrick. 2003. Hybridization between a rare, native tiger salamander (Ambystoma californiense) and its introduced congener. Ecological Applications 13:1263-1275.

Ryan, M.E., J.R. Johnson, and B.M. Fitzpatrick. 2009. Invasive hybrid tiger salamander genotypes impact native amphibians. Proceedings of the National Academy of Sciences 106:11166-11171. Fitzpatrick and Shaffer 2004, 2007a

Ryan, M.E., J.R. Johnson, B.M. Fitzpatrick, L.J. Lowenstine, A.M. Picco and H.B. Shaffer. 2013. Lethal effects of water quality on threatened California salamanders but not on co-occurring hybrid salamanders. Conservation Biology 27:95-102.

Santa Barbara County Association of Governments. 2007. Regional growth forecast 2007. Available at: http://www.sbcag.org/default.htm.

Schmieder, R.R. and R.S. Nauman. 1994. Effects of non-native aquatic predators on premetamorphic California red-legged frogs (Rana aurora draytonii). University of California, Santa Cruz. 12 pp.

Schneider, H.E., Carson, S.A., Termondt, S.E. 2021. Smoke-induced germination in the endangered Eriodictyon capitatum. Accepted within Madrono. 37 pp. In prep.

Searcy, C.A., and H.B. Shaffer. 2008. Calculating biologically accurate mitigation credits: insights from the California tiger salamander. Conservation Biology 22:997-1005.

Searcy, C.A. and H.B. Shaffer. 2011. Determining the migration distance of a vagile vernal pool specialist: How much land is required for conservation of California tiger salamanders? Pages 73-87 in D. G. Alexander and R. A. Scblising (Editors), Research and Recovery in Vernal Pool Landscapes. Studies from the Herbarium, Number 16. California State University, Chico, CA.

Searcy, C.A., E. Gabbai-Saldate, and H.B. Shaffer. 2013. Microhabitat use and migration distance of an endangered grassland amphibian. Biological Conservation 158:80-87

Semlitsch, R.D. 2008. Differentiating Migration and Dispersal Processes for Pond-Breeding Amphibians. Journal of Wildlife Management 72:260-267.

Semonsen, V. 1998. California tiger salamander; survey technique. Natural history notes. Herpetological Review 29.

Shaffer, H.B., J. Johnson, and I. Wang. 2013. Conservation genetics of California tiger salamanders. Bureau of Reclamation grant agreement number R10AP20598, Final report dated January 15, 2013.

Shaffer, H.B., R.N. Fisher, and S.E. Stanley. 1993. Status report: the California tiger salamander (Ambystoma californiense). Final report for the California Department of Fish and Game. 36 pp. plus figures and tables. Loredo et al. 1996

Skerratt, L.F., L. Berger, R. Speare, S. Cashins, K.R. McDonald, A.D. Phillott, H.B. Hines, and N. Kenyon. 2007. Spread of chytridiomycosis has caused the rapid global decline and extinction of frogs. Ecohealth 4:125-134.

Shaffer, M.L. 1981. Minimum population sizes for species conservation. Bioscience 31: 131-134.

Shaffer, M.L. 1987. Minimum viable populations: coping with uncertainty. Pp. 69-86. In: M.E. Soulé, (ed.) Viable populations for conservation. Cambridge University Press, New York, New York.

Spear T. 2021. Vandenberg survey data from 2006-2019. Email dated 9 April from Timothy Spear, Vandenberg Space Force Base, to Sarah Termondt, Biologist, Ventura Fish and Wildlife Office. 3 pp.

[SRS] SRS Technologies. 2007. Survey results for three federally endangered plants on Vandenberg Air Force Base, California. Unpublished report prepared by Mantech SRS Technologies, Mission Services Division, Lompoc, California. 52 pp.

[SRS] SRS Technologies. 2010. Survey results for three federally endangered plants on Vandenberg Air Force Base, California. Unpublished report prepared by Mantech SRS Technologies, Mission Services Division, Lompoc, California. 17 pp.

[SRS] SRS Technologies. 2020. Survey results for three federally endangered plants on Vandenberg Air Force Base, California. Unpublished report prepared by Mantech SRS Technologies, Mission Services Division, Lompoc, California. 55 pp.

Stebbins, R.C. 1962. Amphibians of Western North America. Univ. California Press, Berkeley, CA.

Stebbins, R.C. 1985. A field guide to western reptiles and amphibians. Houghton Mifflin Company, Boston, MA. 336 pp.

