United States Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Ecological Services
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
08EVEN00-2018-F-0700

August 5, 2019

Alessandro Amaglio
Federal Emergency Management Agency
1111 Broadway, Suite 1200
Oakland, California 94607

Subject: Programmatic Biological Opinion for the Federal Emergency Management Agency's Disaster, Mitigation, and Preparedness Programs within the Ventura Fish and Wildlife Office's Jurisdiction

Dear Mr. Amaglio:

This document transmits the U.S. Fish and Wildlife Service's (Service) programmatic biological opinion (PBO) based on our review of the Federal Emergency Management Agency's (FEMA) Disaster, Mitigation, and Preparedness Programs in California (Program) within the Ventura Fish and Wildlife Office (VFWO) and its effects on federally listed species and critical habitats, in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). We received your request to initiate consultation on June 21, 2018, and a letter clarifying effects determinations on September 14, 2018. At issue are the effects of FEMA's grant programs that assist with the preparedness, response, recovery, and mitigation for natural and human-caused disasters (Program) on federally-listed species and their designated critical habitats within the VFWO's jurisdiction (Table 1).

The intent of this programmatic consultation is to provide flexibility for the dynamic nature of FEMA's Program, while at the same time ensuring the necessary regulatory compliance with section 7 and ensuring projects completed under this Program are designed and implemented with trust resource conservation in mind. FEMA and the Service collaborated extensively on the Programmatic Biological Assessment (PBA), which led to FEMA's incorporation of Service feedback into development of general avoidance and minimization measures and species-specific conservation measures. This document includes: (1) a program-wide concurrence for species and critical habitats that FEMA determined are not likely to be adversely affected by any aspect of the Program, which concludes section 7 consultation for this subset of species and critical habitat; and (2) a PBO for species or critical habitats that may be affected by one or more of the specific projects within FEMA's Program.

Table 1. Federally listed species and critical habitat covered under the programmatic concurrence or the PBO.

Listed Species and Critical Habitat in VFWO Jurisdiction	Status	FEMA Determination	Service Response
[1]California least tern (*Sterna antillarum browni*)	E	May affect, not likely to adversely affect	Programmatic Concurrence
[2]Contra Costa goldfields (*Lasthenia conjugens*)	E, CH		
[1]Light-footed Ridgway's rail (*Rallus longirostris levipes*)	E		
[3]Marbled murrelet (*Brachyramphus marmoratus*)	T		
[1]Riverside fairy shrimp (*Streptocephalus woottoni*)	E, CH		
[3]Western snowy plover (*Charadrius nivosus* ssp. *Nivosus*)	T, CH		
[4]Arroyo toad (*Anaxyrus californicus*)	E, CH	May affect, likely to adversely affect	Programmatic Biological Opinion
[2]California red-legged frog (*Rana draytonii*)	T, CH		
[2]California tiger salamander (*Ambystoma californiense*) - Central California Distinct Population Segment (DPS)	T, CH		
[2]California tiger salamander (*Ambystoma californiense*) - Santa Barbara DPS	E, CH		
[2]Conservancy fairy shrimp (*Branchinecta conservatio*)	E, CH		
[2]Vernal pool fairy shrimp (*Branchinecta lynchi*)	T, CH		
[4]Tidewater goby (*Eucyclogobius newberryi*)	E, CH		
[1]Coastal California gnatcatcher (*Polioptila californica californica*)	T, CH		
[1]Least Bell's vireo (*Vireo bellii pusillus*)	E, CH		
[4]Smith's blue butterfly (*Euphilotes enoptes smithi*)	E		
[1]Southwestern willow flycatcher (*Empidonax traillii extimus*)	E, CH		
[5]Yellow-billed cuckoo (*Coccyzus americanus*), Western U.S. DPS	T		
[4]Smith's blue butterfly (*Euphilotes enoptes smithi*)	E		

E = Endangered; T = Threatened; CH = Designated Critical Habitat,
[1]Carlsbad Fish and Wildlife Office is the species lead for this species
[2] Sacramento Fish and Wildlife Office is the species lead for this species
[3]Arcata Fish and Wildlife Office is the species lead for this species
[4]VFWO is the species lead for this species
[5]Arizona Ecological Services Field Office is the species lead for this species

Your agency determined that the proposed action was not likely to adversely affect the federally Endangered California least tern, Contra Costa goldfields, light-footed Ridgway's rail, and the federally threatened marbled murrelet and western snowy plover. Based on our review of the

information provided in the PBA, we concur with FEMA's *may affect, but not likely to adversely affect* determination for those species and their respective designated critical habitat (if applicable) within the jurisdiction of the VFWO (see Appendix A for justification and Appendix B for conservation measures). Also, while you requested formal consultation for the federally Endangered Riverside fairy shrimp we have determined that the proposed action is not likely to adversely affect these species, and the basis for this determination is also documented in Appendix A. Thus, these species are not addressed further in this document.

This document is based on information provided in the following: (1) *Programmatic Biological Assessment for Disaster, Mitigation and Preparedness Programs in California*, (FEMA 2018); (2) Correspondence regarding effects determinations for the species within this consultation; (3) conversations and electronic mail correspondence between the VFWO and FEMA staff or their contracted agents; (4) conversations between FEMA and other Service biologists from the Arcata, Carlsbad, Sacramento, Ventura, and Yreka Fish and Wildlife Offices; and (5) information contained in Service files. These documents, and other information relating to the consultation, are located at the VFWO.

Consultation History

March, 2017 - May, 2018	Extensive coordination calls, correspondence exchange and meetings between FEMA and the Service.
June 21, 2018	FEMA provided a Programmatic Biological Assessment and initiated formal consultation.
June 2018 - July 2019	Continued coordination and correspondence exchange regarding effects determinations and development of the PBO.

More details regarding the history of this consultation can be found in section 1.4 of the PBA (FEMA 2018).

PROGRAMMATIC BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Scope of Consultation

This PBO addresses FEMA's disaster, mitigation and preparedness Program (proposed action) in California. By ensuring trusted resource conservation is an integral component of their Program and fulfilling the obligations within this PBO, FEMA is complying with its responsibilities under both sections 7(a)(1) and 7(a)(2) of the Act for projects that result from emergencies and are likely to adversely affect 12 federally-listed species and their respective designated critical habitat within the jurisdiction of the VFWO. However, this consultation does not cover FEMA's implementation of the National Flood Insurance Program.

This PBO will remain in effect for five years from the date it is signed. When the 5-year period has expired or if incidental take coverage under this PBO is exceeded, FEMA may reinitiate consultation under section 7 of the Act to extend or amend the coverage provided.

This PBO is intended to be adaptive in nature. The general avoidance and minimization measures and species-specific conservation measures included herein are intended to be comprehensive and designed to minimize adverse effects to the species and designated critical habitat addressed herein. We encourage feedback on any conservation measures that are not feasible or effective. If either FEMA or the VFWO wish to make changes to the conservation measures, we will work together to update them as appropriate. The VFWO will coordinate any changes to conservation measures with other Service offices as needed.

This PBO only applies to FEMA Subapplicants' proposed projects for which FEMA is the Lead Federal Agency for compliance under section 7 of the Act. When FEMA and the U.S. Army Corps of Engineers (USACE) are both involved with a Subapplicant's proposed project, the process described in the 2015 Memorandum of Understanding (MOU) (executed in 2015, updated in 2018, and subsequent annual updates) between FEMA, USACE, Service, and the National Marine Fisheries Service will be followed to determine whether FEMA or the USACE is the Lead Federal Agency for compliance with the Act.

Emergency Consultations

Actions completed by FEMA's Subapplicants as emergencies, as defined by the Service in 50 CFR 402.05 and by FEMA in 44 CFR 206.201, prior to environmental review may be covered by this PBO at FEMA's discretion, provided that the actions were consistent with the guidelines, criteria, assumptions, and intent of FEMA's June 20, 2018 PBA (FEMA 2018), as amended, and did not: (1) result in jeopardy to a species; (2) result in the destruction or adverse modification of designated critical habitat; (3) exceed the maximum allowable take authorized in the Incidental Take Statement in this PBO; or (4) was otherwise not eligible for inclusion in this PBO.

In order for FEMA to include a project categorized as an emergency under this PBO, FEMA will notify the Service of the emergency as soon as possible, either by phone or electronic mail and request the emergency action be considered for inclusion in this PBO. Within 24 hours of the notification or as soon as possible, the VFWO will provide FEMA any additional site specific conservation measures that may be needed. FEMA will provide Subapplicants all applicable general avoidance and minimization measures and species specific conservation measures listed in this PBO and any additional measures the VFWO warrants appropriate for the specific emergency. FEMA will advise Subapplicants to adhere to the measures when possible. However, if an imminent threat exists to life and/or property, under no circumstances should any measures be implemented if doing so will interfere with alleviating the emergency or placing any individual at risk of injury.

After the emergency, FEMA and the Service will follow the consultation procedures outlined below. Emergency actions conducted prior to environmental review that are subsequently

covered by this programmatic consultation will be counted towards the cumulative amount of take authorized in the Incidental Take Statement of this PBO.

Procedure to Cover Individual Projects Under this PBO

The extensive coordination between FEMA and the Service as well as FEMA's commitment to prioritize species conservation within their jurisdictional capacity while operating their disaster, mitigation, and preparedness programs in California, has resulted in a process designed to expedite project specific section 7 consultation, while at the same time, considering the landscape level needs of the species within the VFWO's jurisdiction.

To determine eligibility for coverage under this PBO, FEMA will determine if a Subapplicant's proposed project meets the suitability criteria established under the PBA (FEMA 2018). If the project meets suitability criteria, FEMA will submit a completed ESA Review Form to the Service (see Appendix C). The ESA Review Form will include a project-specific effects analysis, the applicable general and species specific conservation measures, a summary of the potential direct and indirect effects associated with the proposed project, and the anticipated take.

Upon submittal of the ESA Review Form, FEMA will request confirmation that the project meets the criteria for coverage under the PBO. The Service will notify FEMA by electronic mail whether we agree with the proposed project's coverage under the PBO or not. VFWO's intention is to process FEMA projects that meet eligibility criteria under this PBO as expeditiously as possible, striving to respond within 30 days of receipt. If this is not possible, we will notify FEMA and request more time.

FEMA will submit annual reports that summarize the projects covered under the PBO each year. This report will include a summary of incidental take that occurred and identify any issues with PBO implementation.

7(a)(1)

To meet FEMA's Section 7(a)(1) responsibility, FEMA has committed to the actions below. Additional details are discussed in Section 8 of the PBA (FEMA 2018).

- Developing procedures for implementing its disaster, mitigation, and preparedness programs within the context of listed resource conservation.
- Educating Subapplicants about species conservation and encouraging them to proactively implement conversation measures.
- Educating Subapplicants on conservation efforts at the project design and project planning levels.
- Incorporate an ecosystem services approach into FEMA's decision-making process.

Description of Proposed Programmatic Action

The proposed action is FEMA's funding of grant programs related to its disaster, mitigation, and preparedness program in California. While FEMA doesn't know exactly when or where the next emergency will occur, they have determined that most on-the-ground actions that occur under this Program are categorized as follows [additional details of the actions can be found in Section 3 of the PBA (FEMA 2018)]:

Non-Emergency Debris Removal

For purposes of this document, debris removal performed in non-emergency situations includes:

- Removing rock, silt, sediment, or woody debris that floodwaters have deposited in harbors and ports, stream channels, bridge and culvert openings, canals, sedimentation basins, sewage treatment ponds, ditches, and other facilities in such a manner as to disrupt normal flows, navigation, recreation, or municipal services;
- Removing woody debris and other vegetation following events that damage or destroy trees;
- Removing rubble after earthquakes;
- Removing rock and earth from landslides caused by events such as earthquakes or heavy rains; and
- Hauling and disposing of debris.

All removed debris will be disposed of at approved and licensed disposal sites, in compliance with existing laws and regulations. Any hazardous materials or other contaminants will be removed and disposed of in an appropriate manner. If possible, woody debris and construction materials will be recycled.

Constructing, Modifying or Relocating Facilities

FEMA is authorized to provide funds for constructing, modifying, or relocating facilities. Relevant actions include:

Airport Runway Construction

- Repairing or realigning airport runways and associated facilities;
- Constructing of new airport runways and associated facilities; and
- Managing and/or removing wildlife.

Road and Trial Construction

- Constructing or realigning new roads, trails, or boardwalks;
- Repairing or replacing damaged roads and trails, includes retaining walls, subsurface, and pavement;
- Regrading or improving gravel or dirt roads and trails; and

- Repairing, replacing, or realigning of an existing, or construction of new low-water road crossing.

Utility Construction

- Constructing, repairing, or relocating utility pipelines (e.g., potable water, sewer pipelines, natural gas, petroleum), leach fields, wastewater hookups, electrical lines (including street lighting), and telephone lines that have been damaged in floods or fires;
- Constructing, repairing, or relocating substations or other facilities needed to support utility infrastructure;
- Constructing or installing temporary utilities including associated infrastructure and facilities; and
- Installing electrical boxes for electrical transformers and switches and secondary utility boxes for telephone and cable.

Rail Line Construction

- Acquiring or decommissioning of an existing rail line;
- Realigning or modifying an existing rail line;
- Repairing or replacing ballast and track;
- Stabilizing embankments along a rail line corridor;
- Repairing or replacing fill using rock, grout, timber walls, or steel sheet piling; and
- Repairing or replacing earthen material lost during disasters.

Facility Disaster Mitigation Activities

FEMA may provide funds to implement changes required by current building codes and standards, or otherwise modify existing structures. Often, these changes make the structure more resistant to damage in future events. Typical activities include:

- Modifying structures to reduce the risk of damage during floods by elevating structures above the expected flood level or by flood-proofing;
- Making structures more fire-resistant by replacing roofs, doors, and other building components with fire-resistant materials; and
- Installing bracing, shear panels, shear walls, anchors, or other features so that structures are better able to withstand disaster events such as those associated with seismic, high wind events, or snow loads.

Building and Facility Construction

- Installing prefabricated manufactured structures (or temporary structures) including dwelling pads. Temporary facilities would be removed when no longer needed and land would be restored to original use;
- Constructing safe rooms;
- Modifying existing facilities to serve as temporary housing;
- Acquiring and demolishing existing facilities (e.g., structures and buildings) located in high-hazard areas; and

- Constructing, repairing, or relocating new facilities (e.g., wastewater treatment plants, public buildings, and certain utilities).

Actions Involving Watercourses and Coastal Features

Many FEMA funded activities pertain to inland water sources, such as streams, rivers, and lakes, as well as coastal features such as harbors and beaches. Inland water sources may be perennial or dry during the summer months. During construction, general avoidance and minimization measures and species-specific conservation measures typically will be used and incorporated as part of the action. Relevant categories of activities include the following:

Channelization

- Creating, repairing, modifying, or dredging of a waterway for non-flood control purposes.

Stormwater Management

- Constructing, repairing, replacing, or modifying a stormwater management facility and associated infrastructure, including storm drains, pipelines, and outfalls.

Flood Control Activities

- Channelizing and rechannelizing for flood control purposes;
- Dredging of sediment and debris;
- Removing vegetation, rock, silt, or woody debris. Vegetation may be removed by hand, mechanical means, or herbicides. Sediment and debris would be removed by dredging, heavy equipment, or by hand;
- Constructing, repairing, and realigning drainage swales, earthen channels, concrete channels, or subsurface concrete pipelines;
- Constructing, repairing, or replacing earthen banks or channel; and
- Constructing, repairing, or modifying levees and floodwalls.

Culvert Construction

- Increasing the size of an existing culvert or adding culvert barrels;
- Constructing, repairing, replacing, or realigning a culvert or associated structure;
- Constructing box culverts;
- Modifying the type of culvert; and
- Adding features, such as a headwall, discharge apron, or riprap, to reduce the risk of erosion or damage to a culvert.

Bridge Construction

Bridges may be modified to increase capacity to reduce the risk of flooding or to reduce the risk of damage to the crossing. Typical activities include:

- Increasing capacity to reduce the risk of flooding or to reduce the risk of damage to the crossing;

- Widening existing openings or constructing new openings;
- Reconfiguring bracing to reduce the risk that debris would be trapped;
- Repairing an existing bridge structure, including from large bridges to pedestrian bridges;
- Installing protective features, such as concrete abutments or riprap, to reduce the risk of damage due to erosion and scour; and
- Replacing a multi-span structure with a clear-span structure.

Bank Protection, Stabilization, and Erosion Control Activities

- Repairing or replacing existing or placing new rock riprap within stream channels, banks, or hillsides;
- Repairing or replacing existing or hardening new areas with concrete or soil cement;
- Repairing or replacing existing or installing new retaining walls, gabions, or geotextile fabrics;
- Constructing, repairing, or replacing bank protection, stabilization, and erosion control by using bioengineering techniques (e.g., planting vegetation, placing root wads, or placing willow bundles); and
- Temporarily diverting water during construction activities may be necessary.

Dam Construction

- Decommissioning an existing earthen or concrete dam;
- Constructing or repairing earthen or concrete dams;
- Constructing or repairing spillways;
- Constructing or repairing water diversion structures; and
- Enlarging water storage reservoirs.

Detention/Retention, or Basin Water Storage Facility Construction

- Repairing or replacing existing detention/retention basins, or sediment ponds; and
- Constructing new detention/retention basins or sediment ponds.

Linear Water Conveyance Facility Construction

- Constructing, repairing, replacing, or modifying irrigation ditches, canals, or flumes, and associated infrastructure and facilities.

Shoreline Facilities – Recreation or Maritime Use

- Constructing, repairing, replacing, or modifying boardwalks, piers, boat ramps, docks, and slips.

Shoreline Facilities – Protection

- Constructing, repairing, replacing, or modifying seawalls, groins, jetties, revetments, levees, dikes, and floodwalls;
- Repairing, modifying, or installing interior drainage systems to reduce the risk of damage behind levees and floodwalls during heavy rains or flooding events on streams;
- Repairing, modifying, or installing bank protection of a shoreline facility;

- Repairing damaged shoreline facilities;
- Constructing new facilities to protect flood-prone areas from damage during future floods;
- Raising the height of existing facilities to prevent overtopping in future floods; and
- Construction activities would occur in water and involve driving piles, placing rock or soil, or dredging sediment.

Wildfire Risk Reduction

Vegetation management is intended to reduce the risk of loss and damage due to wildfire and increase the ability of channels to convey flows, thus reducing the risk of flood damage. Some activities may include a combination of these methods. During implementation, avoidance and minimization measures will be used and incorporated as part of the action.

Defensible Space Creation and Hazardous Fuels Reduction

- Mechanical or hand-clearing of vegetation to reduce the amount of vegetative fuels in an area;
- Removing vegetation to create defensible space around buildings and structures;
- Removing of targeted exotic invasive species within specific areas with U.S. Environmental Protection Agency-approved herbicides;
- Preventing re-growth and re-sprouting of undesirable vegetation once an area has been cleared of excessive vegetation by mechanical means, herbicide treatment, and/or hand removal; and
- Some areas may be revegetated with fire resistant native vegetation.

Biological Control

In biological control, cattle, horses, goats, sheep, or other livestock are allowed to graze on grasses and other vegetation as a means of control. Any area proposed for grazing will be fenced. The type of animals, timing, duration, and stocking rate will be selected based on the targets of the vegetation management plan (i.e., the quantity and quality of residue to remain).

Proposed General Avoidance and Minimization Measures and Species-Specific Conservation Measures

The following measures will be implemented, as appropriate, to reduce potential adverse effects from a subapplicant's proposed project. The subapplicant will be responsible for implementation of any avoidance and minimization measures FEMA identifies as necessary for the proposed project. The measures listed below are intended to address a wide range of projects that could be covered by this consultation. Not all measures may be necessary for each project covered under this consultation; rather FEMA should identify the measures that are applicable to minimize the specific impacts anticipated from a particular project and require those measures to be implemented by the subapplicant.

General Avoidance and Minimization Measures

GEN AMM-1 Erosion and Sedimentation Prevention Measures: The Subapplicant will prepare an Erosion Control Plan, as needed. The Erosion Control Plan will detail the erosion and sedimentation prevention measures required. As part of this plan, the Subapplicant will ensure that sediment-control devices are installed and maintained correctly. For example, sediment will be removed from engineering controls once the sediment has reached one-third of the exposed height of the control. The devices will be inspected frequently (i.e., daily or weekly, as necessary) to ensure that they are functioning properly; controls will be immediately repaired or replaced or additional controls will be installed as necessary. Sediment that is captured in these controls may be disposed of onsite in an appropriate, safe, approved area or offsite at an approved disposal site.

Areas of soil disturbance, including temporarily disturbed areas, will be seeded with a regionally appropriate erosion control seed mixture. On soil slopes with an angle greater than 30 percent, erosion control blankets will be installed or a suitable and approved binding agent will be applied. Runoff will be diverted away from steep or denuded slopes.

Where habitat for covered species is identified within, or adjacent to, the project footprint, all disturbed soils at the site will undergo erosion control treatment before the rainy season starts and after construction is terminated. Treatment may include temporary seeding and sterile straw mulch.

GEN AMM-2 Bank Stabilization: If bank stabilization activities are necessary, then such stabilization will be constructed to minimize erosion potential and will contain design elements suitable for supporting riparian vegetation, if feasible.

GEN AMM-3 Dust Control Measures: To reduce dust, all traffic associated with the Subapplicant's construction activities will be restricted to a speed limit of 15 miles per hour when traveling off of highways or county roads.

Stockpiles of material that are susceptible to wind-blown dispersal will be covered with plastic sheeting or other suitable material to prevent movement of the material.

During construction, water or other binding materials will be applied to disturbed ground that may become windborne. If binding agents are used, all manufacturers' recommendations for use will be followed.

GEN AMM-4 Spill Control Planning: The Subapplicant will prepare a Spill Prevention and Pollution Control Plan to address the storage of hazardous materials and emergency cleanup of any hazardous material and will be available onsite, if applicable. The plan will incorporate hazardous waste, storm water, and other emergency planning requirements.

GEN AMM-5 Spill Prevention and Pollution Control Measures: The Subapplicant will exercise every reasonable precaution to protect covered species and their habitats from pollution due to fuels, oils, lubricants, construction by-products, and pollutants such as construction chemicals, fresh cement, saw-water, or other harmful materials. Water containing mud, silt, concrete, or other by-products or pollutants from construction activities will be treated by filtration, retention in a settling pond, or similar measures. Fresh cement or concrete will not be allowed to enter the flowing water of streams and curing concrete will not come into direct contact with waters supporting covered species. Construction pollutants will be collected and transported to an authorized disposal area, as appropriate, per all Federal, State, and local laws and regulations.

To reduce bottom substrate disturbance and excessive turbidity, removal of existing piles by cutting at the substrate surface or reverse pile driving with a sand collar at the base to minimize resuspension of any toxic substances is preferable; hydraulic jetting will not be used.

No petroleum product chemicals, silt, fine soils, or any substance or material deleterious to covered species will be allowed to pass into or be placed where it can pass into a stream channel. There will be no side-casting of material into any waterway.

All concrete or other similar rubble will be free of trash and reinforcement steel. No petroleum-based products (e.g., asphalt) will be used as a stabilizing material.

The Subapplicant will store all hazardous materials in properly designated containers in a storage area with an impermeable membrane between the ground and the hazardous materials. The storage area will be encircled by a berm to prevent the discharge of pollutants to ground water or runoff into the habitats of covered species. A plan for the emergency cleanup of any hazardous material will be available onsite, and adequate materials for spill cleanup will be maintained onsite.

GEN AMM-6 Equipment Inspection and Maintenance: Well-maintained equipment will be used to perform the work and, except in the case of a failure or breakdown, equipment maintenance will be performed offsite. Equipment will be inspected daily by the operator for leaks or spills. If leaks or spills are encountered, the source of the leak will be identified, leaked material will be cleaned up, and the cleaning materials will be collected and properly disposed. Fueling of land- and marine-based equipment will be conducted in accordance with procedures to be developed in the Spill Prevention and Pollution Control Plan.

Vehicles and equipment that are used during the course of a project will be fueled and serviced in a “safe” area (i.e., outside of sensitive habitats) in a manner that will not affect covered species or their habitats. Spills, leaks, and other problems of a similar nature will be resolved immediately to prevent unnecessary effects on covered species and their habitats. A plan for the emergency cleanup of any spills of fuel or other material will be available onsite, and adequate materials for spill cleanup will be maintained onsite.

GEN AMM-7 Fueling Activities: Avoidance and minimization measures will be applied to protect covered species and their habitats from pollution due to fuels, oils, lubricants, and other harmful materials. Vehicles and equipment that are used during project implementation will be fueled and serviced in a manner that will not affect covered species or their habitats. Machinery and equipment used during work will be serviced, fueled, and maintained on uplands to prevent contamination to surface waters. Fueling equipment and vehicles will be kept more than 200 feet away from waters of the United States. Exceptions to this distance requirement may be allowed for large cranes, pile drivers, and drill rigs if they cannot be easily moved.

GEN AMM-8 Equipment Staging: No staging of construction materials, equipment, tools, buildings, trailers, or restroom facilities will occur in a floodplain during flood season at the proposed project location, even if staging is only temporary.

GEN AMM-9 Materials Storage and Disposal: Stockpiled soils will be adequately covered to prevent sedimentation from runoff and wind. All hazardous materials will be stored in upland areas in storage trailers and/or shipping containers designed to provide adequate containment. Short-term laydown of hazardous materials for immediate use will be permitted provided the same containment precautions are taken as described for hazardous materials storage. All construction materials, wastes, debris, sediment, rubbish, trash, and fencing will be removed from the site once project construction is complete and transported to an authorized disposal area, as appropriate, in compliance with applicable Federal, State, and local laws and regulations. No disposal of construction materials or debris will occur in a floodplain. No storage of construction materials or debris will occur in a floodplain during flood season.

GEN AMM-10 Fire Prevention: With the exception of vegetation-clearing equipment, no vehicles or construction equipment will be operated in areas of tall, dry vegetation.

The Subapplicant will develop and implement a fire prevention and suppression plan for all maintenance and repair activities that require welding or otherwise have a risk of starting a wildfire.

GEN AMM-11 Waste Management: The work area will be kept free of loose trash, including small pieces of residual construction material, such as metal cuttings, broken glass, and hardware.

All food waste will be removed from the site on a daily basis.

All construction material, wastes, debris, sediment, rubbish, vegetation, trash, and fencing will be removed from the site once the project is completed and will be transported to an authorized disposal area, as appropriate, per all Federal, State, and local laws and regulations.

GEN AMM-12 Work Involving Boats and Barges: For projects that involve in-water work for which boats and/or temporary floating work platforms are necessary, buoys will be installed so moored vessels will not beach on the shoreline, anchor lines will not drag, and moored vessels

and buoys are not located within 25 feet of vegetated shallow waters. Temporary floating work platforms will not anchor or ground in fish spawning areas in freshwater or in eelgrass, kelp, or macro algae. To reduce the likelihood of introducing aquatic invasive species, vessels will use the State's Marine Invasive Species Program. Drip pans and other spill control measures will be used so that oil or fuel from barge-mounted equipment is properly contained.

GEN AMM-13 Work Area Designation to Minimize Disturbance: The Subapplicant will reduce, to the maximum extent practicable, the amount of disturbance at a site to the absolute minimum necessary to accomplish the project. Wherever possible, existing vegetation will be salvaged from the project area and stored for replanting after earthmoving activities are completed. Topsoil will be removed, stockpiled, covered, and encircled with silt fencing to prevent loss or movement of the soil into covered species habitats. All topsoil will be replaced in a manner to recreate pre-disturbance conditions as closely as possible.

Project planning must consider not only the effects of the action itself, but also all ancillary activities associated with the actions, such as equipment staging and refueling areas, topsoil or spoils stockpiling areas, material storage areas, disposal sites, routes of ingress and egress to the project site, and all other related activities necessary to complete the project.

GEN AMM-14 Access Routes and Staging Areas: When working on stream banks or floodplains, disturbance to existing grades and vegetation will be limited to the actual site of the project and necessary access routes. Placement of all roads, staging areas, and other facilities will avoid and limit disturbance to sensitive habitats (e.g., stream banks, stream channel, and riparian habitat) as much as possible. When possible, existing ingress or egress points will be used and/or work will be performed from the top of the stream banks. After completion of the work, the contours of the streambed, vegetation, and stream flows will be returned to their pre-construction condition or better.

All staging and material storage areas, including the locations where equipment and vehicles are parked overnight, will be placed outside of the flood zone of a watercourse, above areas of tidal inundation, away from riparian habitat or wetland habitat, and away from any other sensitive habitats. When possible, staging and access areas will be situated in areas that are previously disturbed, such as developed areas, paved areas, parking lots, areas with bare ground or gravel, and areas clear of vegetation.

GEN AMM-15 Environmental Awareness Training for Construction Personnel: All construction personnel will be given environmental awareness training by the project's environmental inspector or biological monitor before the start of construction. The training will familiarize all construction personnel with the covered species that may occur onsite, their habitats, general provisions and protections afforded by the Act, measures to be implemented to protect these species, and the project boundaries. This training will be provided within three days of the arrival of any new worker.

As part of the environmental awareness training, construction personnel will be notified that no dogs or any other pets under control of construction personnel will be allowed in the construction area, and that no firearms will be permitted in the construction area, unless carried by authorized security personnel or law enforcement.

GEN AMM-17[1] Daily Work Hours: Construction activities that may affect suitable habitat for covered species will be limited to daylight hours during weekdays, leaving a nighttime and weekend period for the species. Work will be allowed on weekends if the proposed construction is 14 days or less in length.

GEN AMM-18 Entrapment Prevention: To prevent entrapment of covered species, all vertically sided holes or trenches will be covered at the end of the workday, or have escape ramps built into the walls of the excavation. If pipes are stored onsite or in associated staging areas, they will be capped when not in use.

Construction materials that have the potential to entangle or entrap wildlife will be properly contained so that wildlife cannot interact with the materials.

If a covered species is identified onsite, crews will immediately stop work within 50 feet of the individual, and inform the construction supervisor and the VFWO-approved biologist. Work will not continue within 50 feet of the individual until it has traveled off the project site of its own volition. For covered species, please refer to the species-specific Conservation Measures section of the PBO.

GEN AMM-19 Water Quality Protection: Contractors will exercise every reasonable precaution to protect covered species and their critical habitats from construction byproducts and pollutants, such as construction chemicals, fresh cement, saw-water, or other deleterious materials. Fresh cement or uncured concrete will not be allowed to come into contact with any waterway. Construction waste will be collected and transported to an authorized upland disposal area, as appropriate, and per Federal, State, and local laws and regulations.

The Subapplicant will follow the best management practices described in *The Use of Treated Wood Products in Aquatic Environments* guidelines (NOAA Fisheries 2009). Although this guidance focuses on the effects of the contaminants on Pacific salmonids protected under the Act, this guidance may still apply for general water quality protection and other federally-protected species. This guidance will be used in conjunction with site-specific evaluations of other potential impacts. Riprap will be clean and durable, free from dirt, sand, clay, and rock fines and will be installed to withstand the 100-year flood event. If applicable, appropriate measures will be taken to minimize disturbance to potentially contaminated sediments.

1 The general avoidance and minimization measures for this PBO are consistent with other programmatic biological opinions for FEMA's Program within the state of California, but whose actions fall within other Service field office jurisdiction. For consistency in numbering with other field offices, when the VFWO needed to modify a general avoidance or minimization measure, the measure was given a new number. This may create an appearance of mis-numbering within these measures.

GEN AMM-20 Revegetation of Stream Banks: For projects that require revegetation of stream and river banks as a result of riparian vegetation removal during project activities, the Subapplicant will implement revegetation techniques. Where such revegetation is needed, the Subapplicant will prepare and implement a revegetation plan that includes information regarding monitoring for success. Revegetation plantings will be replaced at a 3:1 ratio with an 80 percent planting survival within 5 years of the plantings.

GEN AMM-21 Restoration of Upland Areas to Pre-Project Conditions: For projects that require restoration of upland areas to pre-project conditions as a result of ground disturbance during project activities, the Subapplicant will use native plants to the maximum extent practicable. Similarly, when hydroseeding, only native seed mix will be used.

GEN AMM-22 Invasive Aquatic Species: The Subapplicant will follow the guidelines in the California Department of Fish and Wildlife's (CDFW's) *California Aquatic Invasive Species Management Plan* to prevent the spread of invasive aquatic plant and animal species (CDFW 2008).

Construction equipment will be clean of debris or material that may harbor seeds or invasive pests before entering the work area. This debris or material includes dirt on construction equipment, tools, boots, pieces of vegetation, and water in the bilge of boats. All aquatic sampling equipment will be sterilized using appropriate guidelines before its use in aquatic habitats.

GEN AMM-23 Work below Mean Higher High Water: In freshwater, estuarine, and marine areas that support covered species, disturbance to habitat below mean higher high water will be limited to the maximum extent possible.

GEN AMM-24 Avoidance of Submerged Vegetation: The removal of submerged vegetation (such as eelgrass and kelp estuarine or marine areas, or submerged aquatic vegetation in freshwater areas) will be avoided to the maximum extent possible.

GEN AMM-25 Minimization of Shading by Overwater Structures: To reduce shading effects, new and replacement structures placed over freshwater, estuarine, and marine waters (such as bridges, piers, floating docks, and gangways) will incorporate design elements (such as metal grating or glass paver blocks) that allow light transmission when feasible.

GEN AMM-26 Water Diversion and Dewatering: In-channel work and channel diversion of live flow during project construction will be conducted in a manner to reduce impacts to covered species. Dewatering will be used to create a dry work area and will be conducted in a manner that minimizes turbidity into nearby waters. Water diversion and dewatering will include the following measures:

a. Heavy equipment will avoid flowing water other than temporary crossing or diverting activities.

b. If covered species may be present in the areas to be dewatered, relocation will be conducted by a VFWO-approved biologist in accordance with applicable species-specific Conservation Measures. Because this measure involves take of a species, it is only applicable to covered species for which an Incidental Take Statement is provided.
c. Water pumped or removed from dewatered areas will be treated before its release so that it does not contribute to turbidity in nearby waters.
d. Temporary culverts to convey live flow during construction activities will be placed at stream grade and be of an adequate size as to not increase stream velocity.
e. Silt fences or mechanisms to avoid sediment input to the flowing channel will be erected adjacent to flowing water if sediment input to the stream may occur.

GEN AMM-27 Biological Monitor: If a project involves activities that are likely to result in adverse effects of a species or critical habitat addressed in this PBO, a VFWO-approved biologist will be present onsite for all site preparation (e.g. vegetation removal, soil disturbance) and construction activities that occur within 100 feet of habitat for those species. If a VFWO-approved biologist is needed, the Subapplicant will submit biologist qualifications to us for approval 30 days prior to the initiation of activities that require biologist presence.

Approval requests will include, at a minimum, the following:

a. Relevant education;
b. Training received from a permitted biologist or recognized species expert concerning the listed species for which approval is requested. This training should include species identification, survey techniques, and handling protocols for individuals of different lifestages;
c. A description of field experience with the species for which approval in requested conducting requested activities (to include project/research information);
d. Any previous biological opinions or authorizations under which they were approved to work with the requested species. For any such projects, include the following:
    i. The type of activities were performed (e.g., construction monitoring, handling);
    ii. The names and qualification of supervising biologist under which the work was completed, and;
    iii. The amount of work experience on the actual project.
e. A list of Federal section 10(a)1(A)recovery permits held or under which they are authorized to work with the requested species requested (to include the permit number, authorized activities and name of permit holder); and
f. At least two professional references with contact information.

This biologist will ensure that all applicable general avoidance and minimization measures and species-specific conservation measures in the PBO are implemented. S/he will also ensure that all vehicles entering the site are free of debris that may harbor organisms that could be introduced to the site, such as vegetation or mud from other aquatic areas. The VFWO-approved

biologist will also ensure that turbidity, sedimentation, and the release of materials such as dust or construction runoff are controlled, and that spill control measures are enacted properly.

The VFWO-approved biologist will oversee construction activities to ensure that no covered species and/or their habitats are adversely affected. The VFWO-approved biologist will have the authority to stop any work activities that may result in potential adverse effects to covered species and/or their habitats.

GEN AMM-28 Landscape level conservation planning: When the VFWO has an existing landscape level plan or conservation strategy in use for a specific species, FEMA and Subapplicants will ensure projects activities are carried out in a manner consistent with such plans. The VFWO will ensure any project-specific recommendations are communicated in a timely manner.

Species-specific Conservation Measures

In cases where the species-specific conservation measures are duplicative of the General Conservation Measures, the most comprehensive measure (i.e., the measure providing the most protections for listed species and critical habitat) will apply.

Conservation Measures for Arroyo Toad

ARTO-1 Habitat Assessment: A habitat assessment will be conducted by a VFWO-approved biologist to determine whether suitable habitat for the arroyo toad occurs in the Action Area. If suitable habitat for this species is identified in the Action Area and the proposed project may affect suitable habitat that is not known to be occupied by the arroyo toad, the VFWO will be contacted regarding the need for surveys according to Service protocol and those surveys will be conducted, as appropriate. With VFWO concurrence, FEMA may also forgo surveys by making a determination that suitable habitat is occupied for the purposes of section 7 consultation.

ARTO-2 Amphibian Protection Guidelines: A capture and relocation plan for arroyo toads will be implemented during activities in occupied habitat using a VFWO-approved biologist(s). Biologists must follow the Declining Amphibian Task Force's Fieldwork Code of Practice to prevent the spread of pathogens.

ARTO-3 Seasonal Avoidance: To minimize direct effects to breeding arroyo toads, all project activities within designated critical habitat, occupied habitat, or potential suitable habitat will occur outside the breeding season (i.e., the breeding season is March 15 - July 15 for arroyo toad). If the breeding season cannot be avoided and arroyo toads are found to occur within the Action Area, a VFWO-approved biologist will conduct daily surveys prior to project work within the Action Area until the beginning of the non-breeding season or project activities have ceased. If the breeding season cannot be avoided, a VFWO-approved biologist will conduct surveys no more than 48 hours prior to project work, if no arroyo toads of any life stages or clutches are found to occur within the Action Area, project activities may proceed.

ARTO-4 Preconstruction Surveys: If a project is located in designated critical habitat, occupied, or potential suitable habitat for the arroyo toad, a VFWO-approved biologist must conduct preconstruction surveys no more than 48 hours prior to project work to determine if arroyo toads are present in the Action Area.

ARTO-5 Heavy Machinery Limitations: If a project is located in an occupied area, use of heavy machinery will be avoided when juvenile arroyo toads are known to occupy the bordering banks of suitable water features (i.e. April 15 - October 1).

ARTO-6 Biological Monitor: A VFWO-approved biological monitor with the authority to stop work will monitor project activities within areas occupied habitat. The biological monitor will search the Action Area daily for arroyo toads.

ARTO-7 Capture and Relocation: Implement a capture and relocation plan for arroyo toads on the project site using a VFWO-approved biologist(s). Biologists must follow the Declining Amphibian Task Force's Fieldwork Code of Practice to prevent the spread of pathogens.

ARTO-8 Avoidance of Occupied Habitat: No permanent impacts will occur to arroyo toad occupied habitat, habitat determined to be occupied through surveys or otherwise by FEMA, or designated critical habitat unless the impacts to habitat are determined to be insignificant via project-level consultation with the VFWO (i.e., small permanent impacts that will have a negligible effect on habitat quality for arroyo toad). Temporary impacts to arroyo toad habitat are restricted to 1 acre per project and 10 acres overall.

ARTO-9 Environmental Awareness Training: Conduct environmental awareness training for all workers regarding the arroyo toad and other listed species in the Action Area. This training may be conducted by the biological monitor or VFWO-approved biologist, if present.

ARTO-10 Site Restrictions: The following site restrictions will be implemented to avoid or minimize effects on the listed species and its habitat:

a. A speed limit of 15 miles per hour (mph) in the project footprint in unpaved areas will be enforced to reduce dust and excessive soil disturbance;
b. Construction and ground disturbance will occur only during daytime hours, and will cease no less than 30 minutes before sunset and may not begin again earlier than 30 minutes after sunrise.;
c. Except when necessary for driver or pedestrian safety, to the maximum extent practicable, artificial lighting at a project site will be prohibited during the hours of darkness;
d. Routes and boundaries of roadwork will be clearly marked prior to initiating construction or grading;
e. To the maximum extent practicable, any borrow material will be certified to be non-toxic and weed free;

f. Remove all external oil, grease, dirt, plant parts, and mud from equipment prior to arriving at the Action Area and inspect all equipment before unloading at the Action Area;
g. All food and food-related trash items will be enclosed in sealed trash containers and properly disposed of offsite; and
h. No pets will be allowed anywhere in the Action Area during construction.

ARTO-11 Rain Event Limitations: To the maximum extent practicable, no construction activities will occur during rain events or within 24 hours following a rain event. Prior to construction activities resuming, a VFWO-approved biologist will inspect the Action Area and all equipment/materials for the presence of arroyo toads. Construction may continue 24 hours after the rain ceases if no precipitation is forecasted within 24-hours. If rain exceeds 0.25 inches during a 24-hour period, work will cease until no further rain is forecasted. The Service may approve modifications to this timing on a case-by-case basis.

ARTO-12 Designated staging areas: Use designated staging areas more than 100 feet from riparian areas to perform vehicle maintenance and refueling. Conduct daily checks of equipment for leaks and correct problems before entering aquatic or riparian areas. Infiltrate as much runoff from these areas using permeable surfaces and infiltration ditches or basins in areas where groundwater contamination risk is low. Restore staging areas immediately following use. Effectively prevent access to the area once site restoration activities have been completed.

ARTO-13 Delineate work areas: Clearly delineate work areas and access routes to reduce impacts to the surrounding area and use only existing transportation routes, as feasible.

ARTO-14 Erosion and Sedimentation Control: Implement Best Management Practices to control erosion and sedimentation such as:

a. Use temporary filters, berms, barriers, conveyances, or other materials to collect sediment and prevent it from entering surface waters.
b. Accurately establish and preserve horizontal alignment for each stream-crossing structure, to assure that flows do not erode stream banks or shoreline. For project activities conducted within stream banks, ensure the stream channel alignment and depth is preserved in such a manner as to not cause the streambank or channel to erode.
c. Restore the original surface of the streambed upon decommissioning the concrete crossing, when applicable.
d. Keep excavated materials out of channels, floodplains, wetlands, and lakes.
e. Install silt fences or other sediment –and-debris-retention barriers between the water body and construction material stockpiles and wastes.
f. Remove all project debris from the creek and do not stockpile materials within the creek.
g. Dispose of unsuitable material in approved waste areas. Ensure that project debris will not enter any waterway, and construction materials will not be stockpiled within 50 feet of the waterway.

h. Stabilize decommissioned surfaces and other disturbed soil surfaces by retaining or reestablishing soil cover to 60 to 70 percent. Use certified weed-free straw where existing soil cover is insufficient. Stabilize work areas in an identical manner when the National Weather Service predicts a 30 percent or greater chance of precipitation (predicted precipitation greater than 0.25 inches within a 24-hour period).

ARTO-15 Maintain Vegetation: Native woody riparian vegetation will not be cut or removed, except where needed to facilitate project implementation. Maintain vegetation where practicable to provide adequate shade for riparian habitat.

ARTO-16 Containment of spills: Implement procedures for containment and removal of any chemical spills (for example a Water Pollution Control and Prevention Plan). Use liners as needed to prevent seepage to groundwater. Remove residues, waste oil, and other materials from the site and properly dispose of them. Hazardous materials must be stored at safe distances from riparian or aquatic areas within a designated location designed to contain spills. Report spills and initiate appropriate clean-up action in accordance with applicable State and Federal laws, rules, and regulation.

ARTO-17 Restoration to Pre-Disturbance Conditions: Restore all temporarily disturbed areas within the Action Area to pre-disturbance or better conditions immediately following completion of project activities. Effectively prevent access to the restored area once site restoration activities have been completed.

Conservation Measures for California Red-Legged Frog and California Tiger Salamander, Central California and Santa Barbara DPS

CRLF-CTS-1 Biological Monitor: A VFWO-approved biologist(s) will be onsite during all activities that may result in take of California red-legged frogs or California tiger salamanders.

CRLF-CTS-2 Seasonal Avoidance: Project activities will be scheduled to minimize adverse effects to the California red-legged frog and California tiger salamander and their habitat. Disturbance to upland habitat will be confined to the dry season, generally May 1 through October 15 (or the first measurable fall rain of 1" or greater) because that is the time period when California red-legged frogs and California tiger salamanders are less likely to be moving through upland areas. However, if seasonal avoidance is not possible, conduct grading and other disturbance in pools and ponds only when they are dry, typically between July 15 and October 15. Work within a pool or wetland may begin prior to July 15 if the pool or wetland has been dry for a minimum of 30 days prior to initiating work.

CRLF-CTS-3 Rain Event Limitations: To the maximum extent practicable, no construction activities will occur during rain events or within 24 hours following a rain event. Prior to construction activities resuming, a VFWO-approved biologist will inspect the Action Area and all equipment/materials for the presence of California red-legged frogs and California tiger salamanders. Construction may continue 24 hours after the rain ceases if no precipitation is

forecasted within 24-hours. If rain exceeds 0.5 inches during a 24-hour period, work will cease until no further rain is forecasted. The Service may approve modifications to this timing on a case-by-case basis.

CRLF-CTS-4 Pre-construction Survey: No more than 24 hours prior to the date of initial ground disturbance and vegetation clearing, a VFWO-approved biologist with experience in the identification of all life stages of the California red-legged frog and California tiger salamander and designated critical habitat will conduct a pre-construction survey at the project site. The survey will consist of walking the project limits and within the project site to determine possible presence of the species. The VFWO-approved biologist will investigate all areas that could be used by California red-legged frogs and California tiger salamanders for feeding, breeding, sheltering, movement, and other essential behaviors, such as small woody debris, refuse, burrows, etc.

CRLF-CTS-5 Daily Clearance Surveys: The VFWO-approved biologist will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of California red-legged frogs and California tiger salamanders.

CRLF-CTS-6 Environmentally Sensitive Areas: Prior to the start of construction, Environmentally Sensitive Areas (ESAs) – defined as areas containing sensitive habitats adjacent to or within construction work areas for which physical disturbance is not allowed – will be clearly delineated using high visibility orange fencing. The ESA fencing will remain in place throughout the duration of the proposed action, while construction activities are ongoing, and will be regularly inspected and fully maintained at all times. The final project plans will depict all locations where ESA fencing will be installed and will provide installation specifications. The bid solicitation package special provisions will clearly describe acceptable fencing material and prohibited construction-related activities including vehicle operation, material and equipment storage, access roads and other surface-disturbing activities within ESAs. With prior approval from the Service, a hybrid ESA/Wildlife Exclusion Fencing (WEF)[2] fencing material that is both hi-visibility and impermeable to wildlife movement may be used in place of paired ESA fencing and WEF fencing. Also with prior approval from the Service, an exception to the foregoing fencing measures may apply on a case-by-case basis during the following situations: (1) at work sites where the duration of work activities is very short (e.g., 3 days or less), the work activities occur during the dry season, and the installation of ESA fencing will result in more ground disturbance than from project activities; or (2) at work sites where the substrate (i.e., rock, shale, etc.) or topography (i.e., slopes > 30 degrees) inhibit the safe and proper installation of fencing materials. In these cases, biological monitoring will occur during all project activities at that site.

CRLF-CTS-7 Wildlife Exclusion Fencing: Prior to the start of construction, Wildlife Exclusion Fencing (WEF) will be installed at the edge of the project footprint in all areas where California red-legged frogs and California tiger salamanders could enter the construction area. The onsite

2 See CRLF-CTS-7 for information regarding WEF.

Project Manager and the VFWO-approved biologist will determine location of the fencing prior to the start of staging or surface disturbing activities.

a. Exclusion fencing will be at least 3 feet high and the lower 6 inches of the fence will be buried in the ground to prevent animals from crawling under. The remaining 2.5 feet will be left above ground to serve as a barrier for animals moving on the ground surface.
b. Such fencing will be inspected and maintained daily by the VFWO-approved biologist until completion of the project and removed only when all construction equipment is removed from the site.
c. The WEF specifications will be included in the final project plans and in the bid solicitation package (special provisions) and will include the WEF specifications including installation and maintenance criteria.
d. The WEF will remain in place throughout the duration of the project and will be regularly inspected and fully maintained. Repairs to the WEF will be made within 24 hours of discovery.
e. Upon project completion the WEF will be completely removed, the area cleared of debris and trash, and returned to natural conditions.
f. With prior approval from the Service, an exception to the foregoing fencing measures may apply on a case-by-case basis during the following situations: 1) at work sites where the duration of work activities are very short (e.g., 3 days or less), the work activities occur during the dry season, and the installation of exclusion fencing will result in more ground disturbance than from project activities; or (2) at work sites where the substrate (i.e., rock, shale, etc.) or topography (i.e., slopes > 30 degrees) inhibit the safe and proper installation of fencing materials. In these cases, species monitoring will occur during all project activities at that site. Modifications to this fencing measure may be made on a case-by-case basis with approval from the Service.

CRLF-CTS-8 Entrapment Prevention: To prevent inadvertent entrapment of animals during construction, all excavated, steep-walled holes or trenches more than 6 inches deep will be covered with plywood or similar materials at the close of each working day or provided with one or more escape ramps constructed of earth fill or wooden planks. The VFWO-approved biologist will inspect all holes and trenches at the beginning of each workday and before such holes or trenches are filled. All replacement pipes, culverts, or similar structures stored in the Action Area overnight will be inspected before they are subsequently moved, capped, and/or buried. If at any time a California red-legged frog or California tiger salamander is discovered, the onsite Project Manager and VFWO-approved biologist will be notified immediately and the VFWO-approved biologist will implement the species observation and handling protocol. If handling is necessary, work will be suspended until the appropriate level of coordination is complete.

CRLF-CTS-9 Encounters with Species: Each encounter with a California red-legged frog or California tiger salamander will be treated on a case-by-case basis. If any life stage of the California red-legged frog or California tiger salamander is found and these individuals may be killed or injured by work activities, the following will apply:

a. If California red-legged frogs or California tiger salamanders are detected in the Action Area, work activities within 50 feet of the individual that may result in the harm, injury, or death to the animal will cease immediately and the onsite Project Manager and VFWO-approved biologist will be notified. Based on the professional judgment of the VFWO-approved biologist, if project activities can be conducted without harming or injuring the California red-legged frog and California tiger salamander, it may be left at the location of discovery and monitored by the VFWO-approved biologist. All project personnel will be notified of the finding and at no time will work occur within 50 feet of a California red-legged frog or California tiger salamander without a VFWO-approved biologist present.
b. To the maximum extent possible, contact with the individual frog or salamander will be avoided and it will be allowed to move out of the hazardous situation of its own volition. This procedure applies to situations where a California red-legged frog or California tiger salamander is encountered while it is moving to another location. It does not apply to animals that are uncovered or otherwise exposed or in areas where there is not sufficient adjacent habitat to support the species if the individual moves away from the hazardous location. Such individuals must be relocated per Conservation Measure CRLF-CTS-10.

CRLF-CTS-10 Species Observations and Handling Protocol: If a California red-legged frog or California tiger salamander does not leave the work area, the VFWO-approved biologist will implement the species observation and handling protocol outlined below. Only VFWO-approved biologists will participate in activities associated with the capture, handling, relocation, and monitoring of California red-legged frogs and California tiger salamanders.

a. Prior to handling and relocation, the VFWO-approved biologist will take precautions to prevent introduction of amphibian diseases in accordance with the Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander (Service and CDFW 2003). Disinfecting equipment and clothing is especially important when biologists are coming to the Action Area to handle amphibians after working in other aquatic habitats. California red-legged frogs and California tiger salamanders will also be handled and assessed according to the Restraint and Handling of Live Amphibians (USGS National Wildlife Health Center 2001).
b. California red-legged frogs and California tiger salamanders will be captured by hand, dip net, or other VFWO-approved methodology, transported and relocated to nearby suitable habitat outside of the work area and released as soon as practicable the same day of capture. CTS individuals will be relocated no greater than 300 feet outside of the project site to areas with an active rodent burrow or burrow system (unless otherwise approved by the Service and with written landowner permission). CRLF individuals will be relocated to the nearest area of dense riparian cover outside the project site. Holding/transporting containers and dip nets will be thoroughly cleaned, disinfected, and rinsed with freshwater prior to use within the Action Area and between project sites within the Action Area. The Service will be notified within 24 hours of all capture, handling, and relocation efforts.

c. If an injured California red-legged frog or California tiger salamander is encountered and the VFWO-approved biologist determines the injury is minor or healing and the animal is likely to survive, it will be released immediately, consistent with measure b, above. Any injured California red-legged frogs and California tiger salamanders will be monitored until it is determined that they are not imperiled by predators or other dangers.
d. If the VFWO-approved biologist determines that a California red-legged frog or California tiger salamander has major or serious injuries as a result of project-related activities the VFWO-approved biologist, or designee, will immediately take it to a VFWO-approved facility. If taken into captivity the individual will remain in captivity and not be released into the wild unless it has been kept in quarantine and the release is authorized by the Service. The Subapplicant will bear any costs associated with the care or treatment of such injured California red-legged frogs or California tiger salamanders. The circumstances of the injury, the procedure followed and the final disposition of the injured animal will be documented in a written incident report to the Service as described below.
e. Notification to the Service of an injured or dead California red-legged frog or California tiger salamander in the Action Area will be made and reported whether or not its condition resulted from project-related activities. In addition, the VFWO-approved biologist will follow up with the Service in writing within 2 calendar days of the finding. Written notification to the Service will include the following information: the species, number of animals taken or injured, sex (if known), date, time, location of the incident or of the finding of a dead or injured animal, how the individual was taken, photographs of the specific animal, the names of the persons who observed the take and/or found the animal, and any other pertinent information. Dead specimens will be preserved, as appropriate, and will be bagged and labeled (i.e. species type; who found or reported the incident; when the report was made; when and where the incident occurred; and if possible, the cause of death). Specimens will be held in a secure location until instructions are received from the Service regarding the disposition of the specimen.

CRLF-CTS-11 Environmental Awareness Training: Prior to the start of construction, a VFWO-approved biologist with experience in the ecology of the California red-legged frog and California tiger salamander as well as the identification of all its life stages will conduct a training program for all construction personnel including contractors and subcontractors. Interpretation for non-English speaking workers will be provided. All construction personnel will be provided a fact sheet conveying this information. The same instruction will be provided to any new workers before they are authorized to perform project work. The training will include, at a minimum:

a. habitat within the Action Area;
b. an explanation of the species status and protection under state and Federal laws;
c. the avoidance and minimization measures to be implemented to reduce take of this species;

d. communication and work stoppage procedures in case a listed species is observed within the Action Area; and
e. an explanation of the importance of the ESAs and WEF.

CRLF-CTS-12 Disease Prevention and Decontamination Procedures: To ensure that diseases are not conveyed between work sites by the VFWO-approved biologist, the fieldwork code of practice developed by the Declining Amphibian Populations Task Force will be followed at all times.

CRLF-CTS-13 Pump Screens: If a water body is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than 5 millimeters and the intake will be placed within a perforated bucket or other method to attenuate suction to prevent California red-legged frogs and California tiger salamanders from entering the pump system. Pumped water will be managed in a manner that does not degrade water quality and upon completion be released back into the water body, or at an appropriate location in a manner that does not cause erosion. No re-watering of the water body is necessary if sufficient surface or subsurface flow exists to fill it within a few days, or if work is completed during the time of year the water body will have dried naturally. To avoid effects to eggs and larvae, work within seasonal ponds will be conducted when the pond has been dry naturally for at least 30 days

CRLF-CTS-14 Hand Clear Vegetation: Hand clear vegetation in areas where California red-legged frogs and California tiger salamanders are suspected to occur. All cleared vegetation will be removed from the project footprint to prevent attracting animals to the project site. A VFWO-approved biologist will be present during all vegetation clearing and grubbing activities. Prior to vegetation removal, the VFWO-approved biologist will thoroughly survey the area for California red-legged frogs and California tiger salamanders. Once the VFWO-approved biologist has thoroughly surveyed the area, clearing and grubbing may continue without further restrictions on equipment; however, the VFWO-approved biologist will remain onsite to monitor for California red-legged frogs and California tiger salamanders until all clearing and grubbing activities are complete. The Service may approve modifications to this conservation measure on a case-by-case basis.

CRLF-CTS-15 Wildlife Passage for Road Improvement: When constructing a road improvement, wherever possible, enhance or establish wildlife passage for the California red-legged frog and California tiger salamander across roads, highways, or other anthropogenic barriers. This includes upland culverts, tunnels, and other crossings designed specifically for wildlife movement, as well as making accommodations in curbs, median barriers, and other impediments to terrestrial wildlife movement at locations most likely beneficial to the California red-legged frog and California tiger salamander.

CRLF-CTS-16 Accidental Spills, SWPPP, Erosion Control, and BMPs: Prior to the onset of work, a plan will be in place for prompt and effective response to any accidental spills. All workers will be informed of the importance of preventing spills and of the appropriate measures to implement if a spill occurs. Storm-water pollution prevention plans and erosion control BMPs

will be developed and implemented to minimize any wind- or water-related erosion. These provisions will be included in construction contracts for measures to protect sensitive areas and prevent and minimize storm-water and non-storm-water discharges. Protective measures will include, at a minimum:

a. No discharge of pollutants from vehicle and equipment cleaning is allowed into any storm drains or watercourses.
b. Vehicle and equipment fueling and maintenance operations must be at least 50 feet away from aquatic or riparian habitat and not in a location where a spill may drain directly toward aquatic habitat, except at established commercial gas stations or at an established vehicle maintenance facility. The monitor will implement the spill response plan to ensure contamination of aquatic or riparian habitat does not occur during such operations.
c. Concrete wastes will be collected in washouts and water from curing operations is to be collected and disposed of properly. Neither will be allowed into watercourses.
d. Spill containment kits will be maintained onsite at all times during construction operations and/or staging or fueling of equipment.
e. Dust control will be implemented, and may include the use of water trucks and non-toxic tackifiers (binding agents) to control dust in excavation and fill areas, rocking temporary access road entrances and exits, and covering of temporary stockpiles when weather conditions require.
f. Graded areas will be protected from erosion using a combination of silt fences, fiber rolls, etc. along toes of slopes or along edges of designated staging areas, and erosion control netting (such as jute or coir) as appropriate on sloped areas.
g. Permanent erosion control measures such as bio-filtration strips and swales to receive storm water discharges from paved roads or other impervious surfaces will be incorporated to the maximum extent practicable.
h. All grindings and asphaltic-concrete waste will be stored within previously disturbed areas absent of habitat and at a minimum of 50 feet from any aquatic habitat, culvert, or drainage feature.

CRLF-CTS-17 Site Restrictions: The following site restrictions will be implemented to avoid or minimize effects on the listed species and its habitat:

a. A speed limit of 15 miles per hour (mph) in the project footprint in unpaved areas will be enforced to reduce dust and excessive soil disturbance.
b. Construction and ground disturbance will occur only during daytime hours, and will cease no less than 30 minutes before sunset and may not begin again earlier than 30 minutes after sunrise.
c. Except when necessary for driver or pedestrian safety, to the maximum extent practicable, artificial lighting at a project site will be prohibited during the hours of darkness.
d. Routes and boundaries of roadwork will be clearly marked prior to initiating construction or grading.

e. To the maximum extent practicable, any borrow material will be certified to be non-toxic and weed free.
f. All food and food-related trash items will be enclosed in sealed trash containers and properly disposed of offsite.
g. No pets will be allowed anywhere in the Action Area during construction.

CRLF-CTS-18 Suitable Erosion Control Materials: To prevent California red-legged frogs and California tiger salamanders from becoming entangled, trapped, or injured, erosion control materials that use plastic or synthetic monofilament netting will not be used within the Action Area. This includes products that use photodegradable or biodegradable synthetic netting, which can take several months to decompose. Acceptable materials include natural fibers such as jute, coconut, twine or other similar fibers. Following site restoration, erosion control materials, such as straw wattles, will not block movement of the California red-legged frog and California tiger salamander.

CRLF-CTS-19 Limitation on Insecticide/Herbicide Use: Insecticides or herbicides will not be applied at the project site during construction where there is the potential for these chemical agents to enter creeks, streams, waterbodies, or uplands that contain habitat for the California red-legged frog and California tiger salamander.

CRLF-CTS-20 Limitation on Rodenticide Use: No rodenticides will be used at the project site during construction or long-term operational maintenance in areas that support suitable upland habitat for the California red-legged frog and California tiger salamander.

CRLF-CTS-21 Invasive Non-Native Plant Species Prevention: The VFWO-approved biologist will ensure that the spread or introduction of invasive non-native plant species, via introduction by arriving vehicles, equipment, imported gravel, and other materials, will be avoided to the maximum extent possible. When practicable, invasive non-native plants in the Action Area will be removed and properly disposed of in a manner that will not promote their spread. Areas subject to invasive non-native weed removal or disturbance will be replanted with appropriate mix of fast-growing native species. Invasive non-native plant species include those identified in the California Invasive Plant Council's (Cal-IPC) Inventory Database, accessible at: www.cal-ipc.org/ip/inventory/index.php.

CRLF-CTS-22 Removal of Diversion and Barriers to Flow: Upon completion of construction activities, any diversions or barriers to flow will be removed in a manner that will allow flow to resume with the least disturbance to the substrate. Alteration of creek beds will be minimized to the maximum extent possible; any imported material will be removed from stream beds upon completion of the project.

CRLF-CTS-23 Removal of Non-Native Species: A VFWO-approved individual will permanently remove, from within the Action Area, any individuals of non-native species, such as bullfrogs, crayfish, and centrarchid fishes, to the maximum extent possible. The Subapplicant is responsible for ensuring that these activities are in compliance with the California Fish and

Game Code. No conversion of seasonal breeding aquatic habitat to perennial aquatic breeding habitat is allowed under this PBO. Creating new perennial water bodies in the vicinity of California red-legged frog or California tiger salamander populations where the ponds could be colonized by predators will also be avoided. Larval mosquito abatement efforts will be avoided in occupied breeding habitat for the California red-legged frog and California tiger salamander.

CRLF-CTS-24 Restore Contours of Temporarily Disturbed Areas: Habitat contours will be returned to their original configuration at the end of project activities in all areas that have been temporarily disturbed by activities associated with the project, unless the Subapplicant and the Service determine that it is not feasible or modification of original contours will benefit the California red-legged frog and California tiger salamander.

CRLF-CTS-25 Use of Native Plants for Revegetation: Plants used in revegetation will consist of native riparian, wetland, and upland vegetation suitable for the area. Locally collected plant materials will be used to the extent practicable. This measure will be implemented in all areas disturbed by activities associated with the project, unless the Subapplicant and the Service determine that it is not feasible or practical.

CRLF-CTS-26 Practices to Prevent Pathogen Contamination in Revegetation and Restoration: The Subapplicant will refer to the following restoration design considerations and practices to help prevent pathogen contamination in revegetation and restoration as published by the Working Group for *Phytophthora* in Native Habitats in order to address the risk of introduction and spread of *Phytophthora* and other plant pathogens in site plantings:

a. Design restoration with lower initial plant density. Planting large quantities of nursery plants increases the likelihood that some of those plants may be infested with *Phytophthora* or other plant pathogens. The greater the number of plants installed the higher the risk for pathogen introduction. The closer the plants are to one another the higher the likelihood of pathogen spread.
b. To the extent possible, use direct seeding of native plant seeds or cuttings instead of container stock. Planting locally-collected seeds or cuttings rather than installing container stock can minimize the risk of introducing pathogens to a site.
c. Ensure the use of clean nursery stock. To prevent and manage the introduction and spread of *Phytophthora* and other plant pathogens during revegetation and restoration activities, it is essential that projects use clean nursery stock grown with comprehensive best management practices.
d. Prevent contamination in site preparation, installation, and maintenance. Implementing best management practices to prevent pathogen introduction and spread is also critical during all other phases of revegetation and restoration to reduce contamination risk. For detailed guidance on how to prevent and manage *Phytophthora* during various aspects of restoration, including nursery plant production, see The Phytophthora in Native Habitats Work Group “Restoration Guidance” at www.calphytos.org.
e. Reduce the potential for pathogen spread and introduction due to movement or use of non-sanitized vehicles, tools, footwear or inadvertent use of contaminated materials (e.g.

soil erosion protection wattles and mulch, or non-sanitized materials recycled from other projects such as rebar, fencing materials, etc.). Fundamental principles include:

i. Minimize project footprint and soil disturbance. Keep the number of vehicle pass-throughs and other disturbances during site activities to the least necessary. Avoid visits when conditions are wet, and areas are muddy. Park vehicles in designated staging areas.
ii. Follow sanitation practices. *Phytophthora* and many other pathogens move when contaminated soil is transferred on vehicle tires, footwear, on contaminated tools or infested plant materials. Follow sanitation best management practices: tools, boots, and vehicles will be visibly free of soil before and after use.
iii. Promote prevention through education. Ensure that onsite personnel are aware of the risk of inadvertent pathogen introductions and understand how to prevent pathogen introduction and spread. A pre-project meeting that provides appropriate BMP training to all workers and oversight managers who will be onsite during the project will help avoid confusion and delays in the field and will ensure in advance that everyone understands the project goals related to pathogen prevention.

CRLF-CTS-27 Burrow excavation: Rodent burrows will be avoided to the maximum extent possible. Burrows that cannot be avoided and fall within the project right-of-way, but not subject to ground disturbing activities (e.g., grading, disking, excavating, etc.) should be protected using steel plates or plywood to avoid collapsing the burrows. Plates and plywood should only be used on burrows that may be run over by equipment. Plywood should only be used for lighter equipment such as pickup trucks; plates should be used for all heavier construction equipment. Plates and plywood will not be left in place for: (1) more than 48 hours; (2) when a significant rain event is forecasted within 24 hours; or (3) if work is scheduled to cease for consecutive days.

Burrow excavation should only occur on burrows that are located within areas that are subject to ground disturbing activities. The applicant will retain VFWO-approved biologist(s) to conduct burrow excavation. The biologist(s) will be allowed sufficient time to excavate burrows and relocate California tiger salamander to a suitable relocation site. The biologist will scope and excavate small mammal burrows within the impact area prior to the initiation of ground disturbing activities. The biologist(s) will utilize a fiber optic scope or similar device to scope the burrows to determine if California tiger salamander are present; burrow excavation will proceed after the burrow has been scoped. If the biologist is unable to scope the entire length of the burrow, the burrow will be scoped and excavated in sections. For example, if the scope can only reach the first 3 feet of a burrow, excavation will only occur along those 3 feet. The biologist will then scope the next 3 feet before that is excavated and so on and so forth until the end of the burrow is reached or the burrow leaves the area subject to ground disturbance. Burrow excavation may be performed using hand tools or via gentle excavation using construction equipment, under the direct supervision of a VFWO-approved biologist, until it is certain that the burrows are unoccupied or the burrow navigates to areas that are not subject to ground disturbing activities.

CRLF-CTS-28 Species Specific Conservation Strategies: The VFWO has an existing conservation strategy for Santa Barbara Distinct Population Segment of the California tiger salamander. FEMA will ensure Subapplicant project activities are consistent with the conservation strategies before submitting projects to the VFWO for inclusion in this PBO (see Appendix D).

Conservations Measures for Conservancy Fairy Shrimp and Vernal Pool Fairy Shrimp

The following conservation measures apply to any suitable fairy shrimp habitat within the VFWO's jurisdiction. For the purposes of this PBO, suitable fairy shrimp habitat includes the basin/inundation feature where fairy shrimp and/or resting eggs would be found, and the area of the watershed needed to support the feature(s).

LLBR-1 Pre-activity Surveys: Prior to any site disturbance (e.g., vegetation removal, soil disturbance) in suitable fairy shrimp habitat or initiation of construction activities, a VFWO-approved biologist with demonstrable experience with the diversity of habitat types in which listed branchiopod species can occur will conduct a habitat assessment survey. The intent of this survey is to provide information regarding the likelihood that potential habitat for one or more of the listed branchiopod species is present within, or immediately adjacent to, the project footprint. As part of this assessment, if inundated features are present, their quality and suitability for occupation by one or more of these species will be included. If, based on the results of the habitat assessment, species presence is likely, FEMA or the project applicant will contact the VFWO regarding the need for surveys according to current Service guidance. Modification to this guidance may be allowed if pre-approved by the VFWO. If it is not feasible to conduct surveys, the species presence will be assumed for all suitable habitat in the project area.

LLBR-2 Designated Critical Habitat: A maximum of five (5) percent of habitat containing Physical and Biological Features (PBFs) within designated critical habitat for vernal pool fairy and/or Conservancy fairy shrimp will be affected within the action area during the five year duration of this PBO, with a maximum of one (1) acres to be affected by activities associated with an individual project. Affected areas will be restored to pre-disturbance or improved topographic conditions and upland areas revegetated with native plant species consistent with the surrounding habitat.

LLBR-3 Occupied/Inundation Area Habitat Avoidance: Impacts to basin/inundation areas known or presumed occupied by one or more of the species and likely to contain resting eggs will be avoided.

LLBR-4 Habitat Supporting Occupied Habitat: Impacts to watershed areas that support occupied or presumed occupied basin/inundation features will be avoided to the maximum extent possible. If avoidance is not possible, the remaining conservation measures will be implemented as applicable.

LLBR-5: Exclusion Zones: Disturbance exclusion zones will be established, maintained, and monitored by the VFWO-approved biologist to ensure that impacts to basin/inundation features watershed, and/or critical habitat do not extend beyond the identified project footprint.

LLBR-6 Monitoring: A VFWO-approved biologist will monitor all site preparation (e.g., soil disturbance, vegetation removal) and/or construction activities within 250 feet of fairy shrimp habitat to ensure that there are no impacts to either inundation feature/basin. No permanent impacts to fairy shrimp habitat will occur. Actions that result in permanent alteration of the hydrology that supports inundation/basin features (e.g., construction of culverts, v-ditches, berms, roads, will could divert flows) must be avoided as they have not been analyzed and are not addressed in this programmatic consultation.

LLBR-7 Buffer Areas: All equipment storage, fueling, cleaning, maintenance, and mixing of pesticides, herbicides, or other potentially toxic chemicals is restricted to an area at least 300 feet from any basin/inundation features. Hazardous material absorbent pads must be present onsite and made easily accessible in the event of a spill.

LLBR-8: Work Restrictions – Dry Season: To the maximum extent possible, site preparation and construction activities will be restricted to the dry season (generally considered to be between June 1 and October 15) and occur only under conditions when soil is dry to the touch at the surface and to a depth of 2.5 cm (1 in.). The Service may approve modifications to this timing on a case-by-case basis. The following measures will be established and enforced:

- There will be no soil disturbing activities or herbicide application in a basin/inundation feature or within 25 feet of such a feature;
- There will be no held herbicide application within 50 feet of a basin/inundation feature;
- There will be no power spray herbicide application within 100 feet of a basin/inundation feature; and
- There will be no broadcast herbicide application within 150 feet of a basin/inundation feature.

LLBR-9 Work Restrictions -- Wet Season: If it is not possible to restrict site preparation and/or construction activities to the dry season, the following measures will be established and enforced:

- A VFWO-approved biologist will monitor all site preparation, construction, and/or maintenance activities to occur within 150 feet of a basin/inundation feature;
- Exclusion fencing and erosion control materials will be installed under the supervision of a VFWO-approved biologist to prevent the discharge of sediment into basin/inundation features;
- There will be no soil disturbing activities or manual clearing of vegetation in or within 50 feet of a basin/inundation feature;
- There will be no mechanical clearing of vegetation within 100 feet of a basin/inundation feature;
- There will be no hand-held herbicide application within 25 feet of the edge of a basin/inundation feature; and

- There will be no power spray or broadcast herbicide application within 150 feet of a basin/inundation feature.

LLBR-10 Best Management Practices: The following practices will be implemented within or immediately adjacent to fairy shrimp habitat:

- Implementation of erosion control measures that will protect basin/inundation features from siltation and contaminant runoff. Erosion-control materials will be composed of a tightly woven natural fiber netting or similar material that will not entrap other wildlife species.
- Erosion control materials cannot be comprised of plastic or microfilament netting and all fiber rolls and hay bales used for erosion control must be certified as free of noxious weed seed.
- There will be no application of water (e.g., for dust suppression) within 100 feet of a basin/inundation feature without the use of additional protective measures (e.g., barriers and/or use of low flow water truck nozzles) to keep this type of water out of these features.
- All refueling, maintenance, and staging of equipment and vehicles is restricted to those areas specifically designed to contain any spills. These activities will not occur in any location where spill materials could drain towards a basin/inundation feature.
- Vehicles will be inspected daily for fluid leaks before leaving a staging area.

LLBR-11 Invasive Nonnative Plant Species Prevention: The VFWO-approved biologist will ensure that the spread or introduction of invasive nonnative plant species, via introduction by arriving vehicles, equipment, imported gravel, and other materials, is avoided to the maximum extent possible. Construction vehicles will be certified clean prior to any work within 150 feet of fairy shrimp habitat to minimize the introduction of invasive nonnative plant species, As practicable, nonnative plant species present within the project area will be removed from the site. Disposal will be in a manner that will not promote their spread to other areas. Invasive nonnative species are those identified in the California Invasive Plant Council's (Cal-IPC) Inventory Database, accessible at: www.cal-ipc.org/ip/inventory/index.php.

LLBR-12 Habitat Restoration/Revegetation: Restoration of temporary impacts to topography and vegetation will occur in accordance with a restoration plan reviewed and approved by the VFWO prior to the initiation of project activities. Plant species used in revegetation efforts will consist of native species suitable for the area. Locally collected plant materials will be used to the extent practicable.

Conservation Measures for Tidewater Goby

TWG-1 Block Netting: Prior to initiation of dewatering or sediment removal work, a qualified biologist will install 1/8 inch block nets outside the impact areas and across the stream a minimum of 20 feet above and below the locations proposed for excavation. If widely separated sites are involved, more than one set of block nets will be placed to protect the work area. The

nets will be installed on the first day of work and monitored thereafter for the duration of the work.

TWG-2 Environmental Awareness Training: Prior to initiation of dewatering or sediment removal work, hold an environmental awareness training to inform maintenance and management personnel about tidewater gobies, including tidewater goby protected status, proximity to the project site, avoidance/minimization measures to be implemented during the particular project, and the implications of violating the Act and FEMA funding conditions.

TWG-3 Capture and Relocation: Once the block nets are secured, a VFWO-approved biologist(s) will remove all tidewater gobies found between the block nets using a 1/8 inch seine and dip nets, and relocate tidewater gobies to suitable habitat downstream of the Action Area.

TWG-4 Flagging Construction Areas: Clearly flag the limits of construction areas to avoid or minimize impacts to adjacent riparian and upland habitat. Flagging will be no more than 50 feet apart and will be clearly visible to construction workers on the ground and to operators on heavy equipment.

TWG-5 Erosion and Sedimentation Control: Implement erosion and sedimentation control measures (e.g., silt fences, straw bales or wattles) in all areas where disturbed substrate may potentially wash into waters via rainfall or runoff, particularly around stockpiled material and at the downstream end of each project reach. Such measures will remain in place and be inspected periodically until the project is complete and exposed soils are stabilized. Diversion structures, sediment traps/basins and associated equipment (e.g., pumps, lines) will be maintained in optimal working condition for the entire duration of the preparation and construction periods.

TWG-6 Biological Monitoring: A VFWO-approved biological monitor will remain onsite and search for tidewater gobies and assess turbidity levels within the work areas during all dewatering activities, and will capture and relocate tidewater gobies to suitable habitat as necessary.

TWG-7 Daily Netting, Surveying, and Capture/Relocation: If excavation of a given extent of a basin cannot be completed in one day, a new set or successive sets of block nets will be deployed each day, and subsequent surveys and capture/relocation performed accordingly. Fish released from one day's work will not be released into areas projected to be excavated on successive days.

TWG-8 Reporting: Provide a written summary of work performed (including biological survey and monitoring results), best management practices implemented (i.e., use of biological monitor, flagging of work areas, erosion and sedimentation controls) and supporting photographs of each stage. Furthermore, the documentation describing listed species surveys and re-location efforts (if appropriate) will include name of biologist(s), location and description of area surveyed, time and date of survey, all survey methods used, a list and tally of all sensitive animal species observed during the survey, a description of the instructions/recommendations given to the

applicant during the project, and a detailed discussion of capture and relocation efforts (if appropriate).

Conservation Measures for Coastal California Gnatcatcher

CAGN-1 Habitat Assessment: A habitat assessment will be conducted by a VFWO-approved biologist to determine whether suitable habitat (including foraging, nesting, and dispersal) for the gnatcatcher occurs in the action area. If suitable habitat for this species is identified in the action area and the proposed project may affect suitable habitat that is not known to be occupied by the gnatcatcher, the VFWO will be contacted regarding the need for surveys according to the Service protocol and those surveys will be conducted, as appropriate. With VFWO concurrence, FEMA may also forgo surveys by making a determination that suitable habitat is occupied for the purposes of this PBO.

CAGN-2 Seasonal Avoidance: To minimize direct effects to nesting gnatcatchers, all clearing of vegetation within occupied or designated critical habitat (gnatcatcher habitat) will occur outside the breeding season (February 15-August 30) to the maximum extent practicable. If the breeding season cannot be avoided, a VFWO-approved biologist will conduct preconstruction nesting bird surveys prior to vegetation removal. If no active nests are found to occur within 300 feet of the area of disturbance, project activities may proceed.

CAGN-3 Work Restrictions Near Active Nests: If an active nest is detected during the survey, either work will be suspended until the young have fledged/beginning of the non-breeding season or the following will apply:

a. An exclusionary buffer will be established around the nest. The buffer distance will be determined by the VFWO-approved biologist considering several factors: presence of natural buffers (vegetation/topography), nest height, location of foraging territory, nature of the proposed activities, and baseline levels of noise and human activity. The buffer may range from 50 feet to over 300 feet in width; AND
b. If an exclusion zone is established, a VFWO-approved biologist will monitor the nest during construction for signs of adverse effects including distress/disturbance. If adverse effects are detected, then the VFWO-approved biologist will have the authority to stop all construction activating in the vicinity of the nest and coordinate with the VFWO to determine whether additional conservation measures can avoid or minimize effects on the nesting birds. Construction may resume only with approval from the VFWO; OR
c. The biologist will continue to monitor the nest and will determine when young have fledged. Once young have left the nest the buffer and exclusion zone may be removed and construction activities within these areas may resume.

CAGN-4 Habitat Avoidance: Project impacts will be avoided or minimized in coastal sage scrub, alluvial fan scrub, and other vegetation communities known to be occupied by the gnatcatcher. Staging and temporary construction areas will be located outside of suitable habitat and will use existing roads and developed areas to the maximum extent possible. If impacts to

these habitats cannot be avoided, effects to gnatcatcher individuals will be avoided or minimized through implementation of the measures listed above.

CAGN-5 Habitat Restoration Plan: Prior to construction, a Restoration Plan will be prepared that describes the efforts to restore all the areas that had temporary impacts on suitable habitat for the gnatcatcher. Restoration of temporary impacts will occur in accordance with a VFWO-approved restoration.

CAGN-6 Limits on Habitat Disturbance: For any specific project, temporary impacts on occupied or designated critical habitat for the gnatcatcher will be limited to a maximum of 1 acre. Temporary impacts from all the projects covered under this programmatic consultation will also be limited to a maximum of 20 acres of gnatcatcher occupied or designated critical habitat. In addition, impacts will be limited to 10 gnatcatcher territories.

CAGN-7 No Permanent Loss of Habitat: No permanent loss of occupied or designated critical habitat for the gnatcatcher will occur.

Conservation Measure for Riparian birds: Least Bell's vireo, southwestern willow flycatcher, and yellow-billed cuckoo

RB – 1 Habitat Assessment and Seasonal Avoidance: A habitat assessment will be conducted by a VFWO-approved biologist to determine whether suitable habitat (including foraging, nesting, and dispersal) for listed riparian birds occurs in the action area. If suitable habitat for these species is present within 500 feet of the action area, project activities will be scheduled to avoid the breeding season (March 15 to September 15) to the maximum extent possible.

RB – 2 Pre-activity surveys: In the event that project activities in suitable habitat for least Bell's vireos, southwestern willow flycatchers, and/or yellow-billed cuckoo (riparian birds) cannot be scheduled outside of the breeding season surveys will be conducted according to Service guidance to determine presence or absence of the covered riparian birds. A modified survey protocol may be appropriate on a case-by-case basis and must be approved by VFWO.

RB – 3 Biological Monitor: A VFWO-approved biologist(s) will be onsite during all activities that may result in take of covered riparian birds.

RB – 4 Establishment of Buffer: If a nesting riparian bird is detected within the project area during pre-project surveys, a VFWO-approved biologist will establish a buffer zone around the nest that they deem sufficient to avoid the abandonment of the nest by the adults. The Service generally recommends a minimum 500 foot buffer around nests where no work is to occur; however, a smaller buffer can be established for least Bell's vireos if deemed protective by the VFWO-approved biologist and approved by the Service. Southwestern willow flycatchers and yellow-billed cuckoos are more sensitive to disturbance than least Bell's vireos, and therefore a greater buffer may be required. The VFWO-approved biologist must monitor the nests during all project activities immediately adjacent to buffer zones to determine the effects of project

activities on the nesting riparian birds. The VFWO-approved biologist will have the authority to stop work if deemed necessary to protect the nesting birds.

RB – 4 Native Vegetation Remains in Place: For projects where non-native plant species are targeted for removal within suitable habitat for riparian birds, native vegetation will be left in place to the maximum extent practical; willows (*Salix* sp.) and cottonwoods (*Populus* sp.) with a diameter at breast height of 6 inches or greater may be trimmed, but will be left in place where possible.

RB - 5 Establishment of A VFWO-Approved Restoration Plan: Prior to construction, a Restoration Plan will be prepared that describes the efforts to restore all the areas of suitable habitat for the vireo that were temporarily impacted. The Restoration Plan will be reviewed and approved by the VFWO.

RB - 6 Acreage Restriction: For any specific project, temporary impacts on occupied or designated critical habitat for listed riparian birds will be limited to a maximum of 1 acre.

RB - 7 No Permanent Habitat Loss: No permanent loss of occupied or designated critical habitat for listed riparian birds will occur unless the impacts to habitat are determined to be insignificant via project-level consultation, or are mitigated as approved by the VFWO.

Conservation Measures for Smith's Blue Butterfly

SBB-1 Habitat Avoidance: If possible, avoid damage or removal of seacliff buckwheat (*Eriogonum parvifolium*) or coast buckwheat (*Eriogonum latifolium*) plants, which are essential components of Smith's blue butterfly habitat.

SBB-2 Seasonal Restrictions: If possible, avoid work between June 15 and September 15, when Smith's blue butterfly adults, eggs, and larvae may be present. Pupae may be present throughout the year, but are immobile and unlikely to be present far from seacliff buckwheat or coast buckwheat plants.

SBB-3 Minimize Ground Disturbance: Ensure that ground disturbance for maintenance or project activities will not occur within stands of buckwheat unless a VFWO-approved biologist is on site.

SBB-4 Pre-Activity Surveys: For maintenance work or project activity within stands of buckwheat, a VFWO-approved biologist will survey the work site no more than 30 days before the onset of ground disturbance. If any life stage of the Smith's blue butterfly or its host plants, seacliff or coast buckwheat, is found and is likely to be killed or injured by work activities, the approved biologist will be allowed sufficient time to relocate seacliff or coast buckwheat plants, duff, and/or soil, from the site before work activities begin. The seacliff or coast buckwheat plants, duff, and/or soil will be hand removed and placed as close as possible to, but not on, living seacliff or coast buckwheat plants. The VFWO-approved biologist will relocate the

seacliff or coast buckwheat plants, duff, and/or soil the shortest distance possible to a location that contains suitable habitat and will not be affected by activities associated with the proposed project. The VFWO-approved biologist will maintain detailed records of the number of seacliff or coast buckwheat plants that are moved and submit with project reporting.

SSB-5 Biological Monitoring: A VFWO-approved biologist will be present at the work site for maintenance or project activity within stands of buckwheat until all Smith's blue butterflies and seacliff or coast buckwheat plants that are at risk due to project activities have been removed, workers have been instructed, and disturbance to habitat has been completed. After this time, a biological monitor on-site will ensure compliance with all protective measures. The VFWO-approved biologist will ensure that this monitor receives the training outlined in measure 7 and in the identification of the Smith's blue butterfly and its host plant, seacliff or coast buckwheat. If the biological monitor or the VFWO-approved biologist recommends that work be stopped because the Smith's blue butterfly, or seacliff or coast buckwheat would be affected to a degree that exceeds the levels anticipated by the Service during review of the proposed action, they will notify the resident engineer (the engineer that is directly overseeing and in command of construction activities) immediately. The resident engineer will either resolve the situation by eliminating the unanticipated effect(s) immediately, or require that all actions causing these effects be halted. If work is stopped, the Service will be notified as soon as is reasonably possible.

SSB-6 Capture and Relocation: If suitable habitat has been identified in the Action Area, ensure that only VFWO-approved biologists will participate in capture, handling, and monitoring of the Smith's blue butterfly, in all of its life stages, and the handling of buckwheat plants.

SSB-7 Environmental Awareness Training: Before any maintenance or project activity work begins within stands of buckwheat, VFWO-approved biologist will provide construction awareness training to all field personnel. At a minimum, the training will include a description of the Smith's blue butterfly and its habitat, the specific measures that are being implemented to conserve the Smith's blue butterfly, and boundaries within which the project may be accomplished. Brochures, books, and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.

SSB-8 Minimize Disturbing Activities: The number of access routes, size of staging areas, and the total area of the activity will be limited to the minimum necessary to achieve the project goal. Environmentally Sensitive Areas will be established to confine access routes and construction areas to the minimum area necessary to complete construction, and minimize the impact to Smith's blue butterfly and seacliff or coast buckwheat.

SSB-9 Revegetation: An assemblage of native species will be used for revegetation of project sites. Seacliff or coast buckwheat seed or plants will only be placed outside the vegetation control areas. The spread of invasive weeds during revegetation efforts will be controlled.

SBB-10 Erosion and Sedimentation Control: Ensure that best management practices are implemented according to the most current approved guidelines to control erosion and sedimentation during and after project implementation. Under the California Interagency Noxious Weed Free Forage and Mulch Program (http://pi.cdfa.gov/weed/wff), California is taking steps to make noxious weedfree hay and straw widely available. Under this program, weed-free hay and straw bales will be used for erosion control measures when they become available.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy Determination

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

The jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which describes the range-wide condition of the 12 covered species, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which analyzes the condition of the covered species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the covered species; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the covered species; and (4) the Cumulative Effects, which evaluates the effects of future, non-Federal activities, that are reasonably certain to occur in the action area, on the covered species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the current status of the covered species, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to reduce appreciably the likelihood of both the survival and recovery of the covered species in the wild by reducing the reproduction, numbers, and distribution of that species.

Adverse Modification Determination

Section 7(a)(2) of the Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. A

final rule revising the regulatory definition of "destruction or adverse modification" was published on February 11, 2016 (81 FR 7214). The final rule became effective on March 14, 2016. The revised definition states:

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

The "destruction or adverse modification" analysis in this biological opinion relies on four components: (1) the Status of Critical Habitat, which describes the range-wide condition of the critical habitat in terms of the key components (i.e., essential habitat features, primary constituent elements, or physical and biological features) that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the listed species; (2) the Environmental Baseline, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation/recovery of the listed species; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated and interdependent activities on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the conservation value of the affected critical habitat; and (4) Cumulative Effects, which evaluate the effects of future non-Federal activities that are reasonably certain to occur in the action area on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the conservation value of the affected critical habitat.
For purposes of making the "destruction or adverse modification" determination, the Service evaluates if the effects of the proposed Federal action, taken together with cumulative effects, are likely to impair or preclude the capacity of critical habitat in the action area to serve its intended conservation function to an extent that appreciably diminishes the rangewide value of critical habitat for the conservation of the listed species. The key to making that finding is understanding the value (i.e., the role) of the critical habitat in the action area for the conservation/recovery of the listed species based on the Environmental Baseline analysis.

STATUS OF THE SPECIES AND CRITICAL HABITAT

A final rule published on February 11, 2016 (81 FR 7414), removed the phrase "primary constituent elements" (PCEs) from the regulations for designating critical habitat (50 CFR 424.12). Instead, new designations will focus on "physical and biological features" (PBFs). Existing critical habitat rules may still define PCEs; however, the two terms (PBFs and PCEs) may be used interchangeably as they are considered synonymous.

Arroyo Toad

Legal Status

The arroyo toad was listed as endangered on December 16, 1994 (Service 1994a). The recovery plan for the arroyo toad was published in 1999 (Service 1999). The final rule for revised critical habitat for the arroyo toad was published on February 9, 2011 (Service 2011a). The Service received a petition to downlist the arroyo toad from endangered to threatened on December 19, 2011. After reviewing the available information, the Service determined the petitioned action was not warranted (Service 2015b). Furthermore, we found that the species had not yet responded to conservation efforts to an extent that would allow a change in listing status, therefore, the species remains listed as endangered.

Natural History

The arroyo toad is a small, stocky, warty toad that is about 2 to 3.5 inches (4.6 to 8.6 centimeters) in length (Stebbins 2003). The arroyo toad is a dark-spotted toad of the family *Bufonidae* that is found along medium-to-large streams in coastal and desert drainages in central and southern California, and Baja California, Mexico (Service 2015a). It occupies aquatic, riparian, and upland habitats in a number of the remaining suitable drainages within its range. Suitable habitat for the arroyo toad is created and maintained by the fluctuating hydrological, geological, and ecological processes that naturally occur in riparian ecosystems and adjacent uplands. Campbell et al. (1996) describes that a stream must be large enough for channel scouring processes to operate, but not so large that habitat structure is lost after floods. Arroyo toads require habitat produced and maintained by narrow drainages of intermediate size; in larger systems, suitable microhabitats may be too widely dispersed, if present at all, while stream channels are too unstable in smaller systems (Campbell et al. 1996; Sweet 1992). Arroyo toads tend to be located in areas where the stream is still bordered by low hills and the stream gradient is low due to accumulated bed load (Campbell et al. 1996). Periodic flooding that modifies stream channels, redistributes channel sediments, and alters pool location and form, coupled with upper terrace stabilization by vegetation, is required to keep a stream segment suitable for arroyo toads.

The substrate in habitats preferred by arroyo toads consists primarily of sand, fine gravel, or pliable soil, with varying amounts of large gravel, cobble, and boulders. Areas that are damp and have less than 10 percent vegetation cover provide the best conditions for juvenile survival and rapid growth of the arroyo toad (Campbell et al. 1996). During the breeding season, from late March to June, arroyo toads strongly favor shallow, sand- or gravel- based pools with a minimum of vegetation along one or both margins (Sweet 1992). Larvae occupy shallow areas of open streambeds on substrates ranging from silt to cobble, with preferences for sand or gravel. Newly metamorphosed arroyo toads and juveniles remain on sparsely vegetated sand and gravel bars bordering the natal pool to feed until the pool dries out, usually from 8 to 12 weeks, but up to 4 months depending on the pool site and rainfall conditions (Service 2015a).

Arroyo toads must be able to move between the stream and upland foraging sites, as well as up and down the stream corridor. Juveniles and adult arroyo toads require and spend much of their lives in riparian and upland habitats adjacent to breeding locations (Campbell et al. 1996). Riparian habitats used for foraging and burrowing include sand bars, alluvial terraces, and streamside benches that lack vegetation, or are sparsely to moderately vegetated. Upland habitats used by arroyo toads during both the breeding and non-breeding seasons include alluvial scrub, coastal sage scrub, chaparral, grassland, and oak woodland (Holland 1995; Griffin et al. 1999).

Arroyo toad tadpoles eat microscopic algae, bacteria, and protozoans, which live in the interstices of the substrate such as the spaces among pebbles, gravel, and sand, or abraded from stones (Sweet 1992). Small toads feed almost exclusively on ants. Toads in the size range of 17-23 millimeters feed on fewer ants and an increasing proportion of small beetles, particularly ladybugs (*Coccinellidae*; Sweet 1992). When foraging, arroyo toads are often found around the drip lines of oak trees. These areas often lack vegetation, yet have levels of prey that will support arroyo toads. Toads in the size range of 17-23 millimeters are mostly diurnal, but also begin to be active after dark (Sweet 1992). Mid July to early August, when toads typically reach 22-23 millimeters (in 4-5 weeks), many of the breeding pools and surfaces of the sand bars become dry and cemented by minerals deposited in the surface layer. Toads of this size seem to be largely nocturnal at most sites, though some individuals are active diurnally on sand bars that remain damp (Sweet 1992). Nocturnal activity peaks soon after dark, and consists mostly of toads traveling to the edges of the sand bar where they soak up water before returning to their burrows (Sweet 1992). Additionally, arroyo toads may seek temporary shelter under rocks or debris and have been found in mammal burrows on occasion. Adult arroyo toads are known to burrow between 2-4 inches deep in the substrate (Sweet 1992), while juveniles burrow about 1-2 inches (Sweet 1992).

The arroyo toad has specialized breeding habitat requirements. When warm, rainy conditions occur in January, February and March, arroyo toads become active and begin to forage on stream terraces and in channel margins. Male toads sit on the substrate in shallow water to call and their throats must be above the water's surface. Female arroyo toads lay their eggs in water less than four inches deep (Sweet 1992), but not greater than seven inches deep, over substrates of sand, gravel, or cobble in open sites such as overflow pools, old flood channels, and shallow pools along streams. Breeding usually begins in late March at lower elevations, but male calling peaks in early- to mid-April and extends through late-May, sometimes even into late-June (Sweet 1992). Streams where arroyo toads breed can be either intermittent or perennial streams that typically have periodic flooding events to scour vegetation and replenish fine sediments. Such habitats rarely have closed canopies over the lower banks of the stream channel due to periodic flood events. Heavily shaded pools are generally unsuitable for larval and juvenile arroyo toads because of lower water and soil temperatures and poor algal mat development (Service 2015b).

Female arroyo toads release their entire clutch of eggs as a single breeding effort and it is very doubtful that any produce two clutches in a single mating season (Sweet 1992; Campbell et al. 1996). Larvae usually hatch in four to six days (Sweet 1992) and tadpoles disperse from the pool margin into the surrounding shallow water, where they spend an average of ten weeks (Sweet

1992). Metamorphosis from tadpole to juvenile typically occurs in June or July. After metamorphosis, the juvenile arroyo toads remain on the bordering gravel bars until the pool dries out, which can take from eight to twelve weeks, depending on whether the site remains wet and the surrounding sand or gravel bars do not become cemented by evaporate deposits (Sweet 1992). Most males become sexually mature by the following spring, but females generally do not become sexually mature until at least two years of age (Service 2015a; Sweet 1992). Longevity may vary with local conditions; comparative size data from the Santa Ynez population suggested that few adults survive even to age 5 (Sweet 1992).

Rangewide Status

The species was once relatively abundant across its range, but populations have declined by approximately 76 percent from its historical distribution (Jennings and Hayes 1994). The primary threats to the arroyo toad at the time of listing were habitat destruction and alteration from water storage reservoirs, flood control structures, roads, agriculture, urban development, recreational facilities, and mining activities. Non-native plants, such as tamarisk (*Tamarix* spp.) and giant reed (*Arundo donax*), have also altered arroyo toad habitat. In addition to habitat threats, introduced non-native predators (e.g., bullfrogs (*Rana catesbeiana*), green sunfish (*Lepomis cyanellus*), and African clawed frogs (*Xenopus laevis*)) and fire are substantial threats to the arroyo toad. Threats to the arroyo toad identified subsequent to listing are the chytrid fungus disease (*Batrachochytrium dendrobatidis*), climate change, and wildfire suppression activities (e.g., fire line construction, bulldozing, and water withdrawals by helicopters).

Critical Habitat

The final rule for revised critical habitat for the arroyo toad was published on February 9, 2011 (Service 2011a). Approximately 98,366 acres of habitat, distributed into 21 units are located throughout Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange and San Diego Counties, California. This final revised designation constitutes an increase of approximately 86,671 acres from the 2005 designation of critical habitat for the arroyo toad (Service 2005a). The Service (2011) used current knowledge of the biology and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, to determine that the arroyo toad's PBFs are:

1) Rivers or streams with hydrologic regimes that supply water to provide space, food, and cover needed to sustain eggs, tadpoles, metamorphosing juveniles, and adult breeding toads.

2) Riparian and adjacent upland habitats, particularly low-gradient (typically less than 6 percent) stream segments and alluvial streamside terraces with sandy or fine gravel substrates that support the formation of shallow pools and sparsely vegetated sand and gravel bars for breeding and rearing of tadpoles and juveniles; and adjacent valley bottomlands that include areas of loose soil where toads can burrow underground, to provide foraging and living areas for juvenile and adult arroyo toads.

3) A natural flooding regime, or one sufficiently corresponding to natural, that: (1) is characterized by intermittent or near-perennial flow that contributes to the persistence of shallow pools into at least mid-summer; (2) maintains areas of open, sparsely vegetated, sandy stream channels and terraces by periodically souring riparian vegetation; and (3) also modifies stream channels and terraces and redistributes sand and sediment, such that breeding pools and terrace habitats with scattered vegetation are maintained.

4) Stream channels and adjacent uplands habitats that allow for movement to breeding pools, foraging areas, overwintering sites, upstream and downstream dispersal, and connectivity to areas that contain suitable habitat.

In summary, the need for space for individual and population growth and normal behavior is met by PBFs 1 and 4; the need for food, water, and physiological requirements is met by PBF 1; cover and shelter requirements are met by PBF 2; areas for breeding, reproduction, and rearing of offspring are met by PBFs 1, 2, and 3; and habitats representative of the historical, geographical, and ecological distributions of a species are met by PBF 4.

Recovery

The primary goal identified in the recovery plan for the arroyo toad is to reclassify the species from endangered to threatened and, ultimately, to delist the species (Service 1999). Reclassification to threatened status may be considered when management plans have been approved and implemented on federally-managed lands to provide for conserving, maintaining, and restoring the riparian and upland habitats used by arroyo toads for breeding, foraging, and wintering habitat.

The recovery strategy for the arroyo toad includes the following actions: (1) stabilize and maintain populations throughout the range of the arroyo toad in California by protecting sufficient breeding and nonbreeding habitat; (2) monitor the status of existing populations to ensure recovery actions are successful; (3) identify and secure additional suitable arroyo toad habitat and populations; (4) conduct research to obtain data to guide management efforts and determine the best methods for reducing threats; and (5) develop and implement an outreach program (Service 1999).

In addition, at least 20 self-sustaining metapopulations or subpopulations of arroyo toads must be maintained. Self-sustaining populations or metapopulations are those documented as having successful recruitment (i.e., inclusion of newly matured individuals into the breeding adult cohort in 7 of 10 years of average to above average rainfall amounts with normal rainfall patterns). Self-sustaining populations or metapopulations require little or no direct human assistance such as captive breeding or rearing, or translocation of arroyo toads between sites. These populations must have adequate genetic and phenotypic variation, as described in the recovery plan.

California Red-legged Frog

Legal Status

The California red-legged frog was federally listed as threatened on May 23, 1996 (Service 1996). Revised critical habitat for the California red-legged frog was designated on March 17, 2010 (Service 2010a). The Service issued a recovery plan for the species on May 28, 2002 (Service 2002a).

Natural History

The California red-legged frog uses a variety of habitat types, including various aquatic systems, riparian, and upland habitats. They have been found at elevations ranging from sea level to approximately 5,000 feet. California red-legged frogs use the environment in a variety of ways, and in many cases, they may complete their entire life cycle in a particular area without using other components (i.e., a pond is suitable for each life stage and use of upland habitat or a riparian corridor is not necessary). Populations appear to persist where a mosaic of habitat elements exists, embedded within a matrix of dispersal habitat. Adults are often associated with dense, shrubby riparian or emergent vegetation and areas with deep (greater than 1.6 feet) still or slow-moving water; the largest summer densities of California red-legged frogs are associated with deep-water pools with dense stands of overhanging willows (*Salix* spp.) and an intermixed fringe of cattails (*Typha latifolia*; Hayes and Jennings 1988). Hayes and Tennant (1985) found juveniles to seek prey diurnally and nocturnally, whereas adults were largely nocturnal.

California red-legged frogs breed in aquatic habitats; larvae, juveniles, and adult frogs have been collected from streams, creeks, ponds, marshes, deep pools and backwaters within streams and creeks, dune ponds, lagoons, and estuaries. They frequently breed in artificial impoundments such as stock ponds, given the proper management of hydro-period, pond structure, vegetative cover, and control of exotic predators. While frogs successfully breed in streams and riparian systems, high spring flows and cold temperatures in streams often make these sites risky egg and tadpole environments. An important factor influencing the suitability of aquatic breeding sites is the general lack of introduced aquatic predators. 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.

During periods of wet weather, starting with the first rains of fall, some individual California red-legged frogs may make long-distance overland excursions through upland habitats to reach breeding sites. In Santa Cruz County, Bulger et al. (2003) found marked California red-legged frogs moving up to 1.7 miles through upland habitats, via point-to-point, straight-line migrations without regard to topography, rather than following riparian corridors. Most of these overland movements occurred at night and took up to 2 months. Similarly, in San Luis Obispo County, Rathbun and Schneider (2001) documented the movement of a male California red-legged frog between two ponds that were 1.78 miles apart in less than 32 days; however, most California red-legged frogs in the Bulger et al. (2003) study were non-migrating frogs and always remained

within 426 feet of their aquatic site of residence (half of the frogs always stayed within 82 feet of water). Rathbun et al. (1993) radio-tracked three California red-legged frogs near the coast in San Luis Obispo County at various times between July and January; these frogs also stayed close to water and never strayed more than 85 feet into upland vegetation. Scott (2002) radio-tracked nine California red-legged frogs in East Las Virgenes Creek in Ventura County from January to June 2001, which remained relatively sedentary as well; the longest within-channel movement was 280 feet and the farthest movement away from the stream was 30 feet.

After breeding, California red-legged frogs often disperse from their breeding habitat to forage and seek suitable dry-season habitat. Cover within dry-season aquatic habitat could include boulders, downed trees, and logs; agricultural features such as drains, watering troughs, spring boxes, abandoned sheds, or hay-ricks, and industrial debris. California red-legged frogs use small mammal burrows and moist leaf litter (Rathbun et al. 1993; Jennings and Hayes 1994); incised stream channels with portions narrower and deeper than 18 inches may also provide habitat (Service 1996). This type of dispersal and habitat use, however, is not observed in all California red-legged frogs and is most likely dependent on the year-to-year variations in climate and habitat suitability and varying requisites per life stage.

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 1994), California red-legged frogs appear to be absent from numerous locations in its historical range where these elements are well represented. 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.

Rangewide Status

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 (Storer 1925; Jennings and Hayes 1985; Shaffer et al. 2004). The California red-legged frog has sustained a 70 percent reduction in its geographic range because of several factors acting singly or in combination (Davidson et al. 2001).

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 (*Ictalurus* spp.), bass (*Micropterus* spp.), mosquito fish (*Gambusia affinis*), red swamp crayfish (*Procambarus clarkii*), and signal crayfish (*Pacifastacus leniusculus*). Chytrid fungus is a waterborne fungus that can decimate amphibian populations, and is considered a threat to California red-legged frog populations.

A 5-year review of the status of the California red-legged frog was initiated in May 2011, but has not yet been completed.

Critical Habitat

The Service first designated critical habitat for the California red-legged frog on March 13, 2001 (Service 2001). We revised the designation in a final rule published on March 17, 2010 (Service 2010a). The final rule describes 48 separate units, encompassing approximately 1,636,609 acres, in 27 counties in California. The designation includes lands supporting those features necessary for the conservation of the California red-legged frog. In addition, the Service finalized a special rule pursuant to section 4(d) of the Act, associated with final listing of the California red-legged frog as threatened, for existing routine ranching activities (Service 2006a). A detailed discussion of the history and methods used in developing critical habitat can be found in the final rule (Service 2010a).

In accordance with section 3(5)(A)(i) of the Act and Federal regulations at 50 CFR 424.12, in determining which areas to designate as critical habitat, we identified the PBFs essential to the conservation of the species which may require special management considerations or protection. Because not all life history functions require all the PBFs, not all areas designated as critical habitat will contain all of the PBFs. Based on our current knowledge of the life history, biology, and ecology of the California red-legged frog, we determined the California red-legged frog's PBFs to consist of: (1) aquatic breeding habitat; (2) aquatic non-breeding habitat; (3) upland habitat, and (4) dispersal habitat. Detailed descriptions of these PBFs can be found in the final rule (Service 2010a). The following is a brief summary of the PBFs:

Aquatic breeding habitat consists of standing bodies of fresh water (with salinities less than 4.5 parts per thousand), including natural and manmade (stock) ponds, slow moving streams or pools within streams and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.

Aquatic non-breeding habitat consists of the freshwater habitats as described for aquatic breeding habitat but which may or may not hold water long enough for the species to complete the aquatic portion of its lifecycle but which provide for shelter, foraging, predator avoidance, and aquatic dispersal habitat of juvenile and adult California red-legged frogs.

Upland habitat consists of upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat up to a distance of one mile in most cases (i.e., depending on surrounding landscape and dispersal barriers), including various vegetation types such as grassland, woodland, forest, wetland, or riparian areas that provide shelter, forage, and predator

avoidance for California red-legged frogs. Upland habitat should contain structural features such as boulders, rocks and organic debris (e.g., downed trees, logs), small mammal burrows, or moist leaf litter.

Dispersal habitat consists of accessible upland or riparian habitat within and between occupied or previously occupied sites that are located within 1 mile of each other, and that support movement between such sites. Dispersal habitat includes various natural habitats, and altered habitats such as agricultural fields that do not contain barriers (e.g., heavily traveled roads without bridges or culverts) to dispersal. Dispersal habitat does not include moderate- to high-density urban or industrial developments with large expanses of asphalt or concrete, nor does it include large lakes or reservoirs over 50 acres in size, or other areas that do not contain those features identified in PBFs 1, 2, or 3 as essential to the conservation of the species.

Recovery

The 2002 final recovery plan for the California red-legged frog (Service 2002a) states that the goal of recovery efforts is to reduce threats and improve the population status of the California red-legged frog sufficiently to warrant delisting. The recovery plan describes a strategy for delisting, which includes: (1) protecting known populations and reestablishing historical populations; (2) protecting suitable habitat, corridors, and core areas; (3) developing and implementing management plans for preserved habitat, occupied watersheds, and core areas; (4) developing land use guidelines; (5) gathering biological and ecological data necessary for conservation of the species; (6) monitoring existing populations and conducting surveys for new populations; and (7) establishing an outreach program. The California red-legged frog will be considered for delisting when:

Suitable habitats 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).

Existing populations throughout the range are stable (i.e., reproductive rates allow for long-term viability without human intervention). Population status will be documented through establishment and implementation of a scientifically acceptable population monitoring program for at least a 15-year period, which is approximately 4 to 5 generations of the California red-legged frog. This 15-year period should coincide with an average precipitation cycle.

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).

The species is successfully reestablished in portions of its historical range such that at least one reestablished population is stable/increasing at each core area where California red-legged frog are currently absent.

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

The recovery plan identifies eight recovery units based on the assumption that various regional areas of the species' range are essential to its survival and recovery. The recovery status of the California red-legged frog is considered within the smaller scale of recovery units as opposed to the overall range. These recovery units correspond to 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 support 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.

California Tiger Salamander - Central California DPS and Santa Barbara DPS

Legal Status

The Service recognizes three DPSs of the California tiger salamander: the Sonoma County DPS, the Santa Barbara County DPS, and the Central DPS. On September 21, 2000, the Service emergency listed the Santa Barbara County DPS of the California tiger salamander as endangered (Service 2000a). On March 19, 2003, the Service listed the Sonoma County distinct population segment of the California tiger salamander as endangered (Service 2003a). On August 4, 2004, the Service published a final rule listing the California tiger salamander as threatened range-wide, including the previously identified Sonoma and Santa Barbara distinct population segments (Service 2004a). This rule was subsequently vacated by a judicial decision on August 19, 2005, and the Sonoma and Santa Barbara County DPS was reinstated and returned to endangered status. The central California population is listed as threatened. The distribution of breeding locations of the three DPSs, don't naturally overlap (Loredo et al. 1996, Petranka 1998, Stebbins 2003).

In 2004, the Service designated critical habitat for the Santa Barbara County DPS of the California tiger salamander, consisting of six units totaling 7,491 acres (Service 2004b). In 2005, the Service designated critical habitat for the central DPS of the California tiger salamander, consisting of approximately 199,109 acres located within four geographic regions within California (Service 2005b).

Natural History

The California tiger salamander is a large and stocky terrestrial salamander with small eyes and a broad, rounded snout. Adults may reach a total length of 8.2 inches, with males generally averaging about 8 inches total length, and females averaging about 6.8 inches in total length. For both sexes, the average snout-to-vent length is approximately 3.6 inches (Service 2000a). The small eyes have black irises and protrude from the head. Coloration consists of white or pale yellow spots or bars on a black background on the back and sides. The belly varies from almost uniform white or pale 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), larger tails, and larger overall size (Loredo and Van Vuren 1996).

Historically, California tiger salamanders inhabited low-elevation (generally under 1,500 feet) seasonal ponds and associated 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 (Shaffer et al. 1993, Sweet 1993).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), are typically used by California tiger salamanders for breeding. However, with the conversion and loss of many vernal pools through farmland conversion and urban and suburban development, ephemeral and permanent ponds that have been created for livestock watering are now frequently used by the species (Fisher and Shaffer 1996).

California tiger salamanders spend the majority of their lives in upland habitats and cannot persist without them (Trenham and Shaffer 2005). The upland component of California tiger salamander habitat typically consists of grassland savannah, but includes grasslands with scattered oak trees, and scrub or chaparral habitats (Shaffer et al. 1993, Service 2000a). Juvenile and adult California tiger salamanders spend the dry summer and fall months of the year in the burrows of small mammals, such as California ground squirrels (*Otospermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*; Storer 1925, Loredo and Van Vuren 1996, Trenham 1998). Burrow habitat created by ground squirrels and utilized by California tiger salamanders suggests a commensal relationship between the two species (Loredo et al. 1996). Movement of California tiger salamanders within and among burrow systems continues for at least several months after juveniles and adults leave the ponds (Trenham 2001). Active ground-burrowing rodent populations are likely required to sustain California tiger salamanders because inactive burrow systems become progressively unsuitable over time (Service 2004b). Loredo et al. (1996) found that California ground squirrel burrow systems collapsed within 18 months following abandonment by, or loss of, the mammals.

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. 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, 2011). None of these studies were conducted within the range of the Santa Barbara County 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, studies show that adults can move 1.2 miles to more than 1.4 miles from breeding ponds (Service 2000a, Trenham et al. 2001, Orloff 2011). Estimates differ on the proportion of a population likely to move large distances, with studies finding that 95 percent of a population occurs within 2,034 feet (Trenham and Shaffer 2005) and 1.1 miles (Search and Shaffer 2008, 2011, Searcy et al. 2013) of a breeding pond.

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. Work is currently being conducted by the University of California, Los Angeles to determine the genetic distinctness across metapopulations in Santa Barbara County. Initial results show the northern two metapopulations (West Santa Maria and East Santa Maria) are more genetically similar than the four southern metapopulations (West Los Alamos, East Los Alamos, Purisima Hills, and Santa Rita Valley; Toffelmier and Shaffer 2017).

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). In ponds with little or no vegetation, females may attach eggs to objects, such as rocks and boards on the bottom (Jennings and Hayes 1994). In drought years, the seasonal pools may not form and the adults may not breed (Barry and Shaffer 1994). 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. Generally, 10 weeks is required to allow sufficient time to metamorphose. The larval developmental period can be prolonged in colder weather, commonly in excess of 4 months (Trenham et al. 2000). After the larval developmental period, they emerge as terrestrial metamorphic salamanders, between approximately May and August (Trenham et al. 2000).

Metamorphosed juveniles leave the breeding sites in the late spring or early summer. Like the adults, juveniles may emerge from these retreats to feed during nights of high relative humidity (Storer 1925, Shaffer et al. 1993) before settling in their selected upland sites for the dry, hot summer months. While most California tiger salamanders rely on rodent burrows for shelter, some individuals may utilize soil crevices as temporary shelter during upland migrations (Loredo et al. 1996). Mortality of juveniles during their first summer exceeds 50 percent (Trenham 1998). Emergence from upland habitat in hot, dry weather occasionally results in mass mortality of juveniles (Holland et al. 1990). Juvenile dispersal is more common than adult dispersal (Trenham et al. 2001). Dispersing juveniles move from natal sites to future breeding sites that are not the pond of birth and not part of the local population.

Rangewide Status

Central California DPS
The range of the Central California tiger salamander has been classified into four recovery units (Service 2017). These recovery units are not regulatory in nature; the boundaries of the recovery units do not identify individual properties that require protection, but they are described solely to facilitate recovery and management decisions. The recovery units represent both the potential extent of Central California tiger salamander habitat within the species' range and the biologically (genetically) distinct areas where recovery actions should take place that will eliminate or ameliorate threats. All recovery units must be recovered to achieve recovery of the DPS.

The central California tiger salamander is endemic to the grassland community found in California's Central Valley, the surrounding foothills, and coastal valleys (Fisher and Shaffer 1996). We do not have data regarding the absolute number of California tiger salamanders due to the fact that they spend most of their lives underground. Virtually nothing is known concerning the historical abundance of the species. At one study site in Monterey County, Trenham *et al*. (2000) found the number of breeding adults visiting a pond varied from 57 to 244 individuals. A Contra Costa County breeding site approximately 124 miles north of the Trenham *et al*. (2000) study site in Monterey County showed a similar pattern of variation, suggesting that such fluctuations are typical (Loredo and Van Vuren 1996). At the local landscape level, nearby breeding ponds can vary by at least an order of magnitude in the number of individuals visiting a pond, and these differences appear to be stable across years (Trenham *et al*. 2001).

Santa Barbara DPS
The Santa Barbara County DPS of the California tiger salamander is restricted to northern Santa Barbara County in southern California. This population constitutes the southernmost range of the species (Service 2000a). At the time of publication of the emergency listing rule in January 2000, the Santa Barbara County California tiger salamander was known from 14 ponds. 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 due to restricted access. 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). Each metapopulation areas encompasses both currently occupied, and potentially occupied suitable habitat for each metapopulation. Critical habitat for the Santa Barbara County California tiger salamander has been designated within portions of each of the six metapopulations (Service 2004b).

Currently, there are approximately 60 known extant California tiger salamander breeding ponds in Santa Barbara County (Service 2009) distributed across the six metapopulations. Since listing, Service and the CDFW developed guidance for protocol survey efforts (Service and CDFW 2003), and this guidance has 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.

The California tiger salamander is threatened primarily by the destruction, degradation, and fragmentation of upland and aquatic habitats, primarily resulting from the conversion of these habitats by urban, commercial, and intensive agricultural activities (Service 2016a). Additional threats to the species include hybridization with introduced nonnative barred tiger salamanders (*A. tigrinum mavortium*; Service 2016a), destructive rodent-control techniques (e.g., deep-ripping of burrow areas, use of fumigants; Service 2016a), reduced survival due to the presence of mosquitofish (*Gambusia affinis*; Leyse and Lawlor 2000), and mortality on roads due to vehicles (Service 2000a). Disease, particularly chytridiomycosis and ranaviruses, and the spread of disease by nonnative amphibians, are discussed in the listing rule as an additional threat to the species (Service 2004a).

Lifetime reproductive success for California tiger salamanders is typically low. Less than 50 percent breed more than once (Trenham et al. 2000). In part, this is due to the extended length of time it takes for California tiger salamanders to reach sexual maturity; most do not breed until 4 or 5 years of age. Combined with low survivorship of metamorphs (e.g. in some populations, less than 5 percent of marked juveniles survive to become breeding adults; Trenham 1998), low reproductive success limits California tiger salamander populations. Because of this low recruitment, isolated subpopulations can decline greatly from unusual, randomly occurring natural events as well as from human-caused factors that reduce breeding success and individual survival. Based on metapopulation theory (Hanski and Gilpin 1991), factors that repeatedly lower breeding success in isolated ponds that are too far from other ponds for dispersing individuals to replenish the population further threaten the survival of a local population.

Critical Habitat

Central DPS
On August 23, 2005, the Service designated a total of 199,191 acres of critical habitat in 31 critical habitat units nested within four geographic regions for the Central population of California tiger salamander (Service 2005b). Per the final critical habitat designation, the physical or biological features within the defined area that are essential to the conservation of the species include:

1) Standing bodies of fresh water (including natural and manmade (*e.g.*, stock)) ponds, vernal pools, and other ephemeral or permanent water bodies which typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall.

2) Upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground habitat that CTS depend upon for food, shelter, and protection from the elements and predation; and

3) Accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

Santa Barbara DPS
On November 24, 2004, the Service designated critical habitat for the Santa Barbara County population of California tiger salamander in six disparate areas of Santa Barbara County (Service 2004b). The locations of these areas are not directly analogous to the locations of the six metapopulations described above.

A total of 11,180 acres in six separate units are designated as critical habitat for the California tiger salamander in Santa Barbara County. Per the final critical habitat designation, the PBFs within the defined area that are essential to the conservation of the species include:

1) Standing bodies of fresh water, including natural and man-made (e.g., stock) ponds, vernal pools, and dune ponds, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a sufficient length of time (i.e., 12 weeks) necessary for the species to complete the aquatic portion of its life cycle;

2) Barrier-free uplands adjacent to breeding ponds that contain small mammal burrows. Small mammals are essential in creating the underground habitat that adult California tiger salamanders depend upon for food, shelter, and protection from the elements and predation; and

3) Upland areas between breeding locations (PBF 1) and areas with small mammal burrows (PBF 2) that allow for dispersal among such sites.

Recovery

Central DPS
The strategy of the Recovery Plan for the central DPS of the California Tiger Salamander (Service 2017) focuses on alleviating the threat of habitat loss and fragmentation in order to increase population resiliency (ensure each population is sufficiently large to withstand stochastic events), redundancy (ensure a sufficient number of populations to provide a margin of safety for the species to withstand catastrophic events), and representation (conserve the breadth of the genetic makeup of the species to conserve its adaptive capabilities). 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 and intensive agricultural land uses. Appropriate management of these areas will also reduce mortality by addressing non-habitat related threats, including those from non-native and hybrid tiger salamanders, other non-native species, contaminants, disease, and road mortality. Research and monitoring should be undertaken to determine the extent of known threats, identify new threats, and reduce threats to the extent possible.

The recovery strategy is intended to establish healthy, self-sustaining populations of Central California tiger salamanders through the protection and management of upland and aquatic breeding habitat, as well as the restoration of aquatic breeding habitat where necessary. It also

ensures habitat management and monitoring and the conducting of research. Due to shifting conditions in the ecosystem (e.g., invasive species, unforeseen disease, climate change, and effects from future development and conversion to agriculture), the Service anticipates the need to adapt actions that implement this strategy over time. The recovery strategy ensures that the genetic diversity of the Central California tiger salamander is preserved throughout the DPS to allow adaptation to local environments, maintenance of evolutionary potential for adaptation to future stresses, and reduction in the potential for genetic drift and inbreeding to result in inbreeding depression.

The recovery plan (Service 2017) addresses specific delisting criteria for the DPS and lists the following objectives for recovery of the species:

1. Permanently protect the habitat of self-sustaining populations of Central California tiger salamander throughout the full range of the DPS, ensuring conservation of native genetic variability and diverse habitat types (e.g., high and low elevation sites and areas with higher and lower rainfall);
2. Ameliorate or eliminate the current threats to the species; and
3. Restore and conserve a healthy ecosystem supportive of Central California tiger salamander populations.

Santa Barbara DPS
The goal of the recovery plan for the Santa Barbara County DPS of California tiger salamander (Service 2016a) is to reduce the threats to the population to ensure its long-term viability in the wild, and allow for its removal from the list of threatened and endangered species. The interim goal is to recover the population to the point that it can be downlisted from endangered to threatened status.

Downlisting may be warranted when the recovery criteria below have been met in a sufficient number of metapopulation areas such that the Santa Barbara County DPS of the California tiger salamander exhibits increased resiliency and redundancy to prevent endangerment in the foreseeable future.

Delisting may be warranted when the following recovery criteria have been met in a sufficient number of metapopulation areas to support long-term viability of the Santa Barbara DPS of the California tiger salamander:

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; and
7. The effects of vehicle-strike mortality have been minimized to a level that does not threaten viability and protects connectivity within metapopulations, including providing means for effective migration and dispersal in a roadway-impacted landscape.

The overall objectives of the recovery plan are to: (1) protect and manage sufficient habitat within the metapopulation areas to support long-term viability of the Santa Barbara County Distinct Population Segment of the California tiger salamander; and (2) reduce or remove other threats to the Santa Barbara County Distinct Population Segment of the California tiger salamander.

Conservancy Fairy Shrimp

Legal Status

The Conservancy fairy shrimp was listed as endangered in 1994 (Service 1994b) and critical habitat was designated in 2005 (Service 2005c). A five-year review was published in June 2012. The conservancy fairy shrimp remains listed as endangered.

Natural History

Conservancy fairy shrimp are tiny freshwater crustaceans with delicate elongate bodies, large stalked compound eyes, and 11 pairs of phyllopods (swimming legs that also function as gills). Conservancy fairy shrimp do not have a hard shell, a characteristic of the order *Anostraca* to which they belong. This species can be differentiated from other branchinectids by the flattened portions of its antennae. Conservancy fairy shrimp are endemic to vernal pools, and have adapted to this ephemeral environment. Conservancy fairy shrimp hatch out of tiny cysts within the soil during the first winter rains, and complete their entire life cycle by early summer. This species is restricted to the Central Valley of California, except for one population in the Central Coast in Ventura County. The majority of sites inhabited by this animal are relatively large and turbid vernal pools called playa pools (Helm 1998, Eriksen and Belk 1999, Vollmar 2002, Service 2005c). Playa pools typically remain inundated much longer than most vernal pools, often well into the summer, even though they normally have maximum depths comparable to vernal pools (Vollmar 2002). For more detailed information regarding this species' biology and life history, see the Recovery Plan (Service 2005d).

Rangewide Status

The California Natural Diversity Data Base (CNDDB) (2018) lists 43 occurrences for the Conservancy fairy shrimp. Conservancy fairy shrimp are rare, and at the time of listing, six

widely separated populations (i.e., clusters of localities) of this species were known (Service 1994b). The status of one of these six populations is unknown. This particular population was described as being located “south of Chico, Tehama County”. Tehama County is actually north of Chico, and the Service is not aware of its current status. Extensive surveys for fairy shrimp throughout the range of Conservancy fairy shrimp have located five additional populations since the species was listed in 1994. Currently, the Service is aware of 10 populations of Conservancy fairy shrimp, which include (from north to south): (1) Vina Plains, Butte and Tehama counties; (2) Sacramento National Wildlife Refuge (NWR), Glenn County; (3) Mariner Ranch, Placer County; (4) Yolo Bypass Wildlife Area, Yolo County; (5) Jepson Prairie, Solano County; (6) Mapes Ranch, Stanislaus County; (7) University of California (U.C.) Merced area, Merced County; (8) the Highway 165 area, Merced County; (9) Sandy Mush Road, Merced County; and (10) Los Padres National Forest, Ventura County (Service 2012) 5 year review.

Habitat loss and fragmentation is the greatest threat to the survival and recovery of vernal pool species. Habitat loss and fragmentation generally is a result of urbanization, agricultural conversion, and mining. Habitat loss occurs in the form of habitat alteration and degradation resulting from changes to natural hydrology; invasive species; incompatible grazing regimes, including insufficient grazing for prolonged periods; infrastructure projects such as roads, water storage and conveyance and utilities; recreational activities such as off-highway vehicles and hiking; erosion; and contamination. This habitat loss and fragmentation contributes to the isolation, fragmentation and functionality of vernal pool habitats. Direct loss of habitat generally represents irreversible damage to vernal pools; it disrupts the physical processes conducive to functional vernal pool ecosystems. The more severe the alteration and destruction, the more difficult it is to recover such areas in the future due to disruption of soil formations, hydrology, seed banks, and other components of a functional vernal pool ecosystem.

Even in areas where habitat is protected, the urbanization of surrounding lands can reduce the suitability of protected habitats, and hinders the dispersal of the Conservancy fairy shrimp within and between populations, as well as causing increased edge effects to pool complexes. Acquisition of land and conservation easements has resulted in the preservation of vernal pool habitat for the species, but the trend of vernal pool habitat loss in the state has continued. Remnant habitat that has been protected in small parcels is often subject to changed hydrological conditions, invasion by nonnative plants and other species, increased vegetation growth, and other conditions (such as inappropriate grazing levels) that serve to make habitat less suitable for the shrimp (Service 2012).

Climate change is expected to have an effect on vernal pool hydrology through changes in the amount and timing of precipitation inputs to vernal pools and the rate of loss through evaporation and evapotranspiration (Pyke 2004). These changes in hydrology will likely affect fairy shrimp species because they are obligate aquatic organisms with life histories dependent on certain hydrologic conditions (Pyke 2005). The suitability of vernal pools for fairy shrimp depends in large part on the timing and duration of wetland inundation, as these species are dependent on vernal pools that have sufficient water to remain wet throughout the annual reproductive phase of the species.

Critical Habitat

The PBFs of critical habitat for the vernal pool crustaceans (including vernal pool fairy shrimp) are the habitat components that provide:

1. topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools, and providing for dispersal and promoting hydroperiods of adequate length in the pools;
2. depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days for vernal pool fairy shrimp and 19 days for Conservancy fairy shrimp in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands;
3. sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding; and
4. structure within the pools consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

161,786 acres within six critical habitat units for the Conservancy fairy shrimp are designated in Butte, Colusa, Mariposa, Merced, Solano, Stanislaus, Tehama, and Ventura Counties, California.

Recovery

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005d) identifies eight core recovery areas found within five vernal pool regions for the Conservancy fairy shrimp: Vina Plains (Northeast Sacramento Region), Caswell and Grasslands Ecological Area (San Joaquin Region), Ventura County (Santa Barbara Region), Jepson Prairie, Sacramento National Wildlife Refuge and Collinsville (Solano-Colusa Region), and Madera (Southern Sierra Foothills Region).

General recovery criteria for Conservancy fairy shrimp and 19 other listed plants and animals are described in the Recovery Plan (Service 2005d). This Recovery Plan uses an ecosystem-level approach because many of the listed species and species of concern co-occur in the same natural ecosystem and share the same threats. The over-arching recovery strategy for Conservancy fairy shrimp is habitat protection and management. The five key elements that comprise this ecosystem-level recovery and conservation strategy are: (1) habitat protection; (2) adaptive

management, restoration, and monitoring; (3) status surveys; (4) research; and (5) participation and outreach.

The Recovery Plan identifies specific percentages of suitable habitat to be protected in each of the nine core areas. Core areas are ranked as zone 1, 2, or 3 in order of their overall priority for recovery. Core areas containing Conservancy fairy shrimp are included as both zones 1 and 2 in the Recovery Plan, with no core areas ranked as zone 3 (zone 3 represents currently unoccupied, historical habitat, which has not been identified for this species). To downlist the Conservancy fairy shrimp, the Recovery Plan recommends that 95 percent of the suitable species habitat in each of the zone 1 and zone 2 core areas (i.e., 95 percent of the suitable habitat in the Vina Plains core area, 95 percent of the suitable habitat in the Caswell area, etc.) be protected. This criterion has not been met. To delist the species, in addition to achieving the downlisting criteria, any newly discovered populations should be protected. This recovery criterion has been partially met, as the populations discovered since listing have been or will be protected. The Service does not yet have sufficient information to quantify either the acreage of suitable habitat within each core area or the acreage of protected habitat that is suitable for Conservancy fairy shrimp. The amount of suitable habitat that exists range wide has not yet been estimated; therefore, the percent that has been protected range wide is still unknown (Service 2012).

Vernal Pool Fairy Shrimp

Legal Status

The Service listed the vernal pool fairy shrimp as threatened on September 19, 1994 (Service 1994b) and designated critical habitat for the species on August 6, 2003 (Service 2003d). A recovery plan for vernal pool ecosystems of California and southern Oregon also addresses this species (Service 2005d); however, the populations in coastal San Luis Obispo County were not well known at the time the recovery plan was completed. The Service published the most recent 5-year review in 2007 (Service 2007c).

Natural History

This small crustacean ranges in size from 11 to 25 millimeters long and feeds on algae, bacteria, and protozoa. Like other fairy shrimp that live in vernal pools, this species survives the annual drying of vernal pools by reproducing with eggs (commonly called cysts) that can withstand heat, cold, and desiccation until the vernal pool refills once again. Vernal pool fairy shrimp require water temperatures of 50 degrees Fahrenheit or lower to hatch (Helm 1998; Eriksen and Belk 1999). The time to maturity and reproduction is temperature dependent, varying between 18 days and 147 days, with a mean of 39.7 days (Helm 1998). Immature and adult shrimp are known to die off when water temperatures rise to approximately 75 degrees Fahrenheit (Helm 1998). The vernal pool fairy shrimp is endemic to California where it exists only in ephemeral freshwater habitats, including alkaline pools, clay flats, vernal lakes, vernal pools, vernal swales, and other seasonal wetlands in California (Helm 1998). The vernal pool fairy shrimp sometimes,

but not often, co-occurs with other types of fairy shrimp, including the Conservancy fairy shrimp and Riverside fairy shrimp (Service 2005d)

The vernal pool fairy shrimp is a small freshwater crustacean in the family *Branchinectidae* of the order *Anostraca*. Adults range in size from 0.4 to 1.0 inches. Habitat for vernal pool fairy shrimp consists of vernal pools and other depressional features that pond for a period of time sufficient to complete their life cycle. Under optimal conditions this can be as little as 18 days; however, 41 days is more typical of usual seasonal conditions (Helm 1998, Eriksen and Belk 1999). The species often occurs in habitat that exhibits an unpredictable and short-lived inundation pattern and includes vernal pools and vernal pool-like depressions, depressions in sandstone rock outcrops, earth slumps, and grassy swales and depression basins. Upland vegetation communities associated with vernal pool fairy shrimp habitat include native and non-native grassland, alkaline grassland, alkaline scrub, and coastal sage scrub.

Vernal pool fairy shrimp are non-selective filter-feeders that filter suspended solids from the water column. They may filter and ingest detritus, bacteria, algal cells, and other items between 0.3 to 100 microns. This species rarely co-occurs with other fairy shrimp species but when they do, they are not usually the numerically dominant species (Eng et al. 1990, Eriksen and Belk 1999). All species of fairy shrimp provide a food source for a wide variety of wildlife, including beetles, insect larvae, frogs, salamanders, shorebirds, ducks, and even other fairy shrimp. Vernal pool fairy shrimp have a two-stage life cycle with the majority of their life cycle spent in a shelled embryo known as a cyst (or resting egg). It is unknown how many cysts a female can produce per clutch or over their lifetime. Cysts are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks (Eriksen and Belk 1999). Fairy shrimp cysts are capable of withstanding heat, cold, and prolonged desiccation. While it is generally acknowledged that these cysts are able to live for a long time, there is very little information on just how long this might be (Belk 1998). We do know that they persist in the soil until conditions are favorable for successful hatching (Eng et al. 1990, Eriksen and Belk 1999). The cysts hatch when the vernal pools/seasonal depressional features fill with rainwater. Not all of the cysts in a feature hatch in a season, thus providing a mechanism for survival if the inundation period is too short in a given year. Vernal pool fairy shrimp may also undergo multiple hatches in a single feature during one wet season, if conditions are appropriate (Helm 1998, Gallagher 1996). Vernal pool fairy shrimp can mature quickly, allowing it to persist in short-lived shallow pools; however, the species also persists later into the spring when pool inundation persists. Resting eggs and adults disperse between suitable habitats passively by adhesion to waterfowl, migratory birds, cattle, and other wildlife and domestic animals (Eriksen and Belk 1999), as well as through the movement of water between suitable habitats or by resting egg adhesion to wind-blown dust.

Although vernal pool fairy shrimp are more widely distributed than most other fairy shrimp species, the species is generally uncommon throughout its range and rarely abundant where it is found (Eng et al. 1990, Eriksen and Belk 1999). The species currently occurs predominantly in a variety of vernal pool and ephemerally ponded habitats in the Central Valley and Coast Range of California, with a limited number of sites in the Transverse Range and on the Santa Rosa Plateau and in Hemet, Riverside County. There is also one disjunct occurrence in Jackson County,

southern Oregon. Elevations at which the species is typically found range from 33feet to 4,000 feet above mean sea level, although it has been found at 5,600 feet in the Los Padres National Forest (Service 2007c).

Rangewide Status

The CNDDB (2018) lists 766 occurrences for the vernal pool fairy shrimp. In California, the range of the species extends from disjunct locations in Riverside County and the Coast Ranges, north through Central Valley grasslands to Tehama County (Service 2007c). Within vernal pool and other ephemerally ponded habitats on the Central Coast of California (i.e., Monterey, San Luis Obispo, and Santa Barbara counties), vernal pool fairy shrimp are known to occupy at least 55 features on Fort Hunter Liggett, at least 46 features at Camp Roberts, in the vicinity of Soda Lake in the Carrizo Plain National Monument, several areas in the vicinity of Paso Robles, at least two sites in the Los Padres National Forest, in an estimated 60 features at the Chevron Tank Farm in San Luis Obispo, at least two vernal pools at the Santa Maria Airport, and in at least 12 complexes on Vandenberg Air Force Base (Service 2007c). A number of these sites were discovered after the publication of the final listing and critical habitat rules and 2005 recovery plan.

Maintaining the integrity of surrounding upland habitat is essential to the proper ecological function of vernal pool fairy shrimp habitat. Habitat loss and fragmentation represent the largest threats to the survival and recovery of vernal pool fairy shrimp and other species restricted to vernal pools and other ephemerally ponded habitats. Approximately 75 percent of historical vernal pool fairy shrimp habitat had been lost in the Central Valley by 1997 (Holland 1998), with additional habitat lost in the Central Coast mountain ranges (Holland 2003). Continuing annual habitat loss is estimated to be between 2 and 12 percent, depending on the region (Holland 2003). Habitat loss is generally a result of urbanization, agricultural conversion, and mining; although loss also occurs in the form of habitat alteration and degradation as a result of changes to natural hydrology, competition from invasive species, incompatible grazing regimes (including overgrazing), energy development, infrastructure projects (e.g., roads, water storage and conveyance, utilities), recreational activities (e.g., off-highway vehicles, hiking), erosion, mosquito abatement activities, climatic and environmental change, and contamination (Service 2007c).

The Service's 5-year review (Service 2007c) reported that delisting criteria 1 (reintroduction and protection of habitat) and 2 (habitat management and monitoring) have been partially met, including at least 13,000 acres of habitat protected; however, most recovery criteria have not been met. The Service does not have information indicating population or abundance trends for vernal pool fairy shrimp. Surveys for the species have increased the number of known occurrences including occurrences in San Luis Obispo and Santa Barbara Counties; however, concurrent habitat loss and fragmentation has occurred around some known populations. The 5-year review documents extensive habitat loss, including more than 50,000 acres impacted between 1994 and 2005 as a result of human population expansion and conversion of vernal pool habitat to agriculture. The 5-year review also discusses future habitat loss from anticipated

development around quickly growing urban areas. The indirect effects of development (e.g., pesticides, altered hydrology) on remaining habitat increasingly compound the effects of habitat loss on the species. The status review acknowledges that the threats to the species have not decreased since listing and recommends that the Service maintain the species' threatened status (Service 2007c).

Critical Habitat

The Service designated critical habitat collectively for four vernal pool crustaceans and 11 vernal pool plants in 34 counties in California and one county in southern Oregon on August 6, 2003 (Service 2003d) and a revised designation of critical habitat of approximately 858,846 acres was published on August 11, 2005 (Service 2005c). Both vernal pool fairy shrimp and Conservancy fairy shrimp are included in this designation (refer to the Conservancy shrimp Critical Habitat section above for PBFs).

On February 10, 2006, the Service published a final rule providing species-specific unit descriptions and maps identifying the critical habitat for each individual species. The rule identified 597,821 acres within 32 units for the vernal pool fairy shrimp.

Recovery

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon addressed 33 species, including the vernal pool fairy shrimp (Service 2005c). The goal of the recovery plan is to achieve and protect in perpetuity self-sustaining populations of vernal pool fairy shrimp throughout the species' range and delist the species. The decline of the vernal pool fairy shrimp is attributed primarily to habitat loss and fragmentation resulting from development and agricultural expansion, although invasive species and aquatic contaminants also have contributed to the species' decline. A primary component of the species' recovery is protecting vernal pool habitat in conservation areas and reserves.

The recovery plan specifies that the vernal pool fairy shrimp may be considered for delisting when:

1. at least 80 percent of occurrences and 85 percent of suitable habitat have been protected;
2. the species has been reintroduced to vernal pool regions and soil types where surveys indicate the species has been extirpated;
3. appropriate long-term management and monitoring is secured;
4. status surveys show that populations are stable or increasing and threats have been reduced or eliminated;
5. research has been conducted on genetic structure, population viability, and additional recovery actions; and
6. recovery teams and working groups are established to oversee recovery efforts and conduct outreach and incentive programs to develop partnerships.

Tidewater Goby

Legal Status

The Service listed the tidewater goby as endangered on March 7, 1994 (Service 1994d) and designated critical habitat for the tidewater goby on February 6, 2013 (Service 2013b). We published a recovery plan for the tidewater goby on December 12, 2005 (Service 2005f) and a 5-Year Review in September 2007 (Service 2007b). The Service published a proposed rule to downlist the tidewater goby on March 13, 2014 (Service 2014a). During the public comment period, the Service received substantial comments regarding the proposed change in species status, and the tidewater goby remains listed as endangered.

Natural History

The tidewater goby is endemic to California and is one of the only species of fish to live exclusively in brackish water coastal lagoons, estuaries, and marshes in California (Swift et al. 1989, Moyle 2002). Tidewater goby habitat is characterized by fairly still, but not stagnant, brackish water. They can withstand a wide range of habitat conditions and have been documented in waters with salinity levels that range from 0 to 42 parts per thousand, temperatures ranging from 46 to 77 degrees Fahrenheit and water depths from 10 to 79 inches (Irwin and Soltz 1984; Swift et al. 1989; Smith 1998). Most tidewater goby collections occurred in water of approximately one-third ocean salinity (i.e., 12 parts per thousand or less; Service 2005e). Tidewater gobies are generally found over substrate that has a high percentage of sand and gravel (Worcester 1992) and are often clumped in areas that have sparse to medium dense cover by aquatic plants or algae (Worcester 1992). Tidewater gobies often migrate upstream and are commonly found up to 0.6 mile up from a lagoon or estuary (Service 2005e), and have been recorded as far as 3 to 5 miles upstream of tidal areas (Irwin and Soltz 1985).

Tidewater gobies feed on small invertebrates, including amphipods, ostracods, snails, mysids, and aquatic insect larvae, particularly *chironomid* larvae (Swift et al. 1989). Predators of tidewater gobies include staghorn sculpin (*Leptocottus armatus*), prickly sculpin (*Cottus asper*), starry flounder (*Platichthys stellatus*), and largemouth bass (*Micropterus salmoides*); native birds and other predatory fish likely also prey on gobies (Swift et al. 1997, Swift et al. 1989).

The tidewater goby is primarily an annual species (Swift et al. 1989), although there is some variation in life history and some individuals have lived up to 3 years in captivity (Swenson 1999). If reproductive output during a single season fails, few (if any) tidewater gobies survive into the next year. Reproduction typically peaks from late April or May to July and can continue into November or December depending on the seasonal temperature and amount of rainfall (Swift et al. 1989, Worcester 1992, Goldberg 1977). Males begin the breeding ritual by digging burrows at least 3 to 4 inches apart in clean, coarse sand of open areas. Unlike most other fish, females court the males (Swift et al. 1989). Once chosen by a male, females will then deposit

eggs into the burrows, averaging 400 eggs per spawning effort (Swift et al. 1989, Swenson 1995). Males remain in the burrows to guard the eggs and fan the eggs to circulate water, frequently foregoing feeding (Moyle 2002).

Within 9 to 11 days after eggs are laid, larvae emerge and are approximately 4 to 6 millimeters in standard length (Swift et al. 1989, Service 2005e). Larval traits (larval duration, size at settlement, and growth rate) are correlated with water temperature, which varies considerably in the seasonally closed estuaries that tidewater gobies inhabit (Spies and Steele 2016). Larval tidewater gobies are pelagic for an average of 21 to 27 days and settle once they grow to approximately 12 to 13 millimeters in standard length (Spies et al. 2014). When they reach this life stage, they become substrate-oriented, spending the majority of time on the bottom rather than in the water column. Both males and females can breed more than once in a season, with a lifetime reproductive potential of 3 to 12 spawning events (Swenson 1999). Vegetation is critical for over-wintering tidewater gobies because it provides refuge from high water flows and tidewater goby densities are greatest among emergent and submerged vegetation (Moyle 2002).

Because they typically live for approximately one year and inhabit a seasonally changing environment, population sizes of tidewater gobies vary greatly spatially and seasonally, with recorded numbers ranging from 0 to 198 individuals per square meter (Swenson 1995). After the spring spawning season, there is typically an annual die-off of adults (Swift et al. 1989, Swenson 1995).

Rangewide Status

Historically, the tidewater goby occurred in at least 150 California coastal lagoons and estuaries, from Tillas Slough near the Oregon/California border south to Agua Hedionda Lagoon in northern San Diego County (Swift et al. 1989). The species is currently known to occur in 103 localities, although the number of sites fluctuates with climatic conditions and the current status is unknown in 12 localities. Currently, the most stable populations are in lagoons and estuaries of intermediate size (5 to 124 acres) that are relatively unaffected by human activities (Service 2005e).

Local populations of tidewater gobies are best characterized as metapopulations (Lafferty et al. 1999a), or “a network of semi-isolated populations with some level of regular or intermittent migration and gene flow among them, in which individual populations may go extinct but can then be recolonized from other populations” (Groom et al. 2006). Therefore, the stability of a metapopulation depends on the connectivity of subpopulations.

Tidewater gobies enter the marine environment when sandbars are breached during storm events. Lafferty et al. demonstrated that tidewater gobies were able to disperse at least 5.6 miles (Lafferty et al. 1999b), and genetic analysis suggests that this species can disperse much further, with genetic assignment tests showing movement of individuals up to approximately 30 miles (Jacobs et al. 2005). The species’ tolerance of high salinities for short periods of time enables it to withstand marine environment conditions of approximately 35 parts per thousand salinity,

thereby allowing the species to re-establish or colonize lagoons and estuaries following flood events (Swift et al. 1997). Genetic studies indicate that the tidewater goby population is highly geographically structured, indicating that there is low geneflow (Dawson et al. 2001, Dawson et al. 2002) and thus natural recolonization events are likely rare. Swift et al. (2016) estimates that the southernmost population of tidewater goby has been separated from other lineages for 2 to 4 million years, and it has been recognized as a distinct species (*Eucyclogobius kristinae*, the southern tidewater goby), but as of now the tidewater goby remains listed under Act as one entity.

Native predators are not known to be important regulators of tidewater goby population size in the lagoons of southern California. Rather, population declines are attributed to environmental conditions. The decline of the tidewater goby is attributed primarily to habitat loss or degradation resulting from urban, agricultural, and industrial development in and around coastal wetlands, lagoons, and estuaries (Irwin and Soltz 1985). High flows naturally and periodically breach lagoon barriers and expose tidewater gobies to tidal conditions, but artificial breaching has been observed to cause tidewater goby stranding and mortality (C. Dellith, U.S. Fish and Wildlife Service, pers. comm. 2018). Artificial breaching, especially during periods of low inflow, not only flushes tidewater gobies out into the ocean but also drains water from the lagoon and thus reduces the size of available habitat for this species; this can also concentrate predators within this reduced lagoon footprint. Some extirpations appear to be related to pollution, upstream water diversions, and the introduction of non-native predatory fish species, most notably centrarchid sunfish (*Lepomis* spp.) and bass (*Micropterus* spp.; Swift et al. 1989). These threats continue to affect some of the remaining populations of tidewater gobies. Climate change and the attendant sea level rise may further reduce suitable habitat for the tidewater goby as lagoons and estuaries are inundated with saltwater (Cayan et al. 2006) and severe storms interacting with increased sea levels may breach lagoons more frequently.

In 2014, the Service issued a 12-month finding proposing to reclassify the tidewater goby as threatened under the Act. During the public comment period, we received substantive comments regarding the proposed change in the species' status and new scientific information has been published regarding the species. The tidewater goby remains listed as endangered and its overall population and range is currently stable, but still faces ongoing and likely increasing threats of urbanization, artificial breaching, stochastic environmental conditions, and introduced predators. The southernmost population of tidewater goby remains critically endangered because this species has become extirpated from 5 of the 13 historical localities, 4 of which cannot be restored.

Critical Habitat

We originally designated critical habitat for the tidewater goby on November 20, 2000 (Service 2000c). In January 2008, we finalized a revised designation of critical habitat (Service 2008). On October 19, 2011, we published another proposed revision to critical habitat (Service 2011b), and on February 6, 2013, we published a final rule designating revised critical habitat for the tidewater goby (Service 2013b).

Under the Act and its implementing regulations, we are required to identify the PBFs essential to the conservation of the tidewater goby in areas occupied at the time of listing. We consider the PBFs that, when present in the appropriate quantity and spatial arrangement to provide for a species' life-history processes, are essential to the conservation of the species. The PBFs specific to the tidewater goby include:

1. Persistent, shallow (in the range of approximately 0.3 to 6.6 feet), still-to-slow-moving water in lagoons, estuaries, and coastal streams with salinity up to 12 parts per thousand, which provide adequate space for normal behavior and individual and population growth that contain one or more of the following:
    a. Substrates (e.g., sand, silt, mud) suitable for the construction of burrows for reproduction;
    b. Submerged and emergent aquatic vegetation, such as *Potamogeton pectinatus*, *Ruppia maritima*, *Typha latifola*, and *Scirpus* spp., that provides protection from predators and high flow events; or
    c. Presence of a sandbar(s) across the mouth of a lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary, thereby providing relatively stable water levels and salinity.

Critical habitat includes areas outside the geographical area occupied at the time of listing that contain suitable aquatic habitat in coastal lagoons or estuaries, provide connectivity between source populations or may provide connectivity in the future, or may be more isolated but represent unique adaptations to local features (habitat variability, hydrology, microclimate). In total, we designated 45 critical habitat units within the geographical area occupied at listing and 20 critical habitat units outside the geographical area occupied at listing that we have determined are essential for the conservation of the species.

Approximately 12,156 acres fall within the boundaries of the 65 critical habitat units designated by the 2013 final revised critical habitat rule. Revised critical habitat for the tidewater goby now occurs in Del Norte, Humboldt, Mendocino, Sonoma, Marin, San Mateo, Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego Counties, California.

Overall, the critical habitat for this species has remained stable but is still threatened by coastal development.

Recovery

The goal of the tidewater goby recovery plan (Service 2005e) is to conserve and recover the tidewater goby throughout its range by managing threats and maintaining viable metapopulations within each recovery unit while retaining morphological and genetic adaptations to regional and local environmental conditions. The decline of the tidewater goby is attributed primarily to habitat loss or degradation resulting from urban, agricultural, and industrial development in and around coastal wetlands. The recovery plan identifies six recovery units: North Coast Unit,

Greater Bay Unit, Central Coast Unit, Conception Unit, Los Angeles/Ventura Unit, and South Coast Unit.

The recovery plan specifies that the tidewater goby may be considered for downlisting when:

1. Specific threats to each metapopulation (e.g., coastal development, upstream diversion, channelization of rivers and streams, etc.) have been addressed through the development and implementation of individual management plans that cumulatively cover the full range of the species; and
2. A metapopulation viability analysis based on scientifically-credible monitoring over a 10-year period indicates that each recovery unit is viable. The target for downlisting is for individual sub-units within each recovery unit to have a 75 percent or better chance of persistence for a minimum of 100 years.

The tidewater goby may be considered for delisting when the downlisting criteria have been met and a metapopulation viability analysis projects that all recovery units are viable and have a 95 percent probability of persistence for 100 years.

Coastal California Gnatcatcher

Legal Status

The Service listed the coastal California gnatcatcher as threatened on March 30, 1993 (Service 1993) and published a final rule designating critical habitat for the coastal California gnatcatcher on October 24, 2000 (Service 2000b). As a result of various lawsuits and court decisions, the Service re-proposed critical habitat on April 24, 2003 (Service 2003b), and the final rule designating critical habitat was published on December 19, 2007 (Service 2007a).

In September 2010, the Service completed a 5-Year Review addressing the status of the coastal California gnatcatcher (Service 2010b). In the 5-Year Review, we found that implementation of large-scale, multi-species, regional Natural Community Conservation Plans/Habitat Conservation Plans (NCCPs/HCPs) has reduced the magnitude of threats associated with urban and agricultural development; however, the threat of habitat type-conversion is increasing due to multiple factors. Because of the increased magnitude of the threat of habitat type conversion, the 5-Year Review recommended no change to the listing status of the species.

On June 11, 2014, we received a petition requesting the coastal California gnatcatcher be delisted. After reviewing the available information, the Service determined the petitioned action was not warranted (Service 2016b) and the coastal California gnatcatcher remains listed as threatened.

Natural History

The coastal California gnatcatcher is endemic to cismontane southern California and northwestern Baja California, Mexico (Atwood 1991). It typically occurs in or near coastal sage scrub, comprising relatively low-growing, dry-season deciduous and succulent plants. Weaver Weaver (1998) defined characteristic plants of these communities to include California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), snapdragon penstemon (*Keckiella antirrhinoides*), sages (*Salvia* spp.), sunflowers (*Encelia* spp.), and cacti (*Opuntia* spp). The coastal California gnatcatcher may also use chaparral, grassland, and riparian plant communities where they occur adjacent to or intermixed with coastal sage scrub, especially during the non-breeding season (Campbell et al. 1998). Potential factors contributing to the coastal California gnatcatcher's use of alternative habitats may include more abundant food resources, higher survival rates during dispersal, fire avoidance, and cooler microclimate during heat stress (Campbell et al. 1998); however, coastal California gnatcatchers are closely tied to sage scrub habitats for reproduction (Atwood 1993).

The coastal California gnatcatcher is primarily insectivorous. Based on fecal sample analysis, its diet consists of small arthropods, especially leaf-hoppers (*Homoptera*) and spiders (*Araneae*), while true bugs (*Hemiptera*) and wasps, bees, and ants (*Hymenoptera*) are minor components (Burger et al. 1999).

Coastal California gnatcatchers are non-migratory and exhibit strong site tenacity (Atwood 1993). Breeding season territories range widely in size, from less than 2.5 acres to 37 acres (Atwood et al. 1998; Preston et al. 1998), with mean territory size generally greater for inland populations than coastal populations (Preston et al. 1998). During the non-breeding season, coastal California gnatcatchers have been observed to wander in adjacent territories and unoccupied habitat increasing their home range size to approximately 78 percent larger than their breeding territory (Preston et al. 1998).

The breeding season of the coastal California gnatcatcher extends from late-February through early August, with the peak of nesting attempts occurring from mid-March through mid-May. Most coastal California gnatcatchers breed their first year of age (Atwood and Bontrager 2001). Nests are constructed over a 4- to 10-day period and are most often placed in California sagebrush about 3 feet above the ground (Atwood 1993). Clutch size averages approximately 4 eggs (Atwood and Bontrager 2001). The egg incubation period is 14 days, and the nestling period is 10 to 15 days (Grishaver et al. 1998). Both sexes participate in all phases of the nesting cycle, and some pairs may produce more than one brood in one nesting season (Atwood and Bontrager 2001).

Juveniles stay within their natal territories 21 to 35 days after fledging from the nest (Grishaver et al. 1998), with juveniles subsequently dispersing to find their own foraging and nesting territories, if available. Juveniles usually disperse less than 6.2 miles from their natal territory (Atwood and Bontrager 2001), but they generally disperse less than 2 miles on average (Bailey

and Mock 1998; Galvin 1998; Atwood and Bontrager 2001). Dispersing coastal California gnatcatchers are apparently able to traverse human-modified landscapes for at least short distances (Bailey and Mock 1998). Juveniles begin to vie for territories as early as late spring, and will have established territories by the end of October (Preston *et al*. 1998).

Similar to other songbirds, mortality of coastal California gnatcatchers is highest for the youngest age class, with much of this attributable to predation of young in nests. Mean average survivorship of coastal California gnatcatchers during their first year is estimated to be 29 percent, with annual survivorship for adults 57 percent, although there is probably a high annual variation within and between populations. The oldest documented individual was a female at least 8 years old (Atwood and Bontrager 2001).

Rangewide Status

The range of the coastal California gnatcatcher extends from southern Ventura and San Bernardino counties, California, south to near El Rosario, Mexico, at about 30 degrees north latitude (Service 2010b). The northern and eastern limits of the coastal scrub vegetation communities used by the coastal California gnatcatcher are bound by mountainous areas, while the southern limit is defined by the transition to the Vizcaíno Desert. Most of the coastal California gnatcatchers in the United States are found in Orange, western Riverside, and San Diego counties. Relatively isolated populations also remain in portions of its former range in Los Angeles, San Bernardino, and southern Ventura counties (Atwood and Bontrager 2001). The current overall range is roughly the same as it was at the time of listing (Service 2010b). While the species' overall distribution has not changed much over time, the amount of suitable habitat within that range has declined which led to the species' listing as threatened in 1993 (Service 1993).

Coastal California gnatcatchers were considered locally common in the mid-1940s, but they had declined substantially in the United States by the 1960s (Atwood and Bontrager 2001). In 1993, the Service estimated that about 2,562 coastal California gnatcatcher pairs remained in the United States, with the highest densities occurring in Orange and San Diego counties (Service 1993). In a study using more rigorous sampling techniques, Winchell and Doherty (2008) found a mean of 1,324 pairs of coastal California gnatcatchers over four sampling periods in an 111,006-acre area on public and quasi-public lands in Orange and San Diego counties. Their sampling frame covered only a portion of the U.S. range, focusing on the coast, and was limited to 1 year. Although it is not valid to extrapolate beyond the sampling area, especially in light of known differences in population densities across the range of the coastal California gnatcatcher (Atwood 1992), we conclude it is likely there are more coastal California gnatcatchers in the U.S. portion of the range than was suggested by earlier estimates. For example, new locations are being recorded in Ventura and Los Angeles counties where the species was thought to be extirpated or only present in very low numbers. We are not aware of any recent estimates of coastal California gnatcatcher populations in Baja California.

The population estimates described above are based on surveys conducted prior to catastrophic fires in San Diego County in 2003 and San Diego and Orange counties in 2007. These fires may have temporarily reduced the overall coastal California gnatcatcher population because of the temporary loss of coastal California gnatcatcher occupied habitat. In the 2007 fires, about 28,173 acres of coastal sage scrub burned in Orange County and about 84,202 acres of coastal sage scrub burned in San Diego County in several separate locations.

The 5-Year Review for coastal California gnatcatcher includes a detailed evaluation of the current threats and conservation needs of the species. The species was listed in 1993 because of habitat loss and fragmentation resulting from urban and agricultural development (Service 1993). The direct loss of habitat reduces the amount of breeding, sheltering, and foraging area available, thereby proportionally reducing the population size and overall reproductive capacity of the species. Habitats that are fragmented have reduced biological integrity due to the increased potential for human-generated disturbance. Directly associated with development is an increase in recreational use of habitats, fire frequency, waste dumping, air pollution, exotic plant and animal species, predators, cowbird parasitism, domestic pets, and night lighting, all of which can have adverse impacts on the quality of habitat for the coastal California gnatcatcher.

Several stressors, including livestock grazing, anthropogenic atmospheric pollutants, and wildfire, promote habitat type conversion within the range of the coastal California gnatcatcher. Wildfire in particular is a major contributor because it promotes a feedback loop. That is, wildfire allows non-native grasses to outcompete re-growing native shrubs, which leads to an increase in non-native grasses, which makes the area more susceptible to wildfire, which allows the process to repeat, but with successively fewer native shrubs with each iteration. The number of wildfires has increased dramatically as urbanization (with its multitude of ignition sources) has come into greater contact with open space areas. Thus, the threat of habitat type conversion has increased throughout the range of the coastal California gnatcatcher since listing (Service 2010b).

Critical Habitat

The Service designated 11 critical habitat units for the coastal California gnatcatcher comprising 197,303 acres of Federal, State, local, and private land in Ventura, Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties (Service 2007a) critical habitat includes areas throughout the species' range in a variety of climatic zones and vegetation types that would preserve the genetic and behavioral diversity that currently exists within the species. The designation includes individual units that contain the physical and biological features essential to the species' conservation, and identifies special management considerations for the species.

The PBFs of designated critical habitat for the coastal California gnatcatcher are those habitat components that are essential to support the primary biological needs of foraging, nesting, rearing of young, intra-specific communication, roosting, dispersal, genetic exchange, or sheltering (Service 2007a). These include:

1. sage scrub habitats that provide space for individual and population growth, normal behavior, breeding, reproduction, nesting, dispersal, and foraging; and
2. non-sage scrub habitats such as chaparral, grassland, and riparian areas, in proximity to sage scrub habitats that provide space for dispersal, foraging, and nesting.

Recovery

The Service has not developed a recovery plan for the coastal California gnatcatcher. The 5-year review (Service 2010b) and the final rule on the petition to delist the species (Service 2016b) both contain information relative to this discussion, so we rely on those documents to assess the coastal California gnatcatcher's current recovery status and needs. The final rule on the delisting petition analyzes a 50-year timeframe with regard to the current threats to the coastal California gnatcatcher (Service 2016b).

Long-term management is required to address the numerous threats posed by the interface between the coastal California gnatcatcher's habitat and the urban interface. Some long-term management actions that will address identified threats include development and implementation of fire management plans, homeowner education programs (for residences adjacent to occupied habitat), predator control, cowbird trapping, routine invasive vegetation removal, limited public access in areas of high quality habitat, and control of irrigation water and other urban runoff adjacent to preserved habitat. Monitoring of the species distribution over time will assist in determining the effectiveness of management actions at reducing threats and will allow for changes in approach in the event that threats have not been adequately reduced.

Development continues throughout the range of the coastal California gnatcatcher. However, the implementation of regional NCCPs/HCPs in southern California has directed growth into certain areas, while establishing habitat preserves consisting of large "core" areas of coastal California gnatcatcher habitat and connecting "linkage" areas. Five regional plans are finalized and once fully implemented should preserve in perpetuity over 182,976 acres of coastal California gnatcatcher habitat (Service 2010b). Preserved habitat will be managed for the benefit of the coastal California gnatcatcher, thereby reducing the magnitude of the threat to the species due to habitat loss. Large Federal landholdings that support coastal California gnatcatcher habitat also contribute to core and linkage areas. These lands include Marine Corps Base Camp Pendleton, Marine Corps Air Station Miramar, Cleveland National Forest, and San Diego National Wildlife Refuge.

Another recovery concern is habitat type conversion. This occurs when native habitat is disturbed (e.g., fire, discing, etc.) that does not result in permanent ground disturbance but allows other plant communities (usually invasive, exotics plants) to convert the habitat into areas unsuitable for occupancy by coastal California gnatcatchers. Type conversion can affect all areas of habitat, even in those areas otherwise considered preserved. Because habitat type conversion is a threat of high magnitude, particularly given the increasing occurrence of wildfire, the 5-year review (Service 2010b) concluded that additional time is needed to evaluate the adequacy of existing management programs for reducing this threat.

Least Bell's Vireo

Legal Status

The least Bell's vireo was listed as endangered by the Service on May 2, 1986 (Service 1986a). The Service designated critical habitat on February 2, 1994, (Service 1994c) and completed a draft recovery plan in March 1998 (Service 1998).

We completed a 5-Year Review of the least Bell's vireo's status in September 2006 (Service 2006b). In the 5-Year Review, we recommended downlisting the least Bell's vireo from endangered status to threatened because of an increase in population size since its listing in 1986, expansion of locations with breeding least Bell's vireo throughout southern California, and conservation and management of suitable breeding habitat throughout its range. The Service has not published a rule downlisting the species, so the least Bell's vireo remains listed as endangered as of this writing.

Natural History

Least Bell's vireos are obligate riparian breeders, typically inhabiting structurally diverse woodlands along watercourses that feature dense cover within 3 to 6 feet of the ground and a dense, stratified canopy (Salata 1983; Gray and Greaves 1984; Service 1998). Important plant species in least Bell's vireo habitat include mature arroyo willows (*Salix.lasiolepis*) and black willows (*S. gooddingii*) and occasional cottonwoods (*Populus* spp.), western sycamore (P*opulus fremontii*), or coast live oak (*Quercus agrifolia*). The understory within this riparian habitat is typically dominated by mulefat (*Baccharis salicifolia*), California wild rose (*Rosa californica*), poison oak (*Toxicodendron diversiloba*), sandbar willow (*Salix hindsiana*), young individuals of other willow species, and several perennial species (Service 1998). Least Bell's vireos primarily forage and nest in riparian habitat, but they may also use adjoining upland scrub habitat (Salata 1983).

Vegetation structure more than the age of the vegetation appears to be the important determinant of vireo site use; however, early successional riparian vegetation typically supports the dense shrub cover required for nesting and also a structurally diverse canopy for foraging (Service 1998). Ecological processes that contribute to the formation of early successional riparian habitat include channel scour and deposition associated with periodic storm events. As riparian vegetation matures, the tall stands tend to shade out the shrub layer, making the sites less suitable for vireo nesting. In addition, vireo nests tend to occur in openings and along the riparian edge, where exposure to sunlight allows the development of shrubs (Service 1998).

Least Bell's vireos primarily feed on invertebrates, especially *lepidopteran* (butterfly and moth) larvae, within willow stands or associated riparian vegetation (Miner 1989). They occasionally forage in upland vegetation such as coastal sage scrub, chaparral, and oak woodlands, although foraging in these other habitats usually occurs within 100 feet of the edge of riparian vegetation (Salata 1983; Gray and Greaves 1984). The species' feeding largely consists of gleaning prey

from leaves or woody surfaces while perched or hovering and, less frequently, by capturing prey in aerial pursuit (Salata 1983; Miner 1989).

Least Bell's vireos generally arrive in southern California breeding areas by mid-March to early April, with males arriving before females and older birds arriving before first-year breeders (Service 1998). Individuals show site tenacity, typically returning to established breeding territories year after year (Greaves and Labinger 1997; Salata 1983). They generally remain on the breeding grounds until late September, although some post-breeding migration may begin as early as late July (Service 1998). Male least Bell's vireos establish and defend breeding territories through singing and physically chasing intruders (Barlow 1962; Service 1998). Their territories typically range in size from 0.5 to 4.5 acres, although a few as large as 7.5 acres have been recorded (Service 1998). Areas that contain relatively high proportions of degraded habitat are likely to have lower productivity (hatching success) than areas that contain high quality riparian woodland.

Least Bell's vireos begin building their nests a few days after pair formation, with the female selecting the nest site and both sexes constructing the nest (Barlow 1962; Service 1998). They typically suspend their nests in forked branches within 3 feet above the ground (Service 1998). Least Bell's vireos predominantly nest in willows (*Salix* spp.) and mulefat but will nest in a large variety of native and non-native plant species. Typically, three to four eggs are laid on successive days shortly after nest construction (Service 1998). The eggs are incubated by both parents for about 14 days with the young remaining in the nest for another 10 to 12 days (Nolan 1960; Barlow 1962). Each nest appears to be used only once with new nests constructed for each nesting attempt (Greaves 1987). Least Bell's vireos may attempt up to five nests within a breeding season, but they are typically limited to one or two successful nests within a given breeding season (Service 1998).

Multiple long-term monitoring studies indicate that approximately 59 percent of nests successfully produce fledglings, although on average only 1.8 chicks fledge per nest (Service 1998). Although least Bell's vireo nests appear to be more accessible to terrestrial predators because of their relatively low placement (Franzreb 1989), California scrub jays (*Aphelocoma californica*) account for the majority of documented depredation events (Peterson et al. 2004).

The activities of jays and other avian predators may have favored relatively low nest placement, as reflected in the least Bell's vireo's current nest site selection. Predation rates on least Bell's vireo nests can exceed 60 percent of the nests in a given area within a year (Kus 1999), but typical nest predation rates average around 30 percent (Franzreb 1989).

Some individual least Bell's vireos have been documented to live up to 7 years (Service 1998), but the average lifespan for this species is likely substantially lower. Greaves and Labinger (1997) and the Service (1998a) have estimated first-year survivorship to average approximately 25 percent. The annual survivorship of least Bell's vireos in subsequent years is estimated to be about 47 percent, and is slightly lower for females than males presumably due to the higher energetic costs of egg production (Service 1998).

Banding records indicate that while most first-year breeding least Bell's vireos return to their natal drainage after winter migration, some disperse considerable distances to other breeding locations (Greaves and Labinger 1997; Service 1998). For example, several least Bell's vireos banded as nestlings in San Diego County have been re-sighted as breeding adults in Ventura County, and the opposite movement from Ventura to San Diego has also been observed (Greaves and Labinger 1997).

Rangewide Status

The least Bell's vireo historically occupied willow riparian habitats from Tehama County in northern California, southward to northwestern Baja California, Mexico, and as far east as Owens Valley, Death Valley, and the Mojave River (Grinnell and Miller 1944; Service 1998). Although originally considered to be abundant locally, regional declines of this subspecies were noticeable by the 1940s (Grinnell and Miller 1944), and the least Bell's vireo was believed to have been extirpated from California's Central Valley by the early 1980s (Franzreb 1989). At the time of the listing in 1986, more than 99 percent of the remaining least Bell's vireos were concentrated in southern California (Santa Barbara County and southward), with San Diego County containing 77 percent of the population (Service 1986a).

The least Bell's vireo population in the United States increased 10-fold, from 291 to 2,968 known territories, between 1986 and 2005 (Service 2006b). Population growth was the greatest in San Diego and Riverside counties, with lesser but significant increases in Orange, Ventura, San Bernardino, and Los Angeles counties. The largest concentrations of vireos were located in San Diego County along the Santa Margarita River on Marine Corps Base Camp Pendleton and in Riverside County at the Prado flood control basin on the Santa Ana River (Service 2006b). Based on a composite of survey information collected between 2001 and 2005, 54 percent of the population was estimated to occur in San Diego County, 30 percent occurred in Riverside County, and the remaining vireo territories were scattered throughout Orange (6 percent), San Bernardino (3 percent), Ventura (4 percent), and Los Angeles counties (2 percent; Service 2006b). Less than one percent of the documented vireo territories occurred in Santa Barbara, Inyo, and Stanislaus counties (Service 2006b). Thus, despite a significant increase in overall population numbers and a slight shift northward in the species' distribution, the vireo continues to primarily be restricted to the southern portion of its historic range.

More recently, USGS presented population trends for least Bell's vireo between 2003 and 2014 (Kus et al. 2015). The trend data is difficult to interpret with certainty due to differences in survey effort and survey sites each year. In addition, the data likely underestimates the total population because many smaller sites lack consistent survey efforts. Nevertheless, the vireo population appears to have increased steadily up until 2010 and has declined slightly since that time (i.e., 3,280 territorial males were reported in 2010 and 2,477 territorial males were reported in 2014). The population remains above what was reported by USGS between 2003 and 2007.

The 1986 listing rule identified brood parasitism by brown-headed cowbirds (*Molothrus ater*) as a substantial threat to the least Bell's vireo, and it remains the primary threat to least Bell's vireo recovery (Service 2006b). Cowbird trapping has proven to be an effective management technique for recovering vireo populations in areas where it is implemented; however, Kus and Whitfield (2005) argue that trapping programs may not be the best way to achieve long-term recovery of the vireo since it relies on continued human intervention. Nevertheless an effective alternative to cowbird trapping has not yet been identified. Therefore, additional research is needed to identify the best way to manage this threat over the long term (Service 2006b).

At the time of the listing, loss of habitat due to agricultural practices, urbanization, and exotic plant invasion was identified as a major threat to least Bell's vireo populations. The destruction and modification of riparian habitat within the species' current range has been curtailed significantly since the least Bell's vireo was listed, primarily due to protections provided by its listing in 1986 along with other Federal and State regulations that protect wetlands. Agriculture and grazing continue to threaten riparian habitat within the larger historical range of the least Bell's vireo, particularly the Salinas, San Joaquin, and Sacramento valleys (Service 1998); however, urbanization has displaced former agriculture and grazing operations in many areas within southern California. Occupied least Bell's vireo habitat that is adjacent to highly urbanized areas or within major river systems continues to be impacted by flood control and water impoundment projects and may be subject to ongoing and future habitat loss or degradation (Service 2006b).

Giant reed (*Arundo donax*) is a persistent threat throughout much of the vireo's range as it displaces native vegetation, reducing the quality of riparian habitat for the vireo (Service 1998). Within the past decade, control of giant reed and other exotic plants is being conducted systematically in watersheds throughout the vireo's range (Service 2006b). In general, giant reed removal has been effective at restoring least Bell's vireo habitat, but will require continued annual efforts to achieve local eradications and address new invasions. Although control of giant reed has made great progress since the original listing of the least Bell's vireo, invasions by other exotic plants [e.g., Tamarix species, perennial pepperweed (*Lepidium latifolium*)] continue to threaten existing riparian habitat.

Within the past few years, a new threat has emerged that has the potential to significantly impact vireo nesting throughout its range. A disease complex involving two species of ambrosia beetles, the polyphagous shot hole borer (*Euwallacea* sp. 1) and Kurushio shot hole borer (*Euwallacea* sp. 5), a mix of associated fungi (Lynch et al. 2016), and other pathogens is causing widespread damage to trees in riparian ecosystems throughout southern California (Eskalen et al. 2013). These shot hole borers create galleries in trees and inoculate the galleries with fungal spores. *Fusarium* sp. causes significant damage to trees, and the galleries open up trees to attack from other pathogens that may be even more damaging.

The combination of structural damage from the galleries and tissue damage from the pathogens causes limbs to break and trees to die. For example, occupied habitat in the Tijuana River (Recovery Unit 1) has already been infested, and an estimated 140,000 trees or 35 percent of the

trees showed extensive damage from the disease complex (Boland 2016). Willow species are particularly susceptible to damage from the infestation. Preliminary reports suggest that the Prado Basin (Recovery Unit 7) and the San Luis Rey River (Recovery Unit 5) also have substantial infestations. The Sweetwater River (Recovery Unit 3) and San Diego Creek (Recovery Unit 8) are also known to be infested.

No systematic, regional surveys for shot hole borers have been conducted, and it is likely that additional vireo habitat is infested. Because vireos require structure associated with willows and similar species, we anticipate that vireo breeding success will decline in infested habitats. It is too early to determine how this significant new threat will affect the overall status of the species, but it is being monitored closely by the Service. Significant mortality of mature trees related to this threat may alter vireo prey availability, increase exposure to predation (especially for vireo nests), and affect hydrogeomorphic processes (e.g., flooding, alluvial deposition) important for maintaining healthy riparian woodlands that vireos use for feeding, sheltering, and breeding.

Several large, regional habitat conservation plans in southern California have addressed the effects of urban development on the least Bell's vireo. These plans are expected to provide long-term protection of core occurrences of least Bell’s vireos in western Riverside, Orange, and San Diego counties. In addition, compliance-driven and voluntary riparian restoration activities throughout the species’ historical range may have contributed to an increase in riparian habitat since the listing of the least Bell’s vireo (Service 2006b).

Critical Habitat

The Service designated critical habitat for the least Bell's vireo on February 2, 1994 (Service 1994c). In determining the areas we designated, we considered the PBFs essential to the conservation of the species and that require special management consideration (as defined at 50 CFR 424.12). The final rule describes these PBFs as riparian woodland vegetation that generally contains both canopy and shrub layers, and includes some associated upland habitats (Service 1994c).

The final rule also identifies actions that may affect critical habitat (Service 1994c). These activities include:

1. removal or destruction of riparian vegetation;
2. thinning of riparian growth, particularly near ground level;
3. removal or destruction of adjacent chaparral or other upland habitats used for foraging; and,
4. increases in human-associated or human-induced disturbance.

While these are examples of activities that may affect critical habitat for the least Bell's vireo, other activities may be proposed that also affect the PBFs.

We designated critical habitat in 10 locations in southern California totaling 38,000 acres (Table 2). Within those 38,000 acres, approximately 10,979 acres are federal land (U.S. Forest Service, U.S. Army Corps of Engineers, and International Boundary and Water Commission). The reminder of the acreage is under control of state, county, city, Tribal, or private entities. At the time of the final rule for the critical habitat, the 38,000 acres represented approximately 49 percent of least Bell's vireo population in the United States (Service 1994c).

Table 2: Least Bell's Vireo Critical Habitat Locations

Index Map Location*	Drainage	County
A	Santa Ynez River	Santa Barbara
B	Santa Clara River	Los Angeles/Ventura
C	Santa Ana River	Riverside/San Diego
D	Coyote Creek	San Diego
E	Santa Margarita River	San Diego
F	San Luis Rey River	San Diego
G	San Diego River	San Diego
H	Sweetwater River	San Diego
I	Jamul-Dulzura Creeks	San Diego
J	Tijuana River	San Diego

* Index Map Locations from final rule (Service 1994c)

Recovery

The Service published a draft recovery plan for the least Bell's vireo in 1998 (Service 1998), but the plan was never finalized. Subsequently, we prepared a 5-year status review for the species (Service 2006b) that examined the recovery criteria in that draft plan and concluded, “Due to new information regarding the species and an improved understanding of ongoing recovery actions to reduce threats, the recovery goals and strategies should be modified and refined.” The 5-year status review (Service 2006b) provided a set of recommendations for a future recovery plan that included:

1. complete a functional recovery plan for the vireo with realistic, objectively based recovery goals;
2. provide funding and technical support for further studies investigating continuing threats to the vireo from cowbird parasitism, exotic plant invasion of riparian habitats, and potentially elevated predation pressures due to habitat fragmentation or presence of exotic predators (i.e., domestic cats and Argentine ants);
3. Complete an assessment or support other efforts (such as the RHJV effort) to assess the amount and distribution of riparian habitat in California including:
    a. establishment of baseline values for comparison to past and future estimates, including an assessment of various riparian habitat subtypes;
    b. An evaluation of changes in distribution and connectivity of riparian habitat at different stream-order levels (i.e., primary, secondary, tertiary, etc.); and

   c. an evaluation of the amount of riparian habitat restoration attempted and successfully completed since the listing, including restoration not driven by regulatory compliance; and
4. Develop and implement:
   a. a systematic survey program to locate vireo re-colonization of the Salinas, San Joaquin, and Sacramento Valleys so that appropriate management can be developed and implemented; and,
   b. systematic survey programs for watersheds in southern California that are no longer regularly surveyed within a given 5-year period (e.g., Dulzura Creek/Jamul Creek/Otay River, San Diego River, San Dieguito River/Santa Ysabel Creek, San Gabriel River, etc.). It is possible that these systematic surveys may need to rely on volunteer efforts organized and supported by the Service.

Until a final recovery plan for the least Bell's vireo is developed, we rely on the most up-to-date information for discussing recovery in our biological opinions. The ideas provided in the 5-year status review and cited above are currently the best information we have on which to base our analysis.

Southwestern Willow Flycatcher

Legal Status

The southwestern willow flycatcher was federally listed as endangered on February 27, 1995 (Service 1995) and critical habitat was designated for the subspecies on October 19, 2005 (Service 2005e). Revised critical habitat was designated January 3, 2013 (Service 2013a). The final recovery plan for the subspecies was completed in August 2002 (Service 2002b).

Natural History

The southwestern willow flycatcher breeds in southern California (north to the Santa Ynez River, Kern River, and Independence on the Owens River), southern Nevada, southern Utah, Arizona, New Mexico, and extreme western Texas. All subspecies of the willow flycatcher are completely migratory. The species as a whole winters from southern Mexico south through Central America to Panama and western Venezuela. Subspecies *extimus* has been collected in winter in Mexico, Guatemala, El Salvador, Nicaragua, and Costa Rica (Unitt 1987, Paxton et al. 2011).

The southwestern willow flycatcher breeds only in riparian woodland, typically adjacent to or over water. Surface water or saturated soil is usually present in or adjacent to nesting sites during at least the initial portion of the nesting period (Tibbitts et al. 1994). Riparian woodland used by willow flycatchers typically has a canopy and an understory of shrubs or saplings. Native willows dominate the habitat commonly represented in current and historical records.

Southwestern willow flycatchers do nest in some riparian habitats containing and even dominated by tamarisk (McKernan and Braden 1999, Paradzick et al. 2000). In terms of

southwestern willow flycatcher productivity, the suitability of tamarisk dominated habitats is not known. Southwestern willow flycatcher productivity in some sites dominated by non-native vegetation is lower than in some native-dominated habitats (Sogge et al. 1997). The reverse is also true, however; within some tamarisk-dominated habitats southwestern willow flycatcher productivity is similar or higher than nearby native-dominated sites (McKernan and Braden 1999, Paradzick et al. 2000).

The southwestern willow flycatcher is a diurnal insectivore, catching its prey on the wing usually in the middle story of riparian woodland. Males maintain and advertise a territory by singing to attract females. There is little information on the factors a southwestern willow flycatcher female uses to select a mate, though it may be related to some factor of habitat quality or potential quality of the male (Service 2002b). Territorial defense begins immediately after spring arrival. Females occasionally sing, apparently when stimulated by territorial disputes (Sogge et al. 1997). Male southwestern willow flycatchers sing most persistently early in the breeding season, but song rate declines as the season progresses, particularly once the male finds a mate and nesting efforts begin (Finch et al. 2000). Their response to taped playback of songs during surveys has also been known to decrease as the nesting season progresses. Mapped breeding territory sizes are 0.15 to 0.5 acre on the Colorado River (Sogge et al. 1997), 0.5 to 1.25 acres along the Verde River, Arizona (Sogge 1995), and 0.35 to 5.7 acres along the Kern River, California (Whitfield and Enos 1996).

Nests are initiated usually within one week of pair formation, 10 to 14 days after spring arrival. Building nests takes 3 to 8 days. In historical egg collections from southern California, 86 percent of nests were in *Salix* spp. (willow), 4 percent in *Urtica dioica* (stinging nettles), and 10 percent in other plants (Unitt 1987). Females typically lay one egg per day, until the nest contains three to four eggs. Incubation begins after the last egg is laid, and lasts 12 to 13 days (Service 2002b). During incubation, females spend approximately 50 percent of the day attending (incubating or shading) the eggs and incubate throughout the night. Incubation and shading bouts can last from less than 1 to more than 60 minutes (Finch et al. 2000).

Southwestern willow flycatcher young usually leave the nest 12 to 15 days after hatching. During the brooding period, the young are cared for by both the male and female. Feeding trips during the peak of this period can reach 30 trips per hour during days 5 to 10 (Finch et al. 2000). Fledglings stay close to the nest and each other for 3 to 5 days, and may repeatedly return to and leave the nest during this period (Spencer et al. 1996).

Southwestern willow flycatchers typically arrive on breeding grounds from late April to early June (Service 2002b). Evidence gathered during multi-year studies of color-banded populations show that although most southwestern willow flycatchers return to former breeding areas, they regularly move among sites within and between years (Netter et al. 1998). From 1997 to 2000, 66 to 78 percent of southwestern willow flycatchers returned to the same breeding site (Luff et al. 2000). Movements within drainages are more common than between drainages.

Rangewide Status

Unitt (1987) concluded that the southwestern willow flycatcher was once fairly common in the Los Angeles Basin, where habitat is virtually absent now. Approximately 616 acres of riparian habitat has regenerated along the South Fork Kern River since the early 1980s, but fluctuations in number of territories in this area has made it difficult to determine a trend in the population for this area (Whitfield et al. 1999). Downstream from the South Fork Kern River, willow flycatchers (unknown subspecies) were common breeders in the early 1900s, but today virtually no riparian habitat remains. Outside of the Kern River, southwestern willow flycatcher populations are present along the Owens, San Luis Rey, and Santa Margarita (Camp Pendleton) Rivers. Changes in land use along the San Luis Rey River have improved habitat quality and extent, which has resulted in an increase in the number of territorial southwestern willow flycatcher males from 12 in the late 1980s (Unitt 1987) to more than 40 in 1999 (Kus et al. 1999). In contrast, the populations on Camp Pendleton have remained fairly constant for the past two decades despite apparently suitable habitat to support population expansion. The remaining southwestern willow flycatcher populations in southern California, most of which number fewer than five territories, occur at scattered sites along drainages that have changed little in the past 15 years.

The decline of the southwestern willow flycatcher is attributed to numerous factors, including nest depredation and brood parasitism by the brown-headed cowbird. However, large scale loss of southwestern wetlands, particularly cottonwood-willow riparian habitat, is the principal reason for the southwestern willow flycatcher's current status. Habitat loss is a result of urban and agricultural development, water diversion and impoundment, livestock grazing, and hydrological changes attributable to these and other land uses (Service 1995). In some cases, willow flycatchers are faced with situations that force movement, such as when catastrophic habitat loss occurs from fire or flood. Several such cases have been documented, with some of the resident willow flycatchers moving to remaining habitat within the breeding site, some moving to other sites 1.2 to 16.8 miles away (Paxton et al. 1997, Owen and Sogge 1997), and others disappearing without being seen again.

Critical Habitat

Revised critical habitat for the southwestern willow flycatcher was designated on January 3, 2013 (Service 2013a). Designated southwestern willow flycatcher habitat provides aquatic and terrestrial habitat containing the essential PBFs to support and maintain self-sustaining populations and metapopulations throughout its range. The southwestern willow flycatcher breeds in riparian habitats along rivers, streams, or other wetlands, where relatively dense growths of trees and shrubs are established, near or adjacent to surface water or underlain by saturated soil. Habitat characteristics such as dominant plant species, size and shape of habitat patch, canopy structure, vegetation height, and vegetation density vary widely among sites. As a neotropical migrant (migrating between Central and South America and the United States), migration stopover areas for the southwestern willow flycatcher, even though not used for breeding, are critically important, (i.e. essential) resources affecting productivity and survival.

Based on our current knowledge of the life history, biology, and ecology of the subspecies and the requirements of the habitat to sustain the essential life history functions, we determined that the southwestern willow flycatcher's PBFs are:

1. Riparian habitat in a dynamic river or lakeside, natural or manmade successional environment (for nesting, foraging, migration, dispersal, and shelter) that comprises trees and shrubs (that can include Gooddings willow, coyote willow, Geyers willow, arroyo willow, red willow, yewleaf willow, pacific willow, box elder, tamarisk, Russian olive, buttonbush, cottonwood, stinging nettle, alder, velvet ash, poison hemlock, blackberry, seep willow, oak, rose, sycamore, false indigo, Pacific poison ivy, grape, Virginia creeper, Siberian elm, and walnut) and some combination of:
    a. Dense riparian vegetation with thickets of trees and shrubs that can range in height from about 6 to 98 feet. Lower-stature thickets (6 to 13 feet tall) are found at higher-elevation riparian forests and tall-stature thickets are found at middle- and lower-elevation riparian forests; and/or
    b. Areas of dense riparian foliage at least from the ground level up to approximately 13 feet above ground or dense foliage only at the shrub level, or as a low, dense tree canopy; and/or
    c. sites for nesting that contain a dense (about 50 to 100 percent) tree or shrub (or both) canopy (the amount of cover provided by tree and shrub branches measured from the ground); and/or
    d. dense patches of riparian forests that are interspersed with small opening of open water or marsh or areas with shorter and sparser vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.25 acre or as large as 175 acres; and
2. A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, including: flying ants, wasps, and bees (*Hymenoptera*); dragonflies (*Odonata*); flies (*Diptera*); true bugs (*Hemiptera*); beetles (*Coleoptera*); butterflies/moths and caterpillars (*Lepidoptera*); and spittlebugs (*Homoptera*).

Critical habitat for the southwestern willow flycatcher is designated across a wide portion of the subspecies' range and is organized in Management Units (as described in the Recovery Plan; Service 2002b). We designated stream segments in 15 management units found in 5 recovery units as critical habitat for the southwestern willow flycatcher. Critical habitat is located in Apache, Cochise, Gila, Graham, Greenlee, Maricopa, Mohave, Pinal, Pima, Santa Cruz, Yavapai, and Yuma counties in Arizona; Imperial, Los Angeles, Kern, Mono, Orange, Riverside, Santa Barbara, San Bernardino, San Diego, and Ventura counties in southern California; Clark, Lincoln, and Nye counties southeastern Nevada; Catron, Cibola, Dona Ana, Grant, Hidalgo, McKinley, Mora, Rio Arriba, Santa Fe, San Juan, Soccoro, Taos, and Valencia counties in New Mexico; Alamosa, Conejos, Costilla, la Plata, and Rio Grande counties in southern Colorado and; Kane, Juan, and Washington counties in Southwestern Utah.

The physical and biological features essential to the conservation of the southwestern willow flycatcher described above are results of the dynamic river environment that germinates,

develops, maintains, and regenerates the riparian forest and provides food for breeding, nonbreeding, dispersing, territorial, and migrating southwestern willow flycatchers. Anthropogenic factors such as dams, irrigation ditches, or agricultural field return flow can assist in providing conditions that support flycatcher habitat. It is important to recognize that the PBFs are present throughout the river segments selected (PBF 1), but the specific quality of riparian habitat for nesting (PBF 1), migration (PBF 1), foraging (PBF 1 and 2), and shelter (PBF 1) will not remain constant in their condition or location over time due to succession (*i.e.*, plant germination and growth) and the dynamic environment in which they exist.

The Service designated stream ‘‘segments’’ as critical habitat for the southwestern willow flycatcher that provide for flycatcher habitat (nesting, foraging, migrating, regenerating, etc.) and allows for the changes in habitat locations or conditions from those that exist presently. The actual riparian habitat in these areas is expected to expand, contract, or change as a result of flooding, drought, inundation, and changes in floodplains and river channels (Service 2002b) that result from current flow management practices and priorities. Stream segments include breeding sites in high connectivity and other essential flycatcher habitat components needed to conserve the subspecies. Those other essential components of flycatcher habitat (foraging habitat, habitat for nonbreeding flycatchers, migratory habitat, regenerating habitat, streams, elevated groundwater tables, moist soils, flying insects, and other alluvial floodplain habitats, etc.) adjacent to or between sites, along with the dynamic process of riparian vegetation succession and river hydrology, provide current and future habitat for the southwestern willow flycatcher which is dependent upon vegetation succession.

The conservation role critical habitat river segments/units contribute to the southwestern willow flycatcher is metapopulation stability, population connectivity, gene flow, and protection against catastrophic loss of populations. Because the southwestern willow flycatcher exists in disjunct breeding populations across a wide geographic and elevation range, and is subject to dynamic events, the designated critical habitat river segments are widespread across the subspecies range. The focus of the critical habitat designation is therefore a conservation strategy which relies on protecting large southwestern willow flycatcher populations as well as small populations with high connectivity (Service 2002b). Large populations, centrally located, contribute the most to metapopulation stability, especially if other breeding populations are nearby (Service 2002b). Large populations persist longer than small ones, and produce more dispersers capable of emigrating to other populations or colonizing new areas (Service 2002b). Smaller populations in high connectivity can provide as much or more stability than a single isolated population with the same number of territories because of the potential to disperse colonizers throughout the network of sites (Service 2002b).

The approach for defining critical habitat areas supports other key central strategies tied to southwestern willow flycatcher conservation identified in the Recovery Plan (Service 2002b) such as:

1. populations should be distributed close enough to each other to allow for movement;
2. maintaining or augmenting existing populations is a greater priority than establishing new populations; and
3. a population's increase improves the potential to disperse and colonize.

Because large populations, as well as small populations with high connectivity, contribute the most to metapopulation stability (Service 2002b), we identified these areas to help guide the delineation of areas with features essential to the conservation of the southwestern willow flycatcher. The rule defines a large population as a single site or collection of smaller connected sites that support 10 or more territories.

Recovery

The 2002 final recovery plan (Service 2002b) for the southwestern willow flycatcher states that the goal of recovery efforts is the reclassification of the subspecies from endangered to threatened and, ultimately, delisting of the subspecies. The plan states that reclassification to threatened status may be considered when either of the following criteria have been met:

> Criterion A: Increase the total known population to a minimum of 1,950 territories (equating to approximately 3,900 individuals), geographically distributed to allow proper functioning as metapopulations, so that the southwestern willow flycatcher is no longer in danger of extinction. For reclassification to threatened status, these prescribed numbers and distributions must be reached as minimum, and maintained over a 5 year period.
>
> Criterion B: Increase the total known populations to a minimum of 1,500 territories (equating to approximately 3,000 individuals), geographically distributed among management units and recovery units, so that the southwestern willow flycatcher is no longer in danger of extinction. Recovery units are large watershed or hydrologic areas, while management units are a subset of the recovery units and encompass local drainages and distinct geographic features. For reclassification to threatened status, these prescribed numbers and distributions must be reached as a minimum, and maintained over a 3 year period, and the habitats supporting this subspecies must be protected from threats and loss.

The plan states that the southwestern willow flycatcher may be removed from the list of threatened and endangered species when both of the following criteria have been met:

> Criterion 1: Meet and maintain, at a minimum, the population levels and geographic distribution specified under reclassification to threatened Criterion A.
>
> Criterion 2: Provide protection from threats and create/secure sufficient habitat to assure maintenance of these populations and/or habitat over time. The sites containing southwestern willow flycatcher breeding groups, in sufficient number and distribution to warrant downlisting, must be protected into foreseeable future through development and

> implementation of conservation management agreements (e.g., public land management planning process for Federal lands, habitat conservation plans, conservation easements, and land acquisition agreements for private lands, and intergovernmental conservation agreements with Tribes). Prior to delisting, the Service must confirm that the agreements have been created and executed in such a way as to achieve their role in southwestern willow flycatcher recovery, and individual agreements for all areas within all Management Units (public, private, and Tribal) that are critical to metapopulation stability (including suitable, unoccupied habitat) must have demonstrated their effectiveness for a period of at least 5 years.

The recovery plan categorizes recovery actions into nine types: (1) increase and improve occupied, suitable, and potential breeding habitat; (2) increase metapopulation stability; (3) improve demographic parameters; (4) minimize threats to wintering and migration habitat; (5) survey and monitor; (6) conduct research; (7) provide public education and outreach; (8) assure implementation of laws, policies, and agreements that benefit the southwestern willow flycatcher; and (9) track recovery progress.

Yellow-billed cuckoo

Legal Status

The western yellow-billed cuckoo was listed as threatened on October 3, 2014 (Service 2014b). Only the Western DPS, which is larger than its eastern counterpart, was listed. Critical habitat for the cuckoo was proposed on August 15, 2014 (Service 2014c). A five-year review was initiated on June 18, 2018, but is not yet complete.

Natural History

The yellow-billed cuckoo is a member of the avian family *Cuculidae* and is a Neotropical migrant bird that winters in South America and breeds in North America. Adult yellow-billed cuckoos have a fairly stout and slightly down-curved bill; a slender, elongated body with a long-tailed look; and a narrow yellow ring of colored, bare skin around the eye. The plumage is loose and grayish brown above and white below, with reddish primary flight feathers. The tail feathers are boldly patterned with black and white below. They are a medium sized bird about 12 inches in length, and about 2 ounces in weight. The bill is blue-black with yellow on the basal half of the lower mandible. The legs are short and bluish-gray. All cuckoos have a zygodactyl foot with two toes pointing forwards and two toes pointing backwards. Juvenile yellow-billed cuckoos resemble adults, except the tail patterning is less distinct and the lower bill has little or no yellow. Males and females differ slightly and are indistinguishable in the field (Hughes 1999). Typically a secretive and hard-to detect bird, adult yellow-billed cuckoos have a distinctive ‘‘kowlp’’ call, which is a loud, nonmusical series of notes that slows down and slurs toward the end. Yellow-billed cuckoos advertise for a mate using a series of soft ‘‘cooing’’ notes, which they give at night as well as during daytime. Both members of a pair use a soft knocking call as a contact or warning call near the nest (Hughes 1999).

Yellow-billed cuckoos breed within large tracts of suitable riparian habitat. Home ranges are flexible and territories may overlap in this weakly territorial species (Hughes 1999, Halterman 2009, Sechrist et al. 2013). Rangewide, individual home ranges during the breeding season average over 100 acres (Service 2014b). However, Laymon et al. (1993) reported an average cuckoo home range size of 42 acres, and home range estimates for radio-telemetered cuckoos in New Mexico varied from 12 to 697 acres (Sechrist et al. 2009). In New Mexico, the average maximum daily distance traveled was 2,795 feet, and the average maximum seasonal distance traveled was 4,790 feet. Extensive riparian forests may support the greatest density of breeding cuckoos, but other habitats are also important for recovery (Service 2015c). Cuckoos may use narrow bands of riparian woodland for nesting (Arizona Game and Fish Department 2015, Cornell Lab of Ornithology 2015) and even non-riparian habitats (Brown 1994, Cornell Lab of Ornithology 2015, Corman and Magill 2000). Tamarisk may be a component of breeding habitat, but there is usually a native riparian tree component present (Gaines and Laymon 1984, Johnson et al. 2008, McNeil et al. 2013, Carstensen et al. 2015). Site-specific variation is likely a result of characteristics unique to each location such as type and quality of habitat or patch configuration (Hughes 1999, Halterman 2009, Sechrist et al. 2013). Habitat can be found in relatively contiguous stands of dense vegetation, in irregularly shaped mosaics of dense and open vegetation, and in patches that are narrow and linear or savannah-like. Humid conditions created by surface and subsurface moisture and a multi-layered canopy appear to be important for successful hatching and rearing of young (Hamilton and Hamilton 1965, Gaines and Laymon 1984).

Rangewide Status

Yellow-billed cuckoos spend the winter in South America, east of the Andes, primarily south of the Amazon Basin in southern Brazil, Paraguay, Uruguay, eastern Bolivia, and northern Argentina. The breeding range of the entire species formerly included most of North America from southeastern and western Canada (southern Ontario, Quebec, and southwestern British Columbia) south throughout the continental United States to the Greater Antilles and northern Mexico (Service 2014b). Currently, the species no longer breeds in western Canada and the northwestern continental United States (Washington, Oregon, and Montana).

The geographical breeding range of the yellow-billed cuckoo in western North America includes suitable habitat within the low- to moderate-elevation areas west of the crest of the Rocky Mountains in Canada, Mexico, and the United States, including the upper and middle Rio Grande, the Colorado River Basin, the Sacramento and San Joaquin River systems, the Columbia River system, and the Fraser River. In Mexico, the range includes the Cape Region of Baja California Sur, and river systems in the Mexican States of Sonora, Sinaloa, western Chihuahua, and northwestern Durango.

Western populations of the cuckoo are most commonly found in large tracks of dense, multilayered gallery forests consisting primarily of cottonwood (*Populus* spp), willow, and mesquite (*Prosopis* spp) (including mesquite bosques) along riparian corridors in otherwise arid areas (Laymon and Halterman 1989, Hughes 1999).

Within the boundaries of the DPS, cuckoos occur from sea level to elevations up to 7,000 feet or more; however, the moist conditions that support riparian plant communities typically occur at lower elevations. Cuckoo breeding habitat in much of the species' range is associated with perennial rivers and streams in regulated and unregulated flows (Poff et al. 1997). Hydrologic conditions at cuckoo breeding sites can vary widely in a single year and among years, and due to these changes cuckoos may move from one area to another in the same season and from year to year. Recent guidance on cuckoo habitat use (Service 2015c) indicates that cuckoos are more flexible in their choice of foraging and migration stopover habitat than they are in selecting nesting habitat. Foraging areas can be less dense or more patchy than nesting areas, with lower levels of canopy cover (Carstensen et al. 2015, Sechrist et al. 2009). Habitat flexibility during migration may extend to monotypic tamarisk and shrubby habitats, hedgerows, coastal scrub, orchards, and semi-desert grasslands.

The primary threat to the western yellow-billed cuckoo is loss or fragmentation of high-quality riparian nesting habitat. Many factors have altered and eliminated cuckoo habitats, including water diversions, ground water pumping, stream channelization and stabilization, agricultural development, mining, livestock grazing, wildfires, establishment of nonnative vegetation, drought, defoliation of tamarisk by the introduced tamarisk leaf beetle, and prey scarcity due to pesticides (Ehrlich et al. 1992, Corman and Wise-Gervais 2005, Service 2014a;b). Habitat fragmentation has led to the isolation of small populations and has increased their susceptibility to further declines and local extirpations due to all the factors discussed above and to stochastic factors such as weather, fluctuating prey populations, and climate change (Thompson 1961, McGill 1975, Wilcove et al. 1986). Cuckoos in the DPS were formerly widespread and locally common in much of the western U.S., Canada, and Mexico (American Ornithologists' Union 1998, Hughes 1999). The largest remaining breeding areas are in southern and central California, Arizona, New Mexico, and northwestern Mexico (Service 2014b).

Critical Habitat

In total, approximately 546,335 acres are proposed for designation as critical habitat in Arizona, California, Colorado, Idaho, Nevada, New Mexico, Texas, Utah, and Wyoming. However, there is no proposed critical habitat within the VFWO's jurisdiction.

Recovery

A recovery plan for this species has not been published. However, recovery of this species is highly dependent on ameliorating the threats to riparian systems. In particular, activities that benefit the hydrological function of the riparian system, as well as restore or conserve riparian habitat or prevent any additional loss or degradation of riparian habitat, will all benefit yellow-billed cuckoo. Avoiding application of pesticides that would limit the abundance of large insects and their larva on or in the vicinity of riparian areas at any time of year would help to maintain an adequate prey base for the cuckoo. Additionally, any management activities that would protect and enhance the physical or biological features for the western yellow-billed cuckoo by reducing or eliminating threats would aid recovery (Service 2014).

Smith's Blue Butterfly

Legal Status

The Service listed the Smith's blue butterfly as endangered on June 1, 1976 (Service 1976). Critical habitat was proposed on February 8, 1977 (Service 1977), but was not ever designated, thus, there is no designated critical habitat. The Service completed a recovery plan for the species on November 9, 1984 (Service 1984).

Natural History

Smith's blue butterflies co-occur with buckwheat plants that grow in coastal dune, cliffside chaparral, coastal scrub, and coastal grassland communities from the mouth of the Salinas River in Monterey County to San Carpoforo Creek in northern San Luis Obispo County. The Smith's blue butterfly is dependent upon its host plant species, Seacliff buckwheat (*Eriogonum parvifolium*) and coast buckwheat (*Eriogonum latifolium*), during all life stages, except that adults may also feed on nectar from naked buckwheat (*Eriogonum nudum*).

Synchronous with peak flowering of its buckwheat hosts, adult Smith's blue butterflies emerge from their pupal cases for a single flight season extending from mid-June to early September. Adults live for about 1 week, during which time they locate mates, court, and copulate. Females oviposit singly in individual flower heads. Larvae hatch 4 to 8 days after oviposition and feed on buckwheat flowers as they grow and molt through five instars. Under natural conditions, pupation occurs from early August to mid-September (Arnold 1980). The location where pupation occurs has not been adequately documented. Researchers have surmised that pupation occurs in the heads of flowers, adjacent to leaf or stem axils, in the duff, or several inches below the soil surface (Arnold 1980). Larvae overwinter as pupae and emerge as adults the following flight season.

Like many other *lycaenid* butterflies, Smith's blue butterfly larvae are tended by ants during the third through fifth instars. The larvae produce a sugary secretion upon which the ants feed. In return, the ants are presumed to provide the larvae with protection from predation or parasitism. The importance of such ant associations to the Smith's blue butterfly is currently unknown.

Rangewide Status

In the northern portion of their range, Smith's blue butterflies occur at the Salinas River National Wildlife Refuge, in the Marina area (including Marina State Beach), on Fort Ord, and in the vicinity of Sand City (Service 2006c). In the southern portion of their range, Smith's blue butterflies occur in Carmel Valley (including occupied sites at Garland Ranch Regional Park, the Santa Lucia Preserve, and Palo Corona Regional Park; Service 2006c) and along the Big Sur coast, including at least 69 sites between Cooper Point (in Monterey County near the border of Andrew Molera and Pfeiffer Big Sur State Parks) and San Carpoforo Creek (in northern coastal San Luis Obispo County; Arnold 2002). The exact elevation range of the species is unknown and

likely varies from north to south, but Smith's blue butterflies have been observed from near sea level to 2,300 feet and potential habitat occurs to approximately 2,500 feet in some locations (Arnold 1980; Service 2003c).

There are no occupied Smith's blue butterfly localities found from just south of Sand City to the Carmel Highlands (i.e., an approximately 9 mile gap occurs within the range). Smith's blue butterflies are notably absent from the Monterey Peninsula, although, historically, they have been observed just to the north at the Naval Postgraduate School and the south at Point Lobos State Reserve. Thus, Smith's blue butterflies are found within two disjunctive areas within their range; 1) a northern area of primarily dune habitats along Monterey Bay north of the Monterey Peninsula, and 2) a southern area of primarily scrub, chaparral, and grassland habitats of the Carmel Valley and Big Sur Coast south of the Monterey Peninsula (Service 2006c). Long-term monitoring has not occurred for any population of the Smith's blue butterfly. Most of our knowledge of the distribution of the Smith's blue butterfly is the result of singular observations made in the past 30 years. Therefore, the number, size, and persistence of colonies throughout the range of the species are poorly understood.

Several colonies of Smith's blue butterflies and some potential habitat are currently protected from at least some of the threats which led to its listing. Large amounts of land that have supported known colonies of the Smith's blue butterfly are owned and managed by resource agencies. Along the Monterey Bay, these areas include the Salinas River National Wildlife Refuge, Monterey State Beach, Marina State Beach, and the coastal portion of the former Fort Ord. Further south, several occupied localities and at least 574 acres of habitat have been confirmed in the Los Padres National Forest (Service 2003c).

Vegetation within the range of the Smith's blue butterfly is very dynamic, especially where stands of Seacliff buckwheat occur. Seacliff buckwheat seedlings depend upon disturbances such as landslides and other erosional features for the development of site conditions favorable for germination and establishment. Landslides and mass wasting are common along the Monterey coast and provide the disturbances required by Seacliff buckwheat; conversely, these geologic activities can also destroy existing stands of Seacliff buckwheat. The Smith's blue butterfly may benefit from some human disturbances when they mimic natural processes. The quality of habitat likely changes over relatively brief periods due to natural successional processes and, increasingly, due to the invasion of non-native plants. Over time, especially when disturbances are rare, stands of Seacliff buckwheat are likely to be displaced by larger native shrubs on all but the harshest sites.

The role of dynamic processes in creating and maintaining habitat for the Smith's blue butterfly is poorly understood. Most likely, Smith's blue butterflies abandon areas where Seacliff buckwheat is replaced by other vegetation. Adults would be expected to disperse and colonize new areas that contain adequate patches of host buckwheat plants. Arnold (1991) found that the density and age class distribution of Seacliff buckwheat and coast buckwheat are important determinants for the establishment and persistence of Smith's blue butterfly populations in some locations. The Smith's blue butterfly has a wingspan of generally less than 1 inch and adult

Smith's blue butterflies are not strong fliers; therefore, colonies may become isolated if suitable habitat is not available nearby for dispersal and colonization.

Threats to the Smith's blue butterfly exist at many of the sites that are protected from development pressures. Much of the species' habitat has been invaded and, in some cases overtaken, by invasive plants. At least 70 non-native plant species introduced during the past 200 years threaten habitat for the Smith's blue butterfly in both protected and unprotected areas throughout the sub-species' range.

The decline of the Smith's blue butterfly is attributed to degradation and loss of habitat as a result of urban development, recreational activities in dune habitats, sand mining, military activities, fire suppression in chaparral habitat, and encroachment of exotic plant species. Wildfire suppression increases the risk of large-scale, high-intensity wildfires and reduces the frequency of smaller fires. Smaller fires would be expected to create disturbances that favor establishment of Seacliff buckwheat plants; while large, high-intensity fires would be more likely to damage soils and destroy seed banks to the detriment of native plant communities. As a recent example, the 2008 Basin Complex fire burned approximately 19,424 acres of potential Smith's blue butterfly habitat. Fire intensity was variable and the effects of that fire on habitat have not been well documented, but the large size of the area burned creates concern about the ability of Smith's blue butterflies to recolonize the area. Aggressive, disturbance-oriented invasive plant species such as kikuyu grass (*Pennisetum clandestinum*), pampas grass (*Cortaderia jubata*), Cape ivy (*Delairea odorata*), and French broom (*Genista monspessulana*) are found on sites otherwise suitable for seacliff buckwheat and the Smith's blue butterfly. In sand dunes along Monterey Bay, non-native ice plant (*Carpobrotus* spp.) has covered hundreds of acres of formerly suitable habitat for the Smith's blue butterfly. The low vagility of adults, coupled with fragmentation of suitable habitat, reduce the probabilities of colonization events and migratory exchange between populations. Due to the lack of long-term monitoring, the status of the Smith's blue butterfly must be assessed largely based on the status of habitat for the species.

Urban development, recreational activities, and other activities continue to result in habitat loss and degradation. Urban development, introduction of invasive plant species and recreational use have fragmented and continue to fragment habitat for the Smith's blue butterfly. This fragmentation has several ramifications for the Smith's blue butterfly. The quality of the remaining suitable habitat is reduced, the distance dispersing adults must travel to reach the next island of suitable habitat is increased, the entire metapopulation structure is potentially disrupted, and genetic diversity is reduced. Overall, groups of Smith's blue butterflies occupying smaller, more isolated stands of suitable habitat are more likely to be extirpated by stochastic or anthropogenic factors.

Critical Habitat

There is no designated critical habitat for Smith's blue butterfly.

Recovery

The Smith's blue butterfly recovery plan was published in 1984 and is outdated. The recovery objectives in the plan focus on protection of those localities that were known when the plan was published. However, due to changes in our knowledge of the subspecies' range and the threats that it faces, the objectives are largely obsolete. The range is larger and shifted to the south, relative to what was understood in 1984, and several of the locations identified for protection in the recovery plan do not have suitable habitat or are outside the currently accepted range (Service 2003c). Of the 18 locations identified for protection in the recovery plan (Service 1984), 3 are north of the currently accepted range (Service 1986b) and 1 was likely misidentified, as it is at a higher elevation than any other occupied location and has no suitable habitat (Service 2003c).

The general recovery needs of the Smith's blue butterfly include conserving and managing existing habitat, maintaining and improving connectivity between areas of habitat, and increasing the amount of occupied habitat through restoration efforts. The Smith's blue butterfly occurs in two disjunct areas and conservation of the subspecies in both will be necessary for recovery. Although the recovery plan is outdated, several of the recovery actions it identifies are still valid, including:

1. revegetating existing blow-out areas with native plants and removing exotic plants;
2. controlling off-road vehicle use of dunes;
3. carrying out prescribed burns;
4. iceplant and Holland dune grass eradication; and,
5. developing public awareness.

ENVIRONMENTAL BASELINE

Action Area

The implementing regulations for section 7(a)(2) of the Act define the "action area" as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 Code of Federal Regulations 402.02). The action area for this biological opinion is the geographic jurisdiction of the VFWO: Santa Cruz, San Benito, Monterey, San Luis Obispo, Santa Barbara, Ventura, and the northern part of Los Angeles County (Figure 1, FEMA 2018). Please see Appendix E for species range maps within the jurisdiction of the VFWO.

Previous Consultations in the Action Area

The Service has previously issued a biological opinion with FEMA for disaster assistance projects eligible for FEMA funding with the Service under Presidential disaster declarations (FEMA-1628-DRCA and FEMA-1646-DR-CA) in 36 counties in Northern California. The PBA and corresponding PBO addressed potential effects of FEMA-funded actions on approximately 140 federally listed species and habitats. This PBO required implementation of general minimization measures and species-specific conservation measures to be implemented during each project, and authorized the take of up to 1 acre of habitat for listed species at any given project site and the cumulative take of up to 900 acres of habitat for all qualifying projects. The PBA and corresponding PBO expired on July 6, 2011.

As the action area encompasses VFWO's entire jurisdiction, numerous other consultations have been completed. A record of these consultations is available at the VFWO.

EFFECTS OF THE ACTION

FEMA has designed the implementation of their program to incorporate species conservation. They collaborated with the Service to develop a streamlined process for environmental compliance of this program. The program relies on Subapplicants voluntarily choosing a stream-lined approach for environmental compliance, and incorporating measures to avoid and minimize impacts to listed species and critical habitat into project proposals. Successful implementation of this programmatic could demonstrate an effective use of stream-lined regulatory compliance benefiting Subapplicants, species conservation, and both federal agencies.

Effects of the action on all species

The federally-listed species addressed in this programmatic consultation may be directly or indirectly harmed (e.g., killed or injured) as a result of implementing FEMA-funded projects. The effects to listed species addressed in this PBO are project-specific and widely variable. The likelihood that a proposed project will adversely affect covered species or their critical habitats depends on a variety of factors, including, but not limited to, the conditions present in the individual project action area, the probability of species occurrence, timing of the activity, and the quality and quantity of the habitat within the project footprint and its vicinity. For proposed projects covered under the PBO, we anticipate that implementation of general avoidance and minimization measures and species-specific conservation measures, as proposed, will reduce adverse effects, in some instances to levels that are insignificant, discountable, or wholly beneficial.

Activities that are likely to cause direct or indirect harm to covered species and their habitats include grading and earthmoving; road construction; excavation; maneuvering vehicles and heavy equipment on and off roads; production of noise, vibration, and dust; vegetation management; prescribed or accidental fire; placement and removal of cofferdams and other temporary water diversions in creeks and rivers; discharge of fill and sediments in water; and

placement of riprap and water control structures. Some animal species may occur in close proximity to disaster-affected areas and may be indirectly affected by project activities that extend beyond the damaged features themselves, which may include access routes, staging areas, borrow sites, and downstream effects in watercourses. Indirect effects from the covered activities can affect a species ability to breed, feed, disperse, and find shelter. Such indirect effects include the removal of cover and/or habitat, which in turn make the species more vulnerable to predation as they need to travel further to find suitable areas to breed, feed and/or find shelter. Disturbing or displacing species or host plants can reduce the likelihood of breeding, feeding, or finding shelter. Invasive non-native species may be introduced which can result in increased interspecific competition and displacement, and introductions of pathogens can lead to decreased fitness of species and make them more vulnerable to diseases.

Projects funded by FEMA under the Program are limited to repair and replacement of existing facilities and natural areas, rather than new or expanded construction. Also, many of the projects are in previously disturbed areas. Many of the effects of the proposed projects funded by FEMA will be temporary and localized; conditions are expected to return to baseline levels or become better over time periods ranging from minutes (noise) to a few years (recovery of vegetation). Other actions, while seemingly minor when implemented by themselves, may have cumulative, long-term effects over time. For example, the repair of multiple erosion sites along an earthen canal or creek with riprap will have long-term, cumulative effects both upstream and downstream of each individual project site by hardening the embankment, thereby having an effect on the system's water velocity, transport volume, and other parameters, which may include water quality.

All of the covered species may be directly or indirectly affected by temporary disturbance to, or permanent loss of, suitable habitats as a result of proposed projects. Temporary and permanent habitat disturbances can adversely affect covered species by reducing the availability of key habitat components, which species need for breeding, feeding, sheltering, and dispersing. Habitat loss and disturbance may reduce prey availability and foraging habitat, remove or damage host-plant species, reduce or remove shade cover, or cause incremental degradation or temperature increases to in-water habitats. Additionally, loss of habitat can cause an increase in both interspecific and intraspecific competition leading to displacement, which ultimately decrease an individual's fitness through reduced survival and reproductive success due to physical and physiological constraints. Construction-related habitat disturbances may cause mortality or non-lethal harm such as injury to surviving individuals by being crushed by equipment, maintenance materials, or worker foot traffic.

Although permanent loss or alteration of habitat may occur as part of a Subapplicant's proposed project, this will occur infrequently, and most project footprints are small (many less than 1 acre), which will affect only small areas. For projects such as fuel reduction, erosion, and sedimentation control, these adverse effects may occur in the short term, but may ultimately result in beneficial effects to plants, wildlife, and covered species.

Removal or reduction of habitat can result in habitat fragmentation, which also can lead to isolation and edge effects. Isolation effects can negatively impact a species ability to find suitable mates thereby reducing its reproductive success. If populations are isolated for long periods of time, this can lead to inbreeding depressions which can make the population more vulnerable to stochastic events. Edge effects generally have a negative impact on both the biotic and abiotic environments. Edge effect negatively impact species through increased risk through the introduction of invasive competitors or pathogens and an increased risk of predation. Effects to the abiotic environment can also negatively impact species by increasing water and ambient temperatures leading to physiological changes that could make the habitat unsuitable for species at all life stages.

Production of noise, vibration or dust may result in an increased vulnerability to predation or desiccation; individuals displaced from protective cover are subject to predation and accidental death or injury from vehicular or foot traffic as they move across the landscape to avoid the area. Nesting birds, may be flushed from nesting areas, abandoning nests and young in response to significant noise disturbance. Eggs and young are more vulnerable to predation when adults are flushed from nests. Difficulty hearing calls from conspecifics could reduce fitness by decreasing the ability to mate, find food, or avoid predation. The potential for disturbance and will be minimized by implementing Conservation Measures that require onsite biological monitoring, worker education programs, and successful capture and relocation of individuals. The likelihood of disturbance and displacement will be further reduced by avoidance, when feasible, and buffers. Conservation measures that minimize the area disturbed by project-related activities will reduce the potential for fleeing and abandonment as a result of the action, as will the requirement to work outside of the nesting season.

Barriers to migration and movement may be temporary (during construction) or permanent and could result in partial or localized blockage of covered species migration or movement. Effects to covered species migration or movement could differ depending on the covered species, timing, and size of the project and the nature of the activity. Such barriers could result from activities such as the conversion of land to unsuitable habitat; the loss of suitable habitat associated with vegetation management; or the repair, replacement, or construction of new highways, walls, or other infrastructure.

Implementation of the proposed conservation measures will avoid or reduce the extent and severity of adverse effects. For example, requirements to conduct work outside of the sensitive periods, for breeding, nesting, migration and dispersal periods for covered species, will reduce the effects of such activities which include human disturbance and vibration and noise of construction equipment. Restoring areas to pre-project conditions will enable species to move back into areas after project completion. Providing environmental awareness training to workers and having biological monitors onsite during all construction activities will reduce or eliminate negative encounters with individuals of any of the species. Also, clearly delineating work areas and avoidance areas using appropriate construction fencing, seasonal limitations for breeding

areas, and appropriate buffers around, for instance, vernal pools. The Conservation Measures section of this PBO provides a full description of these general and species-specific protective measures

Effects of the action on aquatic species

Increased erosion, turbidity, and sedimentation may affect aquatic species, including arroyo toads, California red-legged frog and California tiger salamander eggs and larvae, tidewater goby, and vernal pool species. Effects include reduced visibility of prey or forage items, respiratory stress, temperature changes, and in severe cases, suffocation and damage to gills, lungs, or other organs.

Heavy equipment use during in-water work activities such as installing temporary diversions or dewatering, may cause increased sedimentation. Construction-generated dust may be deposited into nearby waters and vegetation, and terrestrial or riparian vegetation removal and fuel reduction activities may increase erosion and sedimentation during storm runoff events. These activities can lead to the smothering of eggs thereby interfering with the species ability to complete its life cycle. Arroyo toad, California red-legged frog and California tiger salamander eggs may be smothered by excessive silt and larvae may have difficulty locating food in turbid waters.

Pile driving, in-water drilling, cutting, or excavation can have short-term adverse effects on covered aquatic species such as the arroyo toad, California red-legged frog, and tidewater goby, by increasing in-water noise and vibration. For example, pile driving in or adjacent to water causes high-intensity sound, which acts as a pressure wave that can collapse burrows of tidewater gobies.

For most covered projects, implementing the proposed conservation measures will likely reduce the aforementioned adverse effects to covered species, their prey, and their habitats within vernal pools and other aquatic habitat. These measures include restricting work during seasonal work windows, restricting the entry of heavy equipment into waterbodies, and establishing upland staging areas for equipment and materials. Installing silt fences, sediment curtains, and hay bales will reduce effects from erosion, turbidity, and sedimentation; the dewatering of work areas will minimize the amount and duration of suspended sediment. The Conservation Measures section of this PBO provides a full description of these general and species-specific measures.

Arroyo Toad, California red-legged frog, and California tiger salamander

In addition to the aforementioned effects for all species and for aquatic species, arroyo toad, California red-legged frog, and California tiger salamander are also susceptible to additional effects. Actions within riparian habitats, ponded features, and surrounding upland habitat for arroyo toads, California red-legged frogs, and California tiger salamanders may directly and indirectly adversely affect these species. Personnel, equipment, or materials entering the streambed or waterbody could injure or kill amphibians by trampling or crushing adults,

tadpoles, or eggs. Construction activity can lead to increased erosion and in-water work can stir up sediment; this can settle out and cover eggs leading to injury or mortality, and increase turbidity rendering adults and juveniles less able to detect prey or predators. The Subapplicant would minimize these effects by having a VFWO-approved biologist onsite, conducting pre-construction surveys, inspecting the action area and all equipment/materials, and providing construction awareness training to project staff. The Subapplicant will further minimize effects through the implementation of an Erosion Control Plan to ensure that sediment-control devices are installed and maintained, and that all disturbed soils at the site will undergo erosion control treatment before the rainy season starts. Previously disturbed or developed areas will be used for staging equipment, and heavy equipment will avoid flowing water other than temporary crossing or diverting activities.

If dewatering or heavy equipment use is necessary in occupied habitat, a VFWO-approved biologist will capture and relocate arroyo toad, California red-legged frog, and California tiger salamander individuals to minimize the chance of injury or mortality. Capture and relocation would annoy and potentially harm or kill individuals. Chytrid fungi may be spread to arroyo toad, California red-legged frogs, and California tiger salamanders during capture and relocation if done without proper handling techniques and practices.

Any individuals that avoid detection and capture and remain in the construction zone or dewatered area may be subjected to trampling, crushing, or disturbance from project activities. Egg masses or egg strands would be stranded, likely leading to mortality from desiccation. Pumping could suck in and trap eggs and tadpoles. Temporary indirect effects as a result of dewatering or heavy equipment use include reducing available habitat, altering behavior, and preventing movement of tadpoles. Altering flow by rerouting streams, dewatering, removing or installing a dam, etc. would affect these species downstream by increasing temperature, turbidity, and/or aquatic habitat availability.

The Subapplicant will avoid or minimize these effects by ensuring that water intakes will be completely screened with wire mesh not larger than 5 millimeters and the intake should be placed using a method to attenuate suction, such as a perforated bucket, to prevent arroyo toads, California red-legged frogs, and California tiger salamanders from entering the pump system. Pumped water will be carefully released so that it does not contribute to turbidity in nearby waters so as not cause to erosion and avoids and minimizes streambed structure and water flow alteration. Temporary culverts to convey live flow during construction activities will be placed at stream grade and be of an adequate size as to not increase stream velocity.

Ground disturbing activities in uplands occupied by arroyo toads, California red-legged frogs, and California tiger salamanders could directly injure or kill individuals by crushing, trampling, or entrapping adults or juveniles. Arroyo toads, California red-legged frogs, and California tiger salamanders may become trapped within natural and artificial structures by falling into trenches, sheltering in pipes, debris piles, and equipment and be injured or killed if they are not detected, captured, and relocated.

Project activities such as dredging, and installing bank protection or culverts may alter an area in a way that makes it uninhabitable for submergent and emergent vegetation. Riparian habitat is important for arroyo toads and California red-legged frogs to shelter, forage, and breed. A decrease or elimination of aquatic and riparian plants would increase this species' vulnerability to predation and desiccation and may increase water temperature due to decreased shading. To minimize these effects the Subapplicant would return contours of the streambed, vegetation, and stream flows to their pre-construction condition or better. This consultation anticipates that most activities will occur within a footprint that has been previously disturbed.

Arroyo toad, California red-legged frog and California tiger salamander riparian habitat can become isolated and fragmented due to the proposed covered activities. The fragmentation and isolation of a subpopulation can lead to a decline in dispersal between subpopulations, jeopardizing the metapopulation. The isolated populations then can become vulnerable to local extinction due to stochastic environmental and human-induced events. Additionally, removal of riparian cover can also have negative effects on reproductive success of all three species by allowing more solar radiation to heat pools and slow moving streams. Since egg masses are dependent on specific temperatures, incremental changes to water temperatures may reduce reproductive success of these amphibians. Lastly, the California tiger salamander is dependent on barrier-free landscapes for successful migration and dispersal. Thus, fragmentation or other barriers will reduce connectivity of the metapopulation, isolating subpopulations making them more vulnerable to stochastic events and less likely to be recolonized if extirpated.

The Santa Barbra Distinct DPS of California tiger salamanders are particularly vulnerable. To minimize the types of adverse effects listed above, FEMA has proposed to follow the Service's conservation strategy for the Santa Barbara DPS which requires that effects to specific metapopulations be offset such that isolation and fragmentation does not occur on a level that will lead to local extirpations. Additionally, we anticipate projects covered under this PBO will generally impact less than 1 acre of habitat each and will occur in previously disturbed areas. With implementation of the proposed conservation measures we do not anticipate these effects to cause local extirpations of any California red-legged frogs, arroyo toads, or California tiger salamander populations.

Conservancy fairy shrimp and vernal pool fairy shrimp

In addition to the aforementioned effects for all species and for aquatic species, vernal pool branchiopods are also susceptible to additional effects. Conservancy and vernal pool fairy shrimp use a variety of habitats from typical vernal pools with vegetation rings characteristic of such features, to seasonally inundated depressions that hold water for a sufficient period for branciopods to complete their life cycle but not sufficient to establish vegetation typical of vernal pools. Vernal pool habitats are in areas with specific soil, geology, and microtopography, making them highly susceptible to degradation from environmental changes. FEMA proposes to avoid direct affects to occupied habitat for conservancy and vernal pool fairy shrimp. Depending on the nature and location of the project, indirect effects could alter the hydrology, surrounding vegetation, and sedimentation rate. These indirect effects have the potential to affect the habitat

characteristics that vernal pool branchiopods require, leading to reduced or eliminated populations from affected features.

Many vernal pool areas contain hardpan soils that, if disturbed, will no longer hold water appropriately. Vernal pools also rely on runoff from surrounding areas during winter rains to refill. Re-grading these areas may affect the flow of water and alter the amount of water entering the vernal pool. These activities, as well as effects from erosion, dust, and construction activities may temporarily or permanently alter vernal pool habitat, making such areas less suitable for the covered species occupying the habitat. Vernal pool species are especially vulnerable to alterations in the existing hydrology of vernal pool habitats, because the timing, water depth, and inundation period determines which vernal-pool branchiopods are able to reproduce and persist in a given vernal pool. For example, indirect alterations to the hydrology of vernal pool habitats can result in too little soil moisture for the hatching of vernal pool branchiopod eggs. Indirect alterations to the hydrology of vernal pool habitats may also cause vernal pools to dry too fast, or cause vernal pool water temperatures to increase too soon for a vernal pool species to complete its lifecycle and reproduce.

This PBO does not cover proposed projects that involve placement of fill material in, or excavation of, any vernal pools (wet or dry) as this will require a separate section 7 consultation. However, grading, excavation and filling outside of a vernal pools may have indirect effects on vernal swales and vernal complexes by altering the natural hydrology either upstream or downstream. This can cause unseasonal drying or flooding that can negatively affect species that occupy vernal pool habitats, which can lead to species unable to complete their life cycle. Upland habitat and swales around a vernal pool and within a vernal pool complex are essential to the hydrological and biological integrity of the vernal pool and complex. Typically, if any portion of a vernal pool is affected, then the entire vernal pool is considered affected. Where the reach of these indirect effects cannot be determined definitively, the Service considers most activities in areas within 250 feet of a vernal pool to have potential for indirect effects.

The proposed general and species specific conservation measures will minimize adverse effects. These measures include pre-construction surveys, construction monitoring by a VFWO-approved biologist, establishing construction work windows and activity buffers, and identifying and flagging sensitive areas. Mortality-related effects will be minimized by buffers. The Conservation Measures section of this PBO provides a full description of these general and species-specific conservation measures.

The natural history of both Conservancy and vernal pool fairy shrimp make them difficult to locate and many areas of suitable habitat have not been surveyed. Projects that occur under this program may inadvertently occur in occupied areas. The Subapplicant would minimize the risk of this occurring by providing the Service with a habitat assessment survey completed by a VFWO-approved biologist with demonstrable experience with the diversity of habitat types in which listed branchiopod species can occur. This would include all suitable conservancy and

vernal pool fairy shrimp habitat, including the basin/inundation feature(s) where fairy shrimp and/or resting eggs would be found, and the area of the watershed needed to support the feature(s).

Tidewater goby

In addition to the aforementioned effects for all species and for aquatic species, tidewater goby are also susceptible to additional effects. Any in-water work within occupied habitat can directly affect the tidewater goby through injury or mortality caused by trampling, crushing, or entrapment. Personnel or equipment entering the streambed or waterbody could trample, crush, or entrap all life stages in burrows, and even displace individuals from their habitat if they are caught in equipment or debris during removal. Project activities that include removing debris such as wood and sediment could disturb the substrate and potentially bury burrows. The subapplicant would minimize these effects by having a VFWO -approved biological monitor onsite who would survey for tidewater gobies and assess turbidity levels within the work areas. If necessary, a VFWO -approved biologist may capture and relocate tidewater gobies to suitable habitat, which would annoy individuals and potentially lead to injury or mortality.

Debris removal may also indirectly affect this species. Project activities could reduce habitat quality by increasing turbidity and erosion, removing emergent vegetation that shade aquatic habitat, or removing submerged vegetation, substrate, or other features that are used as foraging habitat or shelter for the tidewater goby. Increasing turbidity may affect this species by decreasing water clarity and rendering individuals less able to detect prey or predators. When the particles in the water settle, burrows and eggs could be covered in sediment, thus reducing water and oxygen circulation to embryos. Removing habitat complexity such as submerged or emergent vegetation exposes tidewater gobies to increased predation from other fish and birds because it would remove shelter and shaded areas. The subapplicant would minimize these effects by preparing an Erosion Control Plan that includes erosion and sedimentation control measures for areas where disturbed substrate may potentially wash into waters via rainfall or runoff, particularly around stockpiled material and at the downstream end of each project reach. Bank stabilization activities may also be implemented to minimize erosion potential and would contain design elements suitable for supporting riparian vegetation.

Removing debris that block flow in streams and in lagoons would reduce barriers to fish movement. If debris is blocking the mouth of a lagoon, removing this debris could restore natural tidal flow and allow dispersal when the lagoon is intermittently breached, which is necessary for this species to maintain its metapopulation structure. However, artificially causing a sudden breaching event, especially outside the typical wet season, would not give this species warning through environmental cues and could flush tidewater gobies out to the ocean or strand them on sand banks, leaving them vulnerable to predation and desiccation.

Depending on the location of the project, indirect effects from road and trail, utility, and rail line construction activities could increase sedimentation and turbidity in tidewater goby habitat. The Subapplicant would minimize these effects by preparing an Erosion Control Plan that takes into

account erosion and sedimentation control measures in all areas where disturbed substrate may potentially wash into waters via rainfall or runoff, particularly around stockpiled material and at the downstream end of each project reach.

Overall, we anticipate that individual projects will be limited in size (generally affecting less than 1 acre of occupied tidewater goby habitat), and that projects will most commonly be located in previously-disturbed areas. With implementation of the avoidance and minimization measures, we do not anticipate that actions covered under this PBO will cause, or substantially contribute to, the extirpation of any occupied estuary/lagoon.

California gnatcatcher and Riparian Birds: Least Bell's vireo, southwestern willow flycatcher, and yellow-billed cuckoo

Coastal California gnatcatchers and the listed riparian birds (least Bell's vireo, southwestern willow flycatcher, and yellow-billed cuckoo) may be indirectly affected by project activity through disturbance and habitat modification. Increased activity and significant noise disturbance and vibration from heavy machinery operation and foot traffic in riparian corridors or scrub habitat can cause these species to abandon the habitat and potentially abandon nesting attempts or active nests. Eggs and young are more vulnerable to predation when adults are flushed from nests.

The riparian birds are migratory and are only anticipated to be present during spring summer months, but coastal California gnatcatchers are non-migratory and will be present year-round. Activities that disturb habitat for riparian birds in the non-breeding season, can have adverse effects to birds returning to their territories the following year. Activities that disturb habitat for coastal California gnatcatchers can have impacts to the birds year-round; however during the non-breeding season gnatcatchers can move away from work areas to other suitable habitat. To minimize effects to nesting birds, clearing of vegetation within occupied, or potential suitable habitat will occur outside the respective breeding seasons to the maximum extent possible. If work must proceed during the breeding season, surveys will be conducted to identify and avoid nesting birds by establishing no-work buffer zones around nests. Despite efforts to identify and avoid nesting birds, adverse effects may still occur if birds are missed during surveys, or if surveys and project activities displace birds from otherwise suitable habitat.

Since nests will be protected from direct impacts, eggs and nestlings will not be directly impacted under the proposed action. However, the proposed projects could result in the removal of vegetation, thus reducing the availability of foraging and nesting resources. Project activities could also result in the introduction and/or spread of the nonnative plant species, particularly giant reed, which can form dense stands that are unsuitable for riparian birds. Destruction of habitat outside the breeding season could impact individuals returning to previous nest sites. Individuals could be forced to compete with each other when attempting to expand an existing territory or establish a new territory or miss the opportunity to breed. Also, if displaced birds cannot find suitable habitat to forage and shelter in, they will be more vulnerable to predation and may die or be injured. Individuals that successfully establish territories in adjacent habitat

are expected to experience reduced productivity (e.g., delayed initiation or prevention of nest building, fewer nesting attempts per season, and/or overall reduction in reproductive output) due to reduced availability of foraging and breeding habitat and increased territorial interactions.

Projects that require lighting could result in direct and indirect effects on the covered species. Direct effects to covered bird species will be primarily associated with changes in behavior. Lights may cause disruption, such as disorientation, in local, seasonal, or long-distance dispersal or migration events. These effects may be temporary or permanent, and may alter breeding or foraging behaviors, or affect the ability of species to find or return to breeding territories.

No permanent loss of occupied or designated critical habitat will occur within or outside of the breeding season under this PBO. For any specific project, temporary impacts on occupied or designated critical habitat will be limited to a maximum of 1 acre. Temporary impacts from all the projects covered under this PBO will also be limited to a maximum of 20 acres of occupied or designated critical habitat.

Smith's blue butterfly

Ground disturbance or vegetation clearing in areas of occupied Smith's blue butterfly habitat could directly affect this species if larvae or pupae associated with host buckwheat plants or in the surrounding soil are crushed, trampled, or entombed, leading to injury or death. Foot and vehicular traffic from constructing or modifying facilities, along with ongoing disturbance from operation and maintenance of these facilities, could startle Smith's blue butterflies and cause them to abandon a safe area, thus making them more vulnerable to predation or collisions with vehicles.

If seacliff or coast buckwheat plants must be removed during the implementation of a project, this not only could lead to injury or mortality by directly removing larvae living on host plants or pupae in surrounding soil and duff, but it would also remove habitat for Smith's blue butterfly. In addition to reducing sheltering and foraging opportunities for this species, habitat loss can also decrease connectivity and lead to isolated populations that are less resilient to stochastic events. The Subapplicant would minimize these effects by having a VFWO-approved biologist onsite in areas with buckwheat plants, implementing measures such as restricting speed limits to 20 mph when travelling off of highways or county roads (15 mph in the project footprint), holding a construction awareness training for project staff, and avoiding damage or removal of seacliff and coast buckwheat. Furthermore, relocating facilities and roads to areas that do not contain or encroach on suitable habitat (thereby reducing foot and vehicular traffic), along with revegetating areas with native species could be beneficial to the species.

Construction-related noise can also adversely affect covered butterfly species, by startling them away from a safe area thus making them more vulnerable to collisions with vehicles and equipment and predation by other species.

Effects to Critical Habitat

As described above, the Action Area encompasses the entire VFWO jurisdiction and all critical habitat units within the VFWO's jurisdiction for the arroyo toad, California red-legged frog, California tiger salamander (Central DPS and Santa Barbara DPS), conservancy fairy shrimp, coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, tidewater goby, and vernal pool fairy shrimp. The Service anticipates that projects funded by FEMA could negatively affect some of the critical habitat units and PBFs for these species within the Action Area.

Arroyo toad Critical Habitat

The Service anticipates effects could occur to PBF 1 (rivers or streams), PBFE 2 (alluvial streamside terraces), and PBF 4 (dispersal and connectivity habitat) through implementation of a variety of ground disturbing activities associated with individual projects covered under the PBO. PBF 3 (flooding regime) may be impacted by installation of structures that modify the hydrogeology of arroyo toad habitat, such as levees or other hardened surfaces. These effects would be minimized by FEMA's proposed measure to avoid permanent impacts to critical habitat unless the impact is so small that it will have a negligible effect on habitat quality for arroyo toads. Therefore, we do not expect any appreciable reduction in the ability of the critical habitat to provide for the survival and recovery of arroyo toads.

California Red-Legged Frog Critical habitat

The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1 (aquatic breeding habitat), PBF 2 (non-breeding aquatic habitat), PBF 3 (upland habitat), and PBF 4 (dispersal habitat) of the California red-legged frog critical habitat within the Action Area. However, these activities will likely result in minor effects to habitat as most projects will restore the area to pre-disaster conditions. The Action Area contains aquatic breeding and non-breeding habitat (PBFs 1 and 2) in the form of ponds, creeks, and streams. This habitat could be affected by construction activities through erosion from project activities such as culvert replacement, though following conservation measures will minimize these effects. However, constructing flood control structures such as levees could channelize the applicable waterway permanently affecting the PBFs making them less suitable for the California red-legged frog. Some permanent activities are proposed such as constructing new facilities or relocating existing facilities outside of disaster prone areas. These activities will permanently affect upland and dispersal habitat (PBFs 3 and 4) by installing structures on high quality habitat which will remove upland areas for the California red-legged frog to hide and will create barriers to movement to and from aquatic areas. However, the footprint of the project will confine these effects to a small area. When implemented with both the general and species-specific conservation measures, these proposed activities will not prevent critical habitat from providing essential conservation values for the California red-legged frog. Therefore, we do not expect any appreciable reduction in the ability of the critical habitat to provide for the survival and recovery of California red-legged frogs.

California Tiger Salamander (Central California and Santa Barbara DPS) Critical Habitat

The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1 (aquatic breeding habitat), PBF 2 (upland habitat), and PBF 3 (dispersal habitat) of the California tiger salamander critical habitat within the Action Area. However, these activities will likely result in minor effects to habitat as most projects will restore the area to pre-disaster conditions. Activities with a larger effect are those that will construct new facilities such as developing demonstration projects. These projects have to potential to fill aquatic breeding habitat (PBF 1), excavate and fill burrow systems (PBF 2), and construct barriers that prevent movement to and from breeding sites (PBF 3). When implemented with both the general and species-specific conservation measures, these activities will not prevent critical habitat from providing essential conservation values for the California tiger salamander. Therefore, we do not expect any appreciable reduction in the ability of the critical habitat to provide for the survival and recovery of California tiger salamander.

Conservancy Fairy Shrimp and Vernal Pool Fairy Shrimp Critical Habitat

The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1 (topographic features), PBF 2 (depressional features), PBF 3 (food sources), and PBF 4 (shelter) of the vernal pool branchiopods critical habitat within the Action Area. However, these activities will likely only result in minor effects to habitat as most projects will restore the area to pre-disaster conditions. Activities associated with the proposed action could negatively impact all four PBFs if activities are located adjacent to vernal pool branchiopod critical habitat. The habitat could be affected by construction activities that divert extra water to or from the vernal pool critical habitat. Altering the topography of adjacent sites could negatively impact PBF 2 by altering the frequency and duration of filling. Additionally, this change could affect prey species (PBF 3) and vernal pool plants that provide shelter (PBF 4). However, project footprints will confine these effects to a small area. When implemented with both the general and species-specific conservation measures, these activities will not prevent critical habitat from providing essential conservation values for the vernal pool branchiopods. Therefore, we do not expect any appreciable reduction in the ability of the critical habitat to provide for the survival and recovery of conservancy fairy shrimp and/or vernal pool fairy shrimp.

Coastal California Gnatcatcher Critical Habitat

The Service anticipates effects could occur to PBFs 1 (i.e., sage scrub) and 2 (i.e., non-sage scrub habitat associated with sage scrub, including chaparral, grassland, and riparian habitat) of gnatcatcher critical habitat via removal during construction and maintenance activities. However, temporary impacts from all will be limited to a maximum of 1 acre of designated critical habitat per project and twenty acres of gnatcatcher designated critical habitat overall and no permanent loss of habitat is expected. Thus, impacts should be small in scale, spread out over the range of the species, and intermittent over the life of the project and impact a small proportion of the approximately 197,303 acres of designated critical habitat for this species. Therefore, no appreciable reduction in the ability of the critical habitat to provide for the survival and recovery

of this species is expected. Therefore, we do not expect any appreciable reduction in the ability of the critical habitat to provide for the survival and recovery of coastal California gnatcatcher.

Least Bell's Vireo Critical Habitat

The Service anticipates that activities associated with the proposed action could negatively affect the PBFs, which are described as riparian woodland vegetation that generally contains both canopy and shrub layers, and includes some associated upland habitats. Activities that may negatively affect least Bell's vireo critical habitat include removal or destruction of riparian vegetation; thinning of riparian growth, particularly near ground level; removal or destruction of adjacent chaparral or other upland habitats used for foraging; and increases in human-associated or human-induced disturbance. The overall area of critical habitat that is anticipated to be impacted by projects covered under this PBO is small in comparison to any individual critical habitat unit. FEMA proposes no permanent loss of designated critical habitat for least Bell's vireo, unless the impacts are determined to have a negligible effect on habitat quality for least Bell's vireo. Therefore, no appreciable reduction in the ability of the critical habitat to provide for the survival and recovery of least Bell's vireo is expected.

Southwestern Willow Flycatcher Critical Habitat

The Service anticipates that activities associated with the proposed action could negatively affect PBF 1(riparian habitat) and PBF 2 (a variety of insect prey). Activities that may negatively affect southwestern willow flycatcher critical habitat include removal or destruction of riparian vegetation; thinning of riparian growth; and increases in human-associated or human-induced disturbance. The overall area of critical habitat that is anticipated to be impacted by projects covered under this PBO is small in comparison to any individual critical habitat unit. FEMA proposes no permanent loss of designated critical habitat for southwestern willow flycatcher, unless the impacts are determined to have a negligible effect on habitat quality for southwestern willow flycatcher. Therefore, no appreciable reduction in the ability of the critical habitat to provide for the survival and recovery of southwestern willow flycatcher is expected.

Tidewater Goby Critical Habitat

The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1a (substrate), PBF 1b (aquatic vegetation), PBF 1c (sandbars) of the tidewater goby critical habitat within the Action Area. However, these activities will likely result in minor effects to habitat as most projects will restore the area to pre-disaster conditions. As the specific PBFs are flexible depending on the water level, repairing coastal features such as coastal flood-control structures could affect the PBFs by shrinking the amount of available habitat that fall within the PBFs should the repair extend outside of the original footprint. When implemented with both the general and species-specific conservation measures, these activities will not prevent critical habitat from providing essential conservation values for the tidewater goby.

Therefore, no appreciable reduction in the ability of the critical habitat to provide for the survival and recovery of tidewater goby is expected.

Summary of effects to Critical Habitat

Most of the covered activities will only result in minor effects limited to small areas. These activities are not likely to diminish the quality of PBFs in a unit for any of the covered species critical habitat. While disturbance within critical habitat may prevent some covered species from using portions of the critical habitat for essential life function whether temporarily or permanently, they will still be able to complete their essential ecological and biological functions in the remaining areas of critical habitat. Therefore, all critical habitat units will retain their PBFs and the PBFs within each critical habitat unit for each covered species will still remain functional. Consequently, the designated critical habitat for all covered species will still be able to perform its intended functions and conservation role.

In conclusion, the Service determines that the majority of activities associated with any proposed projects will result in only minor effects to PBFs, and with implementation of the conservation measures, will not prevent critical habitat from providing essential conservation values. The restoration of native vegetation, removing invasive species, improving water quality and hydrology, stabilizing eroding banks, reducing sedimentation, replacing structures that form partial or complete barriers to movement, and vegetation management to reduce wildfire risk will have negligible or beneficial effects to critical habitat. This determination is further based on the fact that projects funded by FEMA primarily will occur in previously disturbed areas, and the project footprint of most individual projects will be small in size and impact. The Service anticipates that habitat loss and degradation at individual project sites will be minimal and implementation of conservation measures will further minimize effects.

Effects to Recovery

The proposed activities do not conflict with the recovery actions or goals described in the draft recovery plan or the 5-year review because permanent loss of habitat is not expected and temporary impacts should be small in scale, spread out over the range of the species, and intermittent over the life of project activities. Further, the potential for impacts from the project activities are effectively minimized due to the proposed conservation measures. Finally, the number of individuals that may be affected is a small proportion of the total and regional populations. Additionally, we do not expect the proposed project to appreciatively reduce the recovery capacity of any of the 12 listed entities covered in this PBO because FEMA, in coordination with the Service, has developed procedures for implanting its disaster mitigation, and preparedness programs within the context of listed species conservation. In addition to the comprehensive list of conservation measures that are directed towards the protection of the habitat and, therefore, the long-term protection of individual species, FEMA has committed to educating Subapplicants about species conservation and encouraging them to proactively implement conversation measures; educating Subapplicants on conservation efforts at the project design and project planning levels; and is incorporating an ecosystem services approach into

FEMA's decision-making process. Thus, overall, FEMA's commitment to implement a meaningful section 7(a)(1) program within their authority will likely help improve the status of the species covered in this PBO.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this PBO. We do not consider future Federal actions that are unrelated to the proposed action in this section because they require separate consultation pursuant to section 7 of the Act. The following actions may affect the species covered in this PBO by directly or indirectly harming individuals or by adversely affecting designated or proposed critical habitats.

An undetermined number of future land use conversions and routine land management practices are anticipated to be implemented and are often not reviewed for environmental compliance under the federal permitting process. These activities may alter the habitat or increase incidental take of federally-listed species and are cumulative to the proposed programmatic actions. These cumulative effects include, for example:

- Ongoing land conversion leading to continued habitat loss, fragmentation, or degradation;
- Increased recreational activities such as off-road vehicle use, golf courses, species collecting, bike and equestrian use, wave action in water channels caused by boats;
- Increased mining, oil and gas exploration and production, incompatible grazing, and unsustainable timber harvesting;
- Increased invasive species and predation that generally accompany urban expansion;
- Increased mosquito abatement programs (that introduce exotic fish into breeding and non-breeding ponds impact the reproductive success of amphibians.
- Dredging and clearing of vegetation from irrigation canals;
- Deep-ripping, discing or mowing upland habitat;
- Use of burrow fumigants on levees or in other potential upland refugia;
- Use of plastic erosion control netting; and
- Point and non-point source chemical contaminant discharges (e.g., selenium, pesticides, herbicides, fuels, and other toxic substances).

CONCLUSION

The regulatory definition of "to jeopardize the continued existence of the species" focuses on assessing the effects of the proposed action on the reproduction, numbers, and distribution, and their effect on the survival and recovery of the following species being considered in the PBO:

- Arroyo toad
- California red-legged frog
- California tiger salamander – Central California DPS and Santa Barbara DPS
- Conservancy fairy shrimp

- Vernal pool fairy shrimp
- Tidewater goby
- Coastal California gnatcatcher
- Least Bell's vireo
- Southwestern Willow Flycatcher
- Yellow-billed cuckoo
- Smith's blue butterfly

Reproduction

FEMA and the Service worked extensively in coordinating a comprehensive suite of general and species-specific conservation measures designed with species conservation in mind. While temporary decreased fitness to individuals may occur as a result of projects implemented under this PBO, we do not expect those effects to be significant or meaningful at a population or species level. Consequently, we do not anticipate the actions covered within this PBO to impact reproduction of any of the listed species to the extent that it "reduces appreciably the likelihood of both the survival and recovery" of the aforementioned species.

Numbers

FEMA and the Service worked extensively in coordinating a comprehensive suite of general and species-specific conservation measures designed with species conservation in mind. While temporary reduction of numbers may occur within individual populations as a result of projects implemented under this PBO, we do not expect those effects to be significant or meaningful at a population or species level. Consequently, we do not anticipate the actions covered within this PBO to impact the numbers of any of the listed species to the extent that it "reduces appreciably the likelihood of both the survival and recovery" of the aforementioned species.

Distribution

FEMA and the Service worked extensively in coordinating a comprehensive suite of general and species-specific conservation measures designed with species conservation in mind. While temporary impacts to individuals may occur as a result of projects implemented under this PBO, we do not expect those effects to be significant or meaningful at a population or species level. Consequently, we do not anticipate the actions covered within this PBO to impact distribution of any of the listed species to the extent that it "reduces appreciably the likelihood of both the survival and recovery" of the aforementioned species.

After reviewing the current status of the 12 listed entities covered by this PBO, the species' status, environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that FEMA's Program in California, as proposed, is not likely to jeopardize the continued existence of the following species:

The Service reached this conclusion because the project-related effects to the species, when

added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of the species based on the following:

(1) FEMA, in coordination with the Service, has proposed an extensive suite of general and species-specific conservation measures to be implemented for each project that are directed towards the protection of the habitat and, therefore, the long-term protection of individual species; (2) most individual project areas will have small footprints (less than 1 acre), therefore, not all populations or habitats will be affected by the proposed actions; and (3) FEMA will initiate individual section 7 consultations on all actions involving species and projects that do not specifically qualify for coverage under this PBO, as described in the PBA.

Critical Habitat

After reviewing the current status of the designated critical habitat, the environmental baseline of critical habitat for the action area, the effects of the proposed action(s) on critical habitat, and the cumulative effects, it is the Service's biological opinion that the action(s), as proposed, is not likely to result in the destruction or adverse modification of critical habitat of the following species:

- Arroyo toad
- California red-legged frog
- California tiger salamander – Central California DPS and Santa Barbara DPS
- Conservancy fairy shrimp
- Vernal pool fairy shrimp
- Tidewater goby
- Coastal California gnatcatcher
- Least Bell’s vireo
- Southwestern Willow Flycatcher

The Service reached this conclusion because the project-related effects to the designated critical habitat for these species will not rise to the level of precluding the function of the respective critical habitat to serve its intended conservation role for the species based on the following: (1) FEMA, in coordination with the Service, has proposed an extensive suite of general and species-specific conservation measures that will be implemented for each project; (2) the majority of the effects of the projects are temporary and not persistent; (3) most of the projects restore structures such as roads, bridges, or other pre-existing facilities that are not in themselves physical and biological features essential to species’ conservation; and (4) the effects to critical habitat for these species are small and discrete, relative to the entire area designated, and are not expected to appreciably diminish the value of the critical habitat or prevent it from sustaining its role in the conservation of these species.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened wildlife species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not the purpose of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

In June 2015, the Service finalized new regulations implementing the incidental take provisions of section 7(a)(2) of the Act. The new regulations also clarify the standard regarding when the Service formulates an Incidental Take Statement [50 CFR 402.14(g)(7)], from "…if such take may occur" to "…if such take is reasonably certain to occur." This is not a new standard, but merely a clarification and codification of the applicable standard that the Service has been using and is consistent with case law. The standard does not require a guarantee that take will result; only that the Service establishes a rational basis for a finding of take. The Service continues to rely on the best available scientific and commercial data, as well as professional judgment, in reaching these determinations and resolving uncertainties or information gaps.

AMOUNT OR EXTENT OF TAKE

We anticipate that some arroyo toads, California red-legged frogs, California tiger salamanders (Central California and Santa Barbara Distinct Population Segments), California coastal gnatcatcher, conservancy fairy shrimp, least Bell's vireo, smith's blue butterfly, southwestern willow flycatcher, tidewater goby, and yellow-billed cuckoos could be taken as a result of the proposed action. We expect the incidental take to be in the form of lethal and non-lethal harm through capture and relocation, habitat disturbance that displaces listed species, or activities in occupied habitat that results in injury or death of listed species.

We cannot quantify the precise number of covered species that may be taken as a result of the actions that FEMA has proposed for multiple reasons. Individuals move over time; for example, animals may have entered or departed the action area since the time of pre-construction surveys. Other individuals may not be detected due to their cryptic nature, small size, and low mobility. The protective measures proposed by FEMA are likely to prevent mortality or injury of most individuals. In addition, finding a dead or injured covered species is unlikely.

Consequently, we are unable to reasonably anticipate the actual number of covered species that would be taken by the proposed project; however, we must provide a level at which formal consultation would have to be reinitiated. The Environmental Baseline and Effects Analysis sections of this PBO indicate that adverse effects to covered species would likely be low given the extensive suite of conservation measures, and we, therefore, anticipate that take of covered species would also be low. We also recognize that for every individual found dead or injured, other individuals may be killed or injured that are not detected, so when we determine an appropriate take level we are anticipating that the actual take would be higher and we set the number below that level.

Arroyo Toad

The Service anticipates that incidental take of the arroyo toad associated with FEMA's proposed action may occur from project activities within occupied aquatic and upland habitat. Individuals may be subject to take in the form of non-lethal harm during relocation of animals that are found in the work area, and take in the form of injury or death if arroyo toads go undetected in the work area and are crushed or otherwise directly or indirectly impacted by project activities. The Service anticipates impacts to not more than 1 acre of occupied habitat at any given project site, and a maximum of 10 acres of impacts to occupied habitat overall for all projects for the five-year term of the PBO.

The Service anticipates and is exempting take incidental to the proposed action in the form of harm, injury, or death of no more than three juvenile or adult arroyo toads and no more than 1 egg strand per site per year; and/or no more than 20 juveniles or adult arroyo toads and no more than 5 egg strands total for all sites for the 5-year duration of this PBO. Additionally, the service is exempting all take in the form of capture and relocation for the project footprint.

Accordingly, the Service concludes that the incidental take of arroyo toads will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. More than one (1) acre of occupied habitat is impacted at any given project site;
2. More than ten (10) acres of occupied habitat are impacted during the 5-year duration of the PBO;
3. Death or injury of more than three (3) juvenile or adult arroyo toads and one (1) egg strand at any individual site;
4. Death or injury of more than twenty (20) juveniles or adults and five (5) egg strands for the 5-year duration of the PBO.

California Red-legged Frog

The Service anticipates that incidental take of California red-legged frogs associated with FEMA's proposed action may occur from project activities within occupied aquatic and upland habitat. Individuals may be subject to take in the form of non-lethal harm during relocation of

animals that are found in the work area, and harm in the form of injury or death if California red-legged frogs go undetected and are crushed or otherwise directly or indirectly impacted by project activities. The Service anticipates that individual projects will generally impact 1 acre of occupied habitat or less, and a maximum of 50 acres of impacts to occupied habitat will occur overall for all projects during the five-year term of the PBO.

The Service anticipates and is exempting take incidental to the proposed action in the form of harm, injury, or death of no more than three juvenile or adult California red-legged frogs and no more than 1 egg mass per site per year; and/or no more than 30 juveniles or adult California red-legged frogs and no more than 5 egg masses total for all sites for the 5-year duration of this PBO. Additionally, the service is exempting all take in the form of capture and relocation for the project footprint.

Accordingly, the Service concludes that the incidental take of California red-legged frogs will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. More than fifty (50) acres of occupied habitat are impacted during the five-year term of the PBO;
2. Death or injury of more than three (3) juvenile or adult California red-legged frogs or one (1) egg mass at any individual site; or
3. Death or injury of more than thirty (30) juveniles or adults and five (5) egg masses total for all sites for the 5-year duration of the PBO.

<u>California Tiger Salamander – Central California DPS</u>

The Service anticipates that incidental take of California tiger salamanders in the Central California DPS may occur during FEMA's proposed from project activities that directly and indirectly affect occupied aquatic and upland habitat. Individuals may be subject to take in the form of non-lethal harm during relocation of California tiger salamanders that are found in the work area, and harm in the form of injury or death if California tiger salamanders go undetected and are crushed or otherwise impacted by project activities. The Service anticipates that individual projects will impact 1 acre of occupied habitat or less, and a maximum of 20 acres of impacts to occupied habitat will occur overall for all projects during the five-year term of the PBO.

The Service anticipates and is exempting take incidental to the proposed action in the form of harm, injury, or death of no more than three juvenile or adult California tiger salamanders per site per year; no more than 30 juveniles or adult California tiger salamanders total for all sites for the 5-year duration of this PBO. Additionally, the service is exempting all take in the form of capture and relocation for the project footprint.

Accordingly, the Service concludes that the incidental take of California tiger salamanders will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. More than one (1) acre of occupied habitat is impacted at any given project site;
2. More than twenty (20) acres total of occupied habitat is impacted by all projects over the 5-year duration of the PBO;
3. Death or injury of more than three (3) juvenile or adult California tiger salamanders at any individual project site; or
4. Death or injury of more than ten (30) juvenile or adults California tiger salamanders for all sites for the 5-year duration of the PBO.

California Tiger Salamander – Santa Barbara DPS

The Service anticipates that incidental take of California tiger salamanders in the Santa Barbara DPS may occur during FEMA's proposed from project activities that directly and indirectly affect occupied aquatic and upland habitat. Individuals may be subject to take in the form of non-lethal harm during relocation of California tiger salamanders that are found in the work area, and harm in the form of injury or death if California tiger salamanders go undetected and are crushed or otherwise impacted by project activities. The Service anticipates that individual projects will impact 1 acre of occupied habitat or less, and a maximum of 20 acres of impacts to occupied habitat will occur overall for all projects during the five-year term of the PBO.

The Service anticipates and is exempting take incidental to the proposed action in the form of harm, injury, or death of no more than three juvenile or adult California tiger salamanders per site per year; no more than 15 juvenile or adult California tiger salamanders total for all sites for the 5-year duration of this PBO. Additionally, the service is exempting all take in the form of capture and relocation for the project footprint.

Accordingly, the Service concludes that the incidental take of California tiger salamanders will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. More than one (1) acre of occupied habitat is impacted at any given project site;
2. More than twenty (20) acres of habitat are impacted by all projects over the 5-year duration of the PBO;
3. Death or injury of more than three (3) juvenile or adult California tiger salamanders per site per year; or
4. Death or injury of more than fifteen (15) juveniles or adults total for all sites for the 5-year duration of the PBO.

Coastal California Gnatcatcher

The Service anticipates that incidental take of the coastal California gnatcatcher associated with FEMA's proposed action may occur from habitat removal. We anticipate take in the form of harm associated with habitat removal that may cause individuals to be displaced from their territories, or may cause injury or death of adults, chicks, and eggs. We expect that individual projects will not have impacts to more than 1 acre of occupied coastal California gnatcatcher habitat. Impacts from all projects covered under this consultation will be limited to a maximum of 20 acres of coastal California gnatcatcher occupied habitat.

The Service anticipates and is exempting take incidental to the proposed action in the form of harm, injury, or death of no more than one adult coastal California gnatcatcher or one nest containing coastal California gnatcatcher eggs or chicks for the 5-year duration of this PBO.

Accordingly, the Service concludes that the incidental take of coastal California gnatcatcher will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. More than one (1) acre of occupied habitat at any given project site is impacted;
2. More than twenty (20) acres occupied habitat are impacted by all projects during the 5-year duration of the PBO;
3. More than one (1) coastal California gnatcatcher adult is found dead or injured; or
4. More than one (1) coastal California gnatcatcher nest containing eggs or chicks is damaged or destroyed.

Conservancy Fairy Shrimp and Vernal Pool Fairy Shrimp

The Service anticipates that direct impacts to occupied basin/inundation features will be avoided; however, project activities in the watershed surrounding occupied features may cause take of conservancy fairy shrimp and/or vernal pool fairy shrimp through indirect effects. An indeterminable number of vernal pool fairy shrimp would be subject to take in the form of injury or mortality from the proposed activities. We cannot predict the exact number of vernal pool fairy shrimp that may be affected by the project activities because of fluctuations in population sizes between years and the species random distribution in the environment. Because of their small size, finding dead or injured vernal pool fairy shrimp is unlikely. The Service is providing a mechanism (number of basin/inundation features affected) to quantify when we will consider take to be exceeded as a result of the proposed project. We have determined that project activities within 250 feet of a basin/inundation area have the potential to have indirect effects that may result in take of Conservancy fairy shrimp and vernal pool fairy shrimp. With implementation of the conservation measures, take is not anticipated to occur from activities greater than 250 feet from occupied basin/inundation features.

Therefore, the Service anticipates that no more than 5 basin/inundation features would be affected by any individual project, and not more than 25 features would be affected over the 5-year term of the PBO. A basin/inundation feature will be considered affected if project activities occur within 250 feet of occupied habitat. Additionally, a basin/inundation feature may include a complex of small depressions or areas of inundation (e.g., tire ruts or other similarly-sized depressions) that would count as one feature for the purpose of quantifying incidental take. Accordingly, the Service concludes that the threshold for incidental take of conservancy fairy shrimp and/or vernal pool fairy shrimp will be considered exceeded under one or more of the following conditions. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. More than five (5) basin/inundation features are affected by any individual project; or
2. More than twenty-five (25) basin/inundation features are affected during the 5-year term of the PBO.

Least Bell's Vireo

The Service anticipates that incidental take of the least Bell's vireo associated with FEMA's proposed action may occur from habitat removal during the non-breeding season (affecting birds returning to impacted territories the following breeding season) or from project activities that occur during the breeding season that may displace adults and kill juveniles or eggs. We anticipate that any individual project would not exceed 1 acre of least Bell's vireo habitat disturbance, within which a maximum of two pairs of least Bell's vireos may be impacted by being displaced from their territory and be subject to non-lethal harm. Temporary impacts from all projects covered under this consultation will be limited to a maximum of 20 acres of least Bell's vireo occupied habitat, within which a maximum of 40 least Bell's vireo pairs that would be impacted.

The Service anticipates and is exempting take incidental to the proposed action in the form of non-lethal harm to a maximum of 40 least Bell's vireos within 20 acres of habitat; and harm in the form of injury or death of no more than two adult least Bell's vireos or one nest containing least Bell's vireo eggs or chicks for the 5-year duration of this PBO.

Accordingly, the Service concludes that the incidental take of least Bell's vireo will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. More than one (1) acre of occupied habitat at any given project site is impacted by any individual project;
2. More than twenty (20) acres of occupied habitat are impacted by all projects during the 5-year term of the PBO;
3. More than one (1) least bell's vireo adult is found dead or injured; or
4. More than one (1) least Bell's vireo nest containing eggs or chicks is damaged or destroyed.

Smith's Blue Butterfly

The Service anticipates that incidental take of Smith's blue butterflies will be difficult to detect because the Smith's blue butterfly has a small body size and finding dead or injured individuals is unlikely. While adults and larvae might occasionally be located through careful surveys by trained personnel, take of eggs and pupae would be nearly impossible to detect. We have further concluded that the use of habitat as a surrogate for the take of individual butterflies is appropriate because reliance on finding killed or injured individuals would likely underestimate the actual effects of the actions; i.e., the number of individual butterflies found dead or injured is going to be lower than what actually occurs. Since we cannot estimate the number of individual Smith's blue butterfly that will be incidentally taken for the reasons listed above, the Service is providing a mechanism (acres) to quantify when we will consider take to be exceeded as a result of the proposed project. Since we expect take to result from the proposed project's effects to habitat, the quantification of habitat becomes a direct surrogate for the species that will be taken.

Therefore, the Service anticipates that all Smith's blue butterflies within occupied habitat that would be impacted by project activities will be subject subject to incidental take in the form of harm, injury, or mortality. The Service anticipates and is exempting the take of not more than 1 acre of occupied habitat at any given project, and no more than 10 total acres of occupied habitat over the five-year term of the PBO.

Accordingly, the Service concludes that the incidental take of Smith's blue butterfly will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. More than one (1) acre of occupied habitat is impacted by project activities at any individual project site; or
2. More than ten (10) acres of occupied habitat are impacted by all projects over the five-year term of the PBO.

Southwestern Willow Flycatcher

The Service anticipates that incidental take of the southwestern willow flycatcher associated with FEMA's proposed action may occur from habitat removal during the non-breeding season (affecting birds returning to impacted territories the following breeding season) or from project activities that occur during the breeding season that may displace adults and kill juveniles or eggs. We anticipate that any individual project would not exceed 1 acre of southwestern willow flycatcher habitat disturbance, within which a maximum of two pairs of southwestern willow flycatcher could be impacted by being displaced from their territory and be subject to non-lethal harm. Due to the very low density of southwestern willow flycatchers within the action area, this is likely an overestimate of take that would occur. Temporary impacts from all projects covered under this consultation will be limited to a maximum of 20 acres of southwestern willow flycatcher habitat, within which we estimate that a maximum of 12 southwestern willow flycatcher pairs could be impacted through non-lethal harm over the 5-year duration of the PBO.

The Service anticipates and is exempting take incidental to the proposed action in the form of non-lethal harm to a maximum of 12 southwestern willow flycatchers within 20 acres of habitat; and harm in the form of injury or death of no more than one adult southwestern willow flycatcher or one nest containing southwestern willow flycatcher eggs or chicks for the 5-year duration of this PBO.

Accordingly, the Service concludes that the incidental take of southwestern willow flycatcher will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. More than one (1) acre of occupied habitat at any individual project site is impacted;
2. More than twenty (20) acres of occupied habitat are impacted by all projects covered during the fiver-year term of the PBO;
3. More than one (1) southwestern willow flycatcher adult is found dead or injured; or
4. More than one (1) southwestern willow flycatcher nest containing eggs or chicks is damaged or destroyed.

Tidewater Goby

The Service anticipates that take of the tidewater goby in the form of harm, injury, or mortality may occur as a result of implementing the proposed projects in and around tidewater goby habitat. Take will be difficult to detect due to the species cryptic coloring, life history, and ecology. The exact number of individuals taken will be difficult to quantify because tidewater goby population sizes fluctuate greatly seasonally and year-to-year, with the amount of occupied area varying with seasonal and stochastic events.

We anticipate that any individual project would not exceed 1 acre of tidewater goby occupied habitat. The Service is exempting take incidental to the proposed action in the form of harm

during capture and relocation or other project activities. We anticipate take in the form of death or injury of up to five percent of individuals captured and relocated at any individual project site. We do not anticipate that the proposed action will cause take of more than 5 percent of the estimated population at any individual occupied feature (i.e., estuary/lagoon).

Accordingly, the Service concludes that the incidental take of the tidewater goby will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. More than one (1) acre of occupied habitat at any individual project site is taken; or
2. Death or injury of more than five (5) percent of individuals captured and relocated at any individual project site.

Yellow-Billed Cuckoo

The Service anticipates that incidental take of the yellow-billed cuckoo associated with FEMA's proposed action may occur from habitat removal during the non-breeding season (affecting birds returning to impacted territories the following breeding season) or from project activities that occur during the breeding season that may displace adults and kill juveniles or eggs. We anticipate that any individual project would not exceed 1 acre of yellow-billed cuckoo habitat disturbance, within which a maximum of one pair of yellow-billed cuckoos may be impacted by being displaced from their territory and be subject to non-lethal harm. Due to the very low density of yellow-billed cuckoos within the action area, this is likely an overestimate of take that would occur. Temporary impacts from all projects covered under this consultation will be limited to a maximum of 20 acres of yellow-billed cuckoo occupied habitat, within which a maximum of 10 yellow-billed cuckoo pairs are estimated to be impacted.

The Service anticipates and is exempting take incidental to the proposed action in the form of non-lethal harm to a maximum of 10 yellow-billed cuckoos within 20 acres of habitat; and harm in the form of injury or death of no more than one adult yellow-billed cuckoos or one nest containing yellow-billed cuckoo eggs or chicks for the 5-year duration of this PBO.

Accordingly, the Service concludes that the incidental take of yellow-billed cuckoo will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. More than one (1) acre of occupied habitat is impacted at any individual project site;
2. More than twenty (20) acres of yellow-billed cuckoo occupied habitat are impacted by all projects during the five-year term of the PBO;
3. More than one (1) yellow-billed cuckoo adult is found dead or injured; or
4. More than one (1) yellow-billed cuckoo nest containing eggs or chicks is damaged or destroyed.

EFFECT OF THE TAKE

In the accompanying PBO, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURE

The measure described below is non-discretionary, and must be undertaken by FEMA or made a binding condition of any grant or permit issued to the (Subapplicant), as appropriate, for the exemption in section 7(o)(2) to apply. FEMA has a continuing duty to regulate the activity covered by this incidental take statement. If FEMA (1) fails to assume and implement the terms and conditions or (2) fails to require the Subapplicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, FEMA or the Subapplicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize the impacts of the incidental take of the 12 covered entities:

1. FEMA and their Subapplicants shall fully implement and adhere to all general and species-specific conservation measures, as described in the PBA and restated in the Conservation Measures section of this PBO. Additionally, FEMA and their Subapplicants will adhere to any landscape level plans developed by the VFWO for the species covered in this PBO.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the FEMA must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. FEMA shall require that all personnel and Subapplicants associated with this project are made aware of the general and species-specific conservation measures that are applicable to their individual project and are aware of their responsibility to implement these measures fully.

2. FEMA Region IX shall attend an annual coordination meeting with the Service by May 15 each year to discuss the annual monitoring report and any adaptive management measures needed to minimize impacts, including the addition or removal of any conservation measures or inclusion of any landscape level strategies developed by the VFWO.

REPORTING REQUIREMENTS

Pursuant to 50 CFR 402.14(i)(3), FEMA must report the progress of the action and its impact on the species to the Service as specified in this incidental take statement. FEMA shall submit an annual report to the Service by March 15 summarizing all projects completed during the previous calendar year. These annual reports shall include a tabular summary of those projects and for each project:

1. Subapplicant and project name;
2. Project location with map or GIS shape file;
3. Covered species impacted;
4. Estimated acres of covered species' habitat affected (acres, linear feet, etc.), as stated in the ESA Review Form;
5. Any other pertinent information that allows the Service to evaluate the causes and extent of habitat effects and any incidental taking that may have occurred that was not authorized in the Incidental Take Statement of this PBO.
6. The annual report will also include a summary of acres of habitat taken and individuals injured or killed from all previous years.
7. FEMA shall require that the Subapplicant to provide a copy of the project report to the Service and FEMA with the following project-specific details on its respective projects within 45 days of project construction completion:
    a. Date the project was initiated and completed;
    b. Number of observed instances of injury or mortality of any covered species;
    c. Number of observations of live, uninjured individuals of any covered species;
    d. Pertinent information concerning the success of the project in meeting the conservation measures; and
    e. An explanation of failure to meet such measures, if any.

DISPOSITION OF DEAD OR INJURED SPECIMENS

As part of this incidental take statement and pursuant to 50 CFR 402.14(i)(1)(v), upon locating any dead or injured species covered in this PBO, initial notification within 24 hours of its finding must be made by telephone and in writing to the VFWO (805-644-1766). If the encounter occurs

after normal working hours, FEMA or its Subapplicants shall contact the VFWO at the earliest possible opportunity the next working day. The report must include the date, time, location of the carcass, a photograph, cause of death or injury, if known, and any other pertinent information.

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the VFWO-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until the Service provides instructions regarding the disposition of the dead specimen.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. FEMA has included a meaningful Section 7(a)(1) component to this project and the Service recognizes FEMA's effort to design their program within the context of listed species conservation. The Service acknowledges the conservation measures in this PBO and comprehensive. Any additional information related to listed species helps Service biologists in their management. As such the Service recommends the following action:

- Sightings of any listed and sensitive species encountered during FEMA-funded activities should be reported to the CNDDB, California Department of Fish and Game.
- FEMA should work with the Service to implement proactive conservation measures for species of species concern such as the Monarch butterfly (*Danaus plexippus plexippus*).
- FEMA should continue to work with the VFWO to deliver conservation measures contained within this PBO through the Service's ECOS-IPaC platform.
- FEMA should continue to work with the service to develop additional 7(a)(1) actions to contribute towards trusted resources conservation.

The Service requests notification of the implementation of any conservation recommendations so we may be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered

in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) may have lapsed and any further take could be a violation of section 4(d) or 9. Consequently, we recommend that any operations causing such take cease pending reinitiation.

If you have any questions about this biological opinion, please contact Jenny Marek of my staff at (808) 677-3313, or by electronic mail at jenny_marek@fws.gov.

Sincerely,

/s/: Stephen P. Henry

Stephen P. Henry
Field Supervisor