Stebbins, R.C. 2003. A field guide to western reptiles and amphibians-third ed. Houghton Mifflin Company, Boston, Massachusetts.

Storer, T.I. 1925. A synopsis of the Amphibia of California. University of California Publications in Zoology 27.

Sweet, S. 2000. Report addressed to Ventura Fish and Wildlife Office regarding new localities of California tiger salamanders as a result of studies conducted under permit [PRT- 702631]. Received on May 4, 2000. University of California, Santa Barbara, California.

Terhivuo, J. 1988. Phenology of spawning for the common frog (Rana temporaria L.) in Finland from 1846 to 1986. Annales Zoologici Fennici 25: 165-175.

Trenham, P.C. 1998. Demography, migration, and metapopulation structure of pond breeding salamanders. Ph.D. dissertation. University of California, Davis, California.

Trenham, P.C. 2001. Terrestrial habitat use by adult California tiger salamanders. Journal of Herpetology 35:343-346.

Trenham, P.C. and H.B. Shaffer. 2005. Amphibian upland habitat use and its consequences for population viability. Ecological Applications 15:1158-1168.

Trenham, P.C. and H.B. Shaffer. 2005. Amphibian upland habitat use and its consequences for population viability. Ecological Applications 15:1158-1168.

Trenham P.C., H.B. Shaffer, W.D. Koenig and M.R. Stromberg. 2000. Life history and demographic variation in the California tiger salamander. Copeia 2000:365-377.

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 82:3519-3530.

Trombulak, S.C. and C.A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14(1):18-30.

Twitty, V.C. 1941. Data on the life history of Ambystoma tigrinum californiense. Copeia 1:1-4.

[Air Force] U.S. Air Force. 1996. Peacekeeper rail garrison and small ICBM mitigation program, San Antonio Terrace, Vandenberg Air Force Base, California. Final report on the successful creation of wetlands and restoration of uplands. Unpublished report prepared by the Earth Technology Corporation, SAIC, and FLx for the Department of the Air Force, Detachment 10, Space and Missile Systems Center, San Bernardino.

[Service] U.S. Fish and Wildlife Service. 1996a. Endangered and threatened wildlife and plants: determination of threatened status for the California red-legged frog. Federal Register 61(101):25813-25833.

[Service] U.S. Fish and Wildlife Service. 2000a. Endangered and threatened wildlife and plants; Emergency rule to list the Santa Barbara County distinct population of the California tiger salamander as endangered. Federal Register 65:3096.

[Service] U.S. Fish and Wildlife Service. 2000b. Endangered and threatened wildlife and plants; Final rule to list the Santa Barbara County distinct population of the California tiger salamander as endangered. Federal Register 65:57242.

[Service] U.S. Fish and Wildlife Service. 2000c. Endangered and threatened wildlife and plants; final rule for endangered status for four plants from south central coastal California. 65 Federal Register 14888.

[Service] U.S. Fish and Wildlife Service. 2002. Endangered and threatened species wildlife and plants; designation of critical habitat for Eriodictyon capitatum (Lompoc yerba santa) and Deinandra increscens ssp. villosa (Gaviota tarplant); final rule. 67 Federal Register 67968.

[Service] U.S. Fish and Wildlife Service. 2002. Recovery Plan for the California Red-legged Frog (Rana aurora draytonii). U.S. Fish and Wildlife Service, Portland, Oregon. viii + 173 pp.

[Service] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; Listing of the Centra California Distinct Population Segment of the California tiger salamander; Reclassification of the Sonoma County and Santa Barbara County Distinct Populations from Endangered to Threatened; Special rule. Federal Register 68:28648.

[Service] U.S. Fish and Wildlife Service. 2004b. Endangered and threatened wildlife and plants; Designation of critical habitat for the California tiger salamander (Ambystoma californiense) in Santa Barbara County. Federal Register 69:68568.

[Service] U.S. Fish and Wildlife Service. 2005. Designation of critical habitat for the California tiger salamander, Central Population; Final Rule. Federal Register, Vol. 70:49380-49458.

[Service] U.S. Fish and Wildlife Service. 2009. California tiger salamander (Ambystoma californiense) Santa Barbara County Distinct Population Segment 5-year review: Summary and evaluation. U.S. Department of Interior, Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2010. Endangered and threatened wildlife and plants: Revised Designation of Critical Habitat for California red-legged frog; Final Rule. Federal Register 75:12816.

[Service] U.S. Fish and Wildlife Service. 2011. Eriodictyon capitatum (Lompoc yerba santa) 5-Year Review: Summary and Evaluation. U.S. Department of Interior, Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2016. Recovery plan for the Santa Barbara County Distinct Population Segment of the California tiger salamander (Ambystoma californiense). U.S. Fish and Wildlife Service, Pacific Southwest Region, Ventura, California. vi + 87 pp.

[Service] U.S. Fish and Wildlife Service. 2020. Conservation Strategy and Mitigation Guidance for the Santa Barbara County Distinct Population Segment of the California tiger salamander. U.S. Fish and Wildlife Service, Pacific Southwest Region, Ventura, California.

[Service] U.S. Fish and Wildlife Service and [Department] California Department of Fish and Wildlife. 2003. Interim guidance on site assessment and field surveys for determining presence or a negative finding of the California tiger salamander. Available at: http://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines/Documents/cts_survey_protocol.pdf.

Van Hattem, M.G. 2004. Underground ecology and natural history of the California tiger salamander. Masters of Science Thesis. San Jose State University.

Wake, D.B. 2007. Climate change implicated in amphibian and lizard declines. Proceedings of the National Academy of Sciences 104 (20):8201-8202.

Wang, I.J., J.R. Johnson, B.B. Johnson, and H.B. Shaffer. 2011. Effective population size is strongly correlated with breeding pond size in the endangered California tiger salamander, Ambystoma californiense. Conservation Genetics 12:911-920.

Wang, I.J., W.K. Savage, and H.B. Shaffer. 2009. Landscape genetics and least-cost path analysis reveal unexpected dispersal routes in the California tiger salamander (Ambystoma californiense). Molecular Ecology 18:1365-1374.

Wells, P.V. 1962. Vegetation in relation to geological substratum and fire in the San Luis Obispo Quadrangle, California. Ecological Monographs 32: 79-103.

Western Regional Climate Center. 2016. Historic Records, Santa Maria Public AP: 1947-2016, www.wrcc.dri.edu. Accessed December 2016.

Whitfield, S.M., K.E. Bell, T. Phillippi, M. Sasa, F. Bolaños, G. Chaves, J.M. Savage, and M.A. Donnelly. 2007. Amphibian and reptile declines over 35 years at La Selva, Costa Rica. Proceedings of the National Academy of Sciences 104 (20):8352-8356.

Worthylake, K.M., and P. Hovingh. 1989. Mass mortality of salamanders (Ambystoma tigrinum) by bacteria (Acinetobacter) in an oligotrophic seepage mountain lake. Great Basin Naturalist 49(3):364-372.

Wright, A.H. and A.A. Wright. 1949. Handbook of frogs and toads of the United States and Canada. Comstock Publishing Company, Inc., Ithaca, New York. xii + appendix.

Wright, S. 1969. Evolution and the genetics of populations, volume 2. The theory of gene frequencies. University of Chicago Press. Chicago.

Xiao, Y., L. Xiaohong, C. Yusong, D. Ming. 2016. The diverse effects of habitat fragmentation on plant-pollinator interactions. Plant ecology 2016 v.217 no.7 pp. 857-868.

In Litteris Reference

Searcy, Christopher A. 2014. Electronic mail correspondence from Chris Searcy, U.C. Davis, to Cat Darst, USFWS, Ventura FWO, dated July 28, 2014.

Toffelmier, Erin. 2021. Electronic mail correspondence from Erin Toffelmier, U.C.L.A., to Rachel Henry, USFWS, Ventura FWO, dated June 1, 2021.

Personal Communications Cited

Collins, Paul. 1999. Santa Barbara Museum of Natural History, Santa Barbara, California. Personal communication with Bridget Fahey, Fish and Wildlife Biologist, Ventura Fish and Wildlife Office, Ventura, California.

Daniels, Brady. 2000. Kiewitt Pacific, Santa Maria, California. Personal communication with Bridget Fahey, Fish and Wildlife Biologist, Ventura Fish and Wildlife Office, Ventura, California.

Lum, L. October 2, 2010. Botanist, Vandenberg Air Force Base, Lompoc, California. Telephone conversation with Erin Shapiro (U.S. Fish and Wildlife Service, Ventura, California) regarding the management of Eriodictyon capitatum populations on Vandenberg Air Force Base.

Sweet, Sam. 1999. University of California, Santa Barbara, California. Personal communication with Bridget Fahey, Fish and Wildlife Biologist, Ventura Fish and Wildlife Office, Ventura, California.

Sweet, Sam. 2009. University of California, Santa Barbara, California. Personal communication with Andrea Adams, Fish and Wildlife Biologist, Ventura Fish and Wildlife Office, Ventura, California